

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
SE2101:Theory of Elasticity and Plasticity				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE	03 Hrs	
Course Outcomes (CO):				
Student will be able to:				
1.	Understand elastic behavior of materials.			
2.	Understand application of theory of elasticity in plane strain and plain stress conditions, bending, and torsion.			
3.	Understand principal stresses in materials.			
4.	Understand application of theory of plasticity in practical applications in analysis and design of structures.			
Course Contents				
Unit 1	Stress & Strain at a point, static indeterminacy of problem of 3-D elasticity, Stress equilibrium equations in rectangular, cylindrical & spherical coordinates, Generalized Hooke's Law, rectangular, cylindrical and spherical coordinates, Generalized Hooke's Law, Strain compatibility equations, Stress compatibility equations.	CO	Hours	
Unit 2	Applications of theory of elasticity: Plane stress and plane strain problem in 2 D elasticity, Airy's stress function & its applications to beam bending problems.	CO1	(06)	
Unit 3	Principal Stresses and strains in 3-D, stress & strain invariants, numerical problems.	CO2	(06)	
Unit 4	Torsion: Shafts of circular and non-circular prismatic sections, Venant theory, warping function approach, stress function approach.	CO3	(06)	
Unit 5	Plasticity: hydrostatic stresses, deviatoric stresses, invariants of deviatoric stresses, various failure theories, various empirical stress –strain relationships, theories of plastic flow, yield, criteria, von Mises, Tresca yield criteria, strain hardening.	CO3	(06)	
Unit 6	Applications of plasticity. Elastic perfectly plastic materials, plane stress- plane strain problems in plasticity, an application to thick cylinders, thick spheres.	CO4	(06)	
Tutorials				
A set of Tutorial per unit is to be submitted				
Text Books				
1.	Theory of Elasticity–S. Timoshenko& J. N. Goodie, McGraw Hill, Singapore. Third Edition 1970, New York			
2.	Theory of Elasticity: Filonenko, Borodich, Foreign Language Publication House, 1965, USA.			
3.	Theory of Elasticity: Sadhu Sing, Khanna Publishers, Delhi, 2012			
Reference Books				
1.	Structural Mechanics with Introductions to Elasticity and Plasticity–By Venkatraman, Sharad A. Patel, McGraw-Hill Book Company, New York. 1970			
2.	Solid Mechanic - S. M. A. Kazimi, Tata McGraw Hill, New Delhi			
3.	Theory of Plasticity – Chakraborty J., Tata McGraw Hill Publishing Company Limited			
4.	Theory of Plasticity – R. Hill, Vannastrod, USA			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	2	3	3
CO 2	3	1	2	-	2	3
CO 3	2	3	3	3	2	2
CO 4	2	2	3	2	2	2

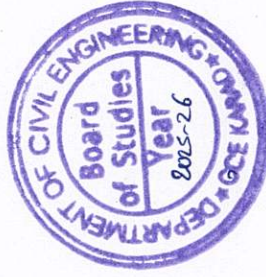
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- I) Civil -Structural Engineering				
SE2102 : Mechanics of Structure				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
Course Outcomes (CO):		Duration of ESE 3Hrs		
Student will be able to:				
1. Understand moving load analysis.				
2. Learn analysis of curved members.				
3. Different types of beams on elastic foundation.				
4. Displacement methods of analysis.				
Course Contents				
Unit 1	Influence Line Diagrams for Indeterminate Structures: Continuous beams, portal frames & two hinged arches. Muller-Breslau's Principle & Moment distribution method	CO ₁		Hours (06)
Unit 2	Beams Curved in Plan: Determinate & Indeterminate beams curved in plan.	CO2		(05)
Unit 3	Beams on Elastic Foundations: Analysis of infinite, semi-infinite & finite beams	CO3		(06)
Unit 4	Beam columns: Concept of geometric & material nonlinearity. Governing differential equation, Analysis of beam-columns subjected to different loadings and support conditions. Stiffness and carry-over factors for beam-columns, fixed end actions due to various loads.	CO3		(06)
Unit 5	Stiffness method of structural analysis, flexibility and stiffness matrices, Analysis of continuous beams, trusses and plane frames by Structure oriented stiffness approach.	CO4		(08)
Unit 6	Member Oriented Stiffness Method: Stiffness matrices of beam, truss, plane frame grid, pin & rigid jointed space frame elements on member axes. Transformation of matrices on Structure axes. Over- all joint stiffness matrix and nodal load vector, assembly rules. Calculation of member end forces, Bandwidth.	CO4		(06)
Text Books				
1. Basic structural Analysis by C. S. Reddy, Tata McGraw Hill, Delhi				
2. Matrix Analysis of Framed Structures by Gere & Weaver, CBS Publishing, Delhi.				
Reference Books				
1. Theory of Elastic Stability by Timoshenko & Gere, East West Press Ltd.				
2. Mechanics of Structures Vol. LII & III by Junnarkar & Shah, Charter Publishing House, Delhi				
3. Advanced Theory of Structures by Vaziram & Ratwani, Khanna Publisher, and Delhi.				
4. Analysis of Structures Vol.11, by Vazirani&Ratwani, Khanna Publisher, Delhi.				
5. Structural Analysis by Negi and Jangid, Tata McGraw Hill, Delhi				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	3	2	2	3
CO 2	3	3	3	2	2	3
CO 3	2	3	3	-	2	3
CO 4	3	3	2	3	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

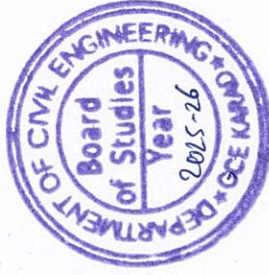
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering			
SE2113:- Elective –I Advanced Design of Concrete Structure			
Teaching Scheme		Examination Scheme	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE 03Hrs	
Course Outcomes (CO):			
Student will be able to:			
1	Understand analysis and design of various types of slabs as per situation and loading conditions.		
2	Understand analysis and design of different types of footings as per superstructure and substructure (soil conditions).		
3	Understand analysis and design of different types of water tanks as per situation and loading Combinations.		
4	Understand analysis and design of different structures using method of prestressing, study concept of prestressing, its methods and behavior under loading.		
Course Contents			
Unit 1	Analysis and design of flat slab, grid slab, circular slab.	CO1	(07)
Unit 2	Analysis and design of combined footing & raft foundation	CO2	(06)
Unit 3	Analysis and design of overhead water tank – Rectangular & circular with flat bottom Design of staging for wind & seismic loads	CO3	(06)
Unit 4	Mechanics of pre-stressed concrete, stress concept, strength concept & load balancing concept, high strength material, systems of prestressing, losses of prestress.	CO4	(06)
Unit 5	Design of Prestressed Concrete, beams, box, T& I Sections, Shear, Deflection, Design of End Block, IS code method.	CO4	(06)
Unit 6	Analysis & design of continuous beams, partial prestressing, circular prestressing – pipes.	CO4	(05)
Text Books			
1	Reinforced concrete, Limit state design by Ashok K. Jain, New Chand & bros. Roorkee.		
2	Advanced Reinforced Concrete design by P.C. Vargese – Prentice Hall of India, Delhi.		
3	Advanced Reinforced Concrete design by N. Krishnaraju – CBS Publishers & Distributors, Delhi.		
4	Prestressed Concrete by S. Ramamurtham, DhanpatRai & Sons.		
5	Prestressed Concrete by N. Krishnaraju		
6	Prestressed Concrete by T. Y. Lin.		
Useful Links			
1.	npTEL.iitk.ac.in/		
2.	www.myeducationkey.com/		
3.	www.wikipedia.Newton.com/		



(Signature)

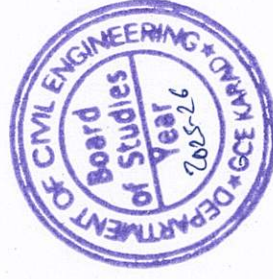
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	3	3	3
CO 2	3	-	2	3	2	2
CO 3	2	3	2	3	2	2
CO 4	3	2	2	3	2	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
SE2123: Elective-I Advances in Concrete Composites				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE		
		03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1. Understand weakness of plain concrete, and understand the latest development in trend in concrete composites.				
2. Understand advanced applications of composite materials.				
3. Manufacturing and properties of concrete composites.				
4. Understand manufacturing and properties of polymer concrete.				
Course Contents				
Unit 1	Fiber reinforced composites: Introduction to Fiber Reinforced Concrete, types of fibers, properties of fibers. Properties of constituent materials. Mix proportion, fixing, casting.	COs	Hours	(06)
Unit 2	Properties of freshly mixed reinforced concrete (fiber concrete), workability tests, mechanical properties, Mechanics and mechanism of Fiber Reinforced Concrete.	CO2		(06)
Unit 3	Testing of fiber reinforced under compression, flexure, and shear and bending. Various toughness indices. Stress-strain behavior. Design aspects of reinforced concrete structures with fibers.	CO2		(06)
Unit 4	Ferro cement - Introduction, materials used mechanical properties, construction techniques, design in direct tension, and applications merits as structural materials.	CO3		(06)
Unit 5	Silica Fume Concrete - Introduction, physical and chemical properties of silica physical and chemical properties of silica fume concrete in fresh state, mechanical properties and durability of silica concrete.	CO3		(06)
Unit 6	Polymer Concrete: Introduction, Classification, properties of constituent materials, polymer impregnated concrete, polymer concrete, application.	CO4		(06)
Text Books				
1. Concrete Technology & Design by R N. Swamy, Surrey University Press.				
2. Special Structural Concretes by Rafal Siddique, Galgotia pub. Pvt.ltd.				
3. Fiber Reinforced Cement Composites by P. N. Balaguru, S. P. Shah, Mc-Graw hill.				
Reference Books				
1. Fiber Cement and Fiber Concrete by D.J Hannant, John Wiley and Sons.				
2. Fracture Mechanics and Structural Concrete by Bhusan L. Karihal.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				



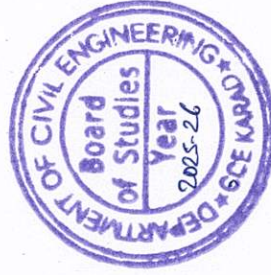

CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	2	3
CO 2	3	3	2	3	3	3
CO 3	2	3	3	2	2	2
CO 4	2	3	2	2	3	2

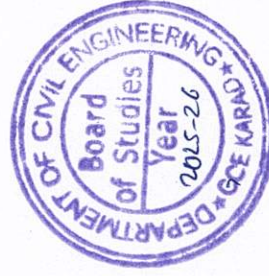
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
SE2133: Elective-I Design of Pre- Stressed Concrete Structures				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1.	Understand the basic aspects of prestressed concretefundamentals, including pre and post-tensioning processes and find out losses in the prestressed concrete.			
2.	Analyze prestressed concrete deck slab and beam/ girders.			
3.	Design prestressed concrete deck slab and beam/ girders.			
4.	Design of end blocks for prestressed members.			
Course Contents				
Unit 1	Introduction to prestressed concrete: types of prestressing, systems and devices, materials, losses in prestress. Analysis of PSC flexural members: basic concepts, stresses at transfer and service loads, ultimate strength in flexure, code provisions.	CO1		(06)
Unit 2	Statically determinate PSC beams: design for ultimate and serviceability limit states for flexure, analysis and design for shear and torsion, code provisions.	CO1		(06)
Unit 3	Transmission of prestressing pretensioned members; Anchorage zone stresses for posttensioned members.	CO2		(06)
Unit 4	Statically indeterminate structures - Analysis and design - continuous beams and frames, choice of cable profile, linear transformation and concordancy.	CO2		(06)
Unit 5	Composite construction with precast PSC beams and cast in-situ RC slab -Analysis and design, creep and shrinkage effects. Partial prestressing - principles, analysis and design concepts, crack width calculations	CO3		(06)
Unit 6	Analysis and design of prestressed concrete pipes, columns with moments.	CO4		(06)
Text Books				
1.	Design of Prestressed Concrete Structures, Lin T.Y., Asia Publishing House, 1955.			
2.	Prestressed Concrete, Krishnaraju N., Tata McGraw Hill, New Delhi, 1981.			
3.	Limited State Design of Prestressed Concrete, Guyana Y., Applied Science Publishers, 1972.			
4.	IS: 1343- Code of Practice for Prestressed Concrete			
5.	IRC: 112			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			
3.	www.wikipedia.Newton.com/			



(Signature)

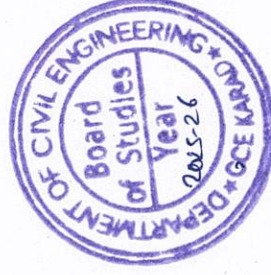
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and Pos

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	3	2	2	2
CO 2	2	3	3	2	3	2
CO 3	3	3	3	2	3	3
CO 4	2	3	3	3	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

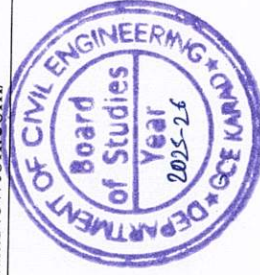
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
SE2114: Elective –II Structural Dynamics				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorial	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
Post Graduate will be able to				
1. Understand the behavior of structure under dynamic loading.				
2. Model the structure mathematically.				
3. Understand the physics of the problem.				
4. Understand the design of earthquake resistant structures.				
Course Contents				
Unit 1	Introduction: Objectives, Importance of Vibration Analysis, Nature of Exciting Forces, Mathematical Modeling of Dynamic Systems.	COs	CO1	Hours
Unit 2	Single Degree of Freedom System: Free and Forced Vibration with and without Damping, Resonance Harmonic Loading, Response to General Dynamic Loading using Duhamel's Integral, Fourier, Analysis for Periodic Loading, State Space Solution for Response.	CO2		(06)
Unit 3	Numerical Solution to Response using New mark Method and Wilson Method, Numerical Solution for State Space Response using Direct Integration.	CO2		(06)
Unit 4	Multiple Degree of Freedom System (Lumped parameter): Two Degree of Freedom System, Multiple Degree of Freedom System, Inverse Iteration Method for Determination of Natural Frequencies and Mode Shapes, Dynamic Response by Modal Superposition Method, Direct Integration of Equation of Motion.	CO3		(06)
Unit 5	Multiple Degree of Freedom System (Distributed Mass and Load): Single Span Beams, Free And Forced Vibration, Generalized Single Degree of Freedom System.	CO3		(06)
Unit 6	Special Topics in Structural Dynamics (Concepts only): Dynamic Effects of Wind Loading, Moving Loads, Vibrations caused by Traffic, Blasting and Pile Driving, Foundations for Industrial Machinery, Base Isolation.	CO4		(06)
Text Books				
1. Dynamics of structures - R.W. Clough and J. Penzine, McGraw-Hill Publication				
2. Structural Dynamics – Roy Craig, John-Wiley & Sons				
3. Dynamics of Structures – Theory & Application to Earthquake Engineering-A.K. Chopra, Prentice Hall Publications.				
4. Dynamics of Structures – Mukhopadhyay				
5. Structural Dynamics – Mario Paz 6. Elements of Earthquake Engineering by Jaikrishna, A.R. Chandrashekharan, Brijesh Chandra, Standard Publishers Distributors				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				



(Signature)

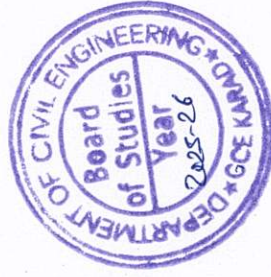
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	3	2	2
CO 2	2	3	2	2	3	2
CO 3	3	3	3	3	3	3
CO 4	2	3	3	3	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

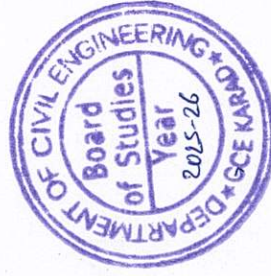
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. (Sem- I) Civil -Structural Engineering			
SE2124: Elective-II Analytical and Numerical methods for Structural Engineering			
Teaching Scheme		Examination Scheme	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
Course Outcomes (CO):		Duration of ESE 03 Hrs	
Student will be able to:			
Post Graduate will be able to			
1.	Solve ordinary and partial differential equations in structural mechanics using numerical methods.		
2.	Write a program to solve a mathematical problem.		
3.	Interpretation of numerical differentiation & Integration		
4.	Solve Numerical Solutions for Different Structural Problems using Computer Algorithms		
Course Contents			
Unit 1	Error Analysis, Polynomial Approximations and Interpolations, Curve Fitting; Interpolation and extrapolation.	COs	Hours
		CO1	(06)
Unit 2	Solution of Nonlinear Algebraic and Transcendental Equations.	CO2	(06)
Unit 3	Elements of Matrix Algebra: Solution of Systems of Linear Equations, Eigen Value Problems.	CO2	(06)
Unit 4	Numerical Differentiation & Integration: Solution of Ordinary and Partial Differential	CO3	(06)
Unit 5	Finite Difference scheme: Implicit & Explicit scheme.	CO3	(06)
Unit 6	Computer Algorithms: Numerical Solutions for Different Structural Problems, Fuzzy Logic and Neural Network.	CO4	(06)
Text Books and Reference Books			
1.	An Introduction to Numerical Analysis, Atkinson K. E, J. Wiley and Sons, 1989.		
2.	Theory and Problems of Numerical Analysis, Scheid F, McGraw Hill Book Company, (Shaum Series), 1988.		
3.	Introductory Methods of Numerical Analysis, Sastry S. S, Prentice Hall of India, 1998.		
Useful Links			
1.	nptel.iitk.ac.in/		
2.	www.myeducationkey.com/		
3.	www.wikipedia.Newton.com/		



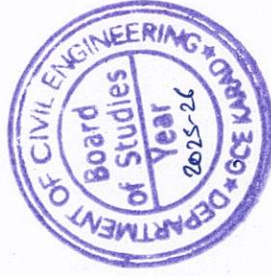

CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	3	3	3
CO 2	3	3	3	2	2	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	2	2	2

Assessment Pattern (with revised Bloom's Taxonomy)

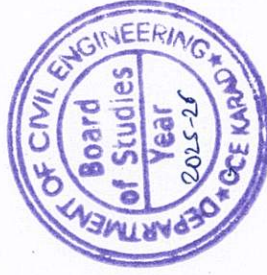
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
SE2134: Elective-II Stability of Structures				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
Course Outcomes (CO):		Duration of ESE 03 Hrs		
Student will be able to:				
1.	Understand the difference between stability and instability.			
2.	Evaluate the structural stability of columns, frames.			
Course Contents				
Unit 1	Introduction- concept of stability, static dynamic and energy criterion of stability. Flexibility and stiffness criteria. Snap through & post buckling behavior	COs	CO1	Hours (05)
Unit 2	Stability of columns Critical load for standard boundary conditions, elastically restrained perfect column, effect of transverse shear in buckling, column with geometric imperfections, eccentrically loaded columns, orthogonality of buckling modes, large deformation theory for columns	CO1		(07)
Unit 3	Stability of continuous beams and frames Moment distribution and stiffness method for stability analysis of continuous beams and frames	CO1		(06)
Unit 4	Lateral buckling of beam Differential equations for lateral buckling, lateral buckling of beam in pure bending, lateral buckling of beam subjected to concentrated and uniformly distributed force	CO2		(06)
Unit 5	Inelastic stability of columns Inelastic buckling, double modulus theory, tangent modulus theory, Shanley's theory of inelastic buckling, eccentrically loaded inelastic column	CO2		(06)
Unit 6	Dynamic stability of structure Discrete system, Lagrange-Hamilton formulation for continuous system, stability of continuous system, general method for conservative and non-conservative system	CO2		(06)
Text Books and Reference Books				
1.	Stability theory of structures- Ashwini Kumar, Tata McGraw-Hill New Delhi			
2.	Principle of structural stability theory- Alexander Chajes, Prentice-hall, Inc., Englewood cliffs, New Jersey			
3.	Theory of elastic stability, Timoshenko and Gere, McGraw-Hill, international			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			
3.	www.wikipedia.Newton.com/			



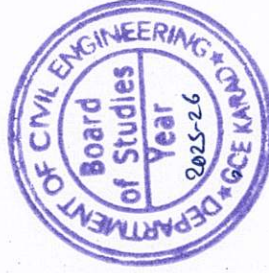

CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	3	3
CO 2	2	3	3	2	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	6
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad	
First Year (Sem – I) M. Tech. AI (CM/SE/HPE/DE/PE/EPS/CSE)	
RM2105: Research Methodology	

Teaching Scheme		Examination Scheme
Lectures	02 Hrs./week	MSE
Tutorials	--	ISE
Total Credits	02	ESE
Course Outcomes (CO):		Duration of ESE
The student will be able to:		02 Hrs 30 Min

1. Understand basic concepts of various research areas, identify and define appropriate research topics concerned to Engineering and related areas.
2. Prepare a research proposal to investigate the problem and achieve results/outcomes from the project.
3. Develop skill of writing/publishing a research paper/topic in conferences and reputed journals.
4. Illustrate need of information about Intellectual Property Right, Patent rights.

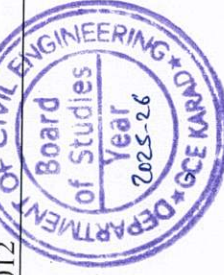
Course Contents		COs	Hours
Unit 1	Introduction: Meaning and objectives of research, Types of research, Research approaches, Research process, Research problem, Selection of research problem, defining research problem, Literature review, Meta-analysis, Effect sizes, Integrating research findings, identification of Research gaps, Errors in research.	CO1	(04)
Unit 2	Data Collection and Analysis: Primary data collection through observations and interviews, Questionnaire surveys, Secondary data collection, Data processing, Measures of central tendency and dispersion, mean, median, mode, range, variance, standard deviation, inter-quartile range, histogram.	CO1	(04)
Unit 3	Research Design: Meaning, need, and features of good design, Dependent, independent, and extraneous variables, Experimental and control groups, Treatments, Experiment, Research designs in exploratory studies, Research designs in descriptive studies, Experimental research designs Sampling: Need for sampling, Population, Normal distribution, Steps in sampling, sample size, errors in sampling, measurement techniques.	CO2	(05)
Unit 4	Hypothesis Testing: Null and alternative hypothesis, Level of significance, Type I and type II error, Two-tailed and one-tailed tests, Procedure of hypothesis testing, Preparation of ANOVA Table and calculation of F-ratio.	CO3	(05)
Unit 5	Effective Technical Writing: Research proposal, Technical Paper writing, Review paper, Report writing, Referencing Research and publication Ethics: Plagiarism, Citation, Journal indexing, Open access publishing, SCI journals, research ethics, principals and practice.	CO3	(05)
Unit 6	IPR Patent Rights: Patents, Trade and Copyright, Process of patenting, Licensing and transfer of technology, Geographical indications. New developments in IPR	CO4	(05)

Text Books

1. C.R. Kothari, "Research Methodology Methods and Techniques, Second revised edition, New Age International Publisher, 2006 (Units 1 to 4)
2. Montgomery, Douglas C. & Runger, George C. "Applied Statistics & Probability", 2007 (Unit 2 & 3)
3. S. K. Yadav, "Research and Publication Ethics", 1st edition, Springer publication, 2024 (Unit 5, 6)
4. Paneer Selvam – Research Methodology

Reference Books

1. Ranjit Kumar, (2006), "Research Methodology- A Step-By-Step Guide for Beginners", Pearson Education, Delhi
2. Trochim, William M.K., "Research Methods", Biztantra, Dream tech Press, New Delhi, 2nd Edition, 2003
3. Kalyan. C. Kanakala, "Fundamentals of Intellectual Property", Asia Law House, ISBN: 9789381849514, 1st edition, 2012




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

4. Krishnaswamy, K. N., Sivakumar, Appa Iyer and Mathi Rajan, M. "Management Research Methodology: Integration of Principles, Methods and Techniques", Pearson Education, New Delhi, 2006
5. Donald R. Cooper, Pamela S. Schindler, "Business Research Methods", Tata McGraw-Hill Co. Ltd., 8th Edition, 2006

Useful Links

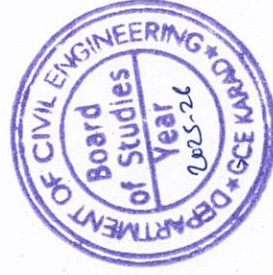
1. <https://www.explorale.com/research-methodology>
2. <http://www.socscidiss.bham.ac.uk/methodologies.html>
3. <http://www.humanities.manchester.ac.uk/studyskills/methodology.html>
4. <http://www.palgrave.com/choosing-appropriate-research-methodologies>

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	2	3
CO 2	2	2	2	2	3	3
CO 3	2	3	3	2	3	2
CO 4	3	3	3	2	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	5	4	10
Apply	5	4	10
Analyse	5	4	10
Evaluate	-	4	10
Create	-	-	10
TOTAL	20	20	60




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

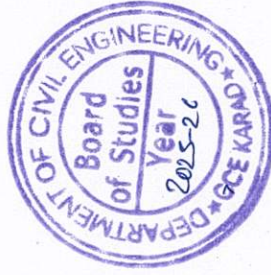
Government College of Engineering, Karad					
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering					
SE 2106: Structural Design Lab I					
Teaching Scheme		Examination Scheme			
Lectures	04Hrs/week		ISE	25	
Total Credits	02		ESE	25	
			TOTAL	50	
Course Outcomes (CO):					
Student will be able to understand:					
1.	Understand the behavior of structure under dynamic loading.				
2.	Model the structure mathematically, or with use of software analyse and design.				
3.	Learn and apply principles of design & investigate the performance of structural elements.				
4.	Evaluate the different testing methods and equipment.				
		Course Contents		COs	Hours
1.	Static and Dynamic analysis and design of Multistorey residential building structures using software (ETABS / STAADPRO OR any available software)		CO1,	(16)	
2.	Programming for analysis & Design of Structures.		2 CO3, 4	(32)	
List of Submission					
1.	Minimum two projects analyzed by software.				
2.	Minimum one sample calculation of design of components of structures in Software/programming in advance excel.				
3.	Preparation of detailed structural drawings in AutoCad.				
Useful Links					
1.	nptel.iitk.ac.in/				
2.	www.myeducationkey.com/				
3.	www.wikipedia.com/				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	2	3	2	2	3	2
CO 3	3	2	2	2	3	3
CO 4	3	2	2	2	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	3	3
Understand	3	3
Apply	2	2
Analyse	1	1
Evaluate	1	1
Create	5	5
TOTAL	25	25



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering			
SE2107: Laboratory 2 (Based on Elective I & II)			
Teaching Scheme		Examination Scheme	
Lectures	04Hrs/week	ISE	50
Total Credits	02	TOTAL	50
Course Outcomes (CO):			
Student will be able to understand:			
1.	Understand the behavior of structure under dynamic loading.		
2.	Model the structure mathematically, or with use of software analyse and design.		
3.	Learn and apply principles of design & investigate the performance of structural elements.		
4.	Evaluate the different testing methods and equipment.		
Course Contents			
Unit 1	Static and Dynamic analysis and design of commercial/industrial building structure by using prestressed/flat slab concept with modern tool.	COs	Hours
		CO1	(16)
Unit 2	Experiments on vibration of multi storey frame models for Natural frequency and modes.	2, CO3	(32)
List of Submmision			
1.	Minimum one projects analysed by software.		
2.	Total number of Experiments- Minimum 2 /course as given by course teacher depending on course content.		
Useful Links			
1.	nptel.iitk.ac.in/		
2.	www.myeducationkey.com/		
3.	www.wikipedia.com/		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	3
CO 2	3	3	3	2	3	3
CO 3	3	2	3	2	3	2
CO 4	2	2	3	3	2	2



Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	7	7
Understand	3	3
Apply	3	3
Analyse	3	3
Evaluate	2	2
Create	7	7
TOTAL	25	25

(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
OE2118: Open Elective- Business Analytics				
Teaching Scheme		Audit course		
Lectures	03Hrs/week	MSE	20	
Tutorials	-	ISE	20	
Total Credits	03	ESE	60	
		TOTAL	100	
Course Outcomes (CO):				
Student will be able to understand:				
1. Students will demonstrate knowledge of data analytics.				
2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.				
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.				
4. Students will demonstrate the ability to translate data into clear, actionable insights				
Course Contents				
Unit 1	Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.	COs	Hours	
		CO1	(07)	
Unit 2	Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology	CO2	(06)	
Unit 3	Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.	CO2	(07)	
Unit 4	Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with aLinear Trend, Forecasting Time Series with Seasonality, Regression Model Curriculum of Engineering & Technology PG Courses [Volume -II] [29] Forecasting with Casual Variables, Selecting Appropriate Forecasting Models, Monte Carlo Simulation and Risk Analysis: Monte CarloSimulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.	CO3	(09)	
Unit 5	Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.	CO3	(07)	
Unit 6	Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.	CO4	(04)	
Reference Books				
1.	Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press			



CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

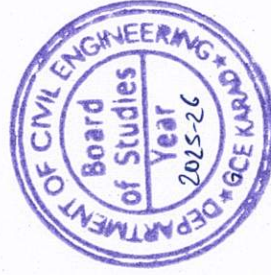
2.	Business Analytics by James Evans, persons Education.
Useful Links	
1.	nptel.iitk.ac.in/
2.	www.myeducationkey.com/
3.	www.wikipedia.Newton.com/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	2	2	3
CO 2	3	3	3	2	3	2
CO 3	2	2	1	3	1	3
CO 4	2	2	3	1	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad

F. Y. M. Tech. (Sem-I) Civil -Structural Engineering

OE2128: Open Elective - Industrial Safety

Teaching Scheme		Audit course
Lectures	03Hrs/week	MSE
Tutorials	-	ISE
Total Credits	03	ESE
		TOTAL
		100

Course Outcomes (CO):

Student will be able to understand:

1. Discuss about the importance of safety management in construction.
2. Adapt safety culture safety assurance in construction project.
3. Recommend various safety activities for different construction work.
4. Describe various safety standards and acts.

Course Contents

Unit	COs	Hours
Unit 1	CO1	(07)
Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.		
Unit 2	CO1	(07)
Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.		
Unit 3	CO2	(07)
Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.		
Unit 4	CO3	(07)
Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.		
Unit 5	CO4	(07)
Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance		

Text Books

1. I. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.

Useful Links

1. nptel.iitk.ac.in/
2. www.myeducationkey.com/
3. www.wikipedia.Newton.com/



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	2	3	3
CO 2	2	3	3	2	3	2
CO 3	2	3	2	3	2	3
CO 4	3	2	3	3	2	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
OE2138: Open Elective : Operations Research				
Teaching Scheme		Audit course		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		TOTAL		100
Course Outcomes (CO):				
Student will be able to understand:				
1. Apply the dynamic programming to solve problems of discrete and continuous variables.				
2. Apply the concept of non-linear programming.				
3. Carry out sensitivity analysis.				
4. Model the realworld problem and simulate it.				
Course Contents				
Unit 1	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	CO1	COs	Hours (07)
Unit 2	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	CO2		(07)
Unit 3	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT	CO2		(07)
Unit 4	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	CO3		(08)
Unit 5	Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation	CO4		(07)
Text Books				
1	H.A. Taha, Operations Research, An Introduction, PHI, 2008			
2	H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.			
3	J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi, 2008			
4	Hitler Libermann Operations Research: McGraw Hill Pub. 2009			
5	Pannarselvam, Operations Research: Prentice Hall of India 2010			
6	Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			
3.	www.wikipedia.Newton.com/			



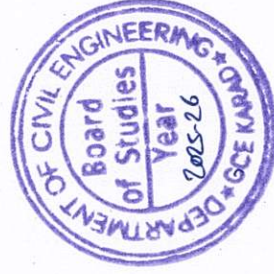

CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	3
CO 2	3	3	3	2	2	2
CO 3	2	3	2	3	3	3
CO 4	3	2	3	3	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

F. Y. M. Tech. (Sem-I) Civil-Structural Engineering

PLAYERS' UNION: ALGERIA

Learning Scheme		Audit course
Lectures	03Hrs/week	
Tutorials	-	MSE 20
Total Credits	03	ISE 20
		ESE 60
		TOTAL 100

Course Outcomes (CO):

Student will be able to understand:

1. Property of various composite materials.
2. Manufacturing process of metal and polymer matrix composites.
3. Laminate strength and its failure criteria.
4. Compare various composite material with different failure criterion.

Course Contents

Course Contents		COs	Hours
Unit 1	Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.	CO1	(06)
Unit 2	REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.	CO1	(06)
Unit 3	Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving, Properties and applications.	CO2	(06)
Unit 4	Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepress – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications	CO3	(06)
Unit 5	Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure.	CO4	(06)
Unit 6	Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.	CO4	(06)

Text Books

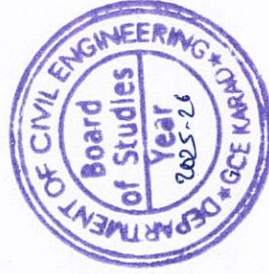
- 1.** Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany. 2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

Reference Books

1. Hand Book of Composite Materials-ed-Lubin. 2. Composite Materials – K.K.Chawla. 3. Composite Materials Science and Applications – Deborah D.L. Chung. 4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tsai.

Useful Links

- | | |
|----|--|
| 1. | nptel.iitk.ac.in/ |
| 2. | www.myeducationkey.com/ |
| 3. | www.wikipedia.Newton.com/ |



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	3	1
CO 2	2	3	3	1	2	2
CO 3	2	3	2	3	3	1
CO 4	2	3	3	1	1	2

Assessment Pattern (with revised Bloom's Taxonomy)

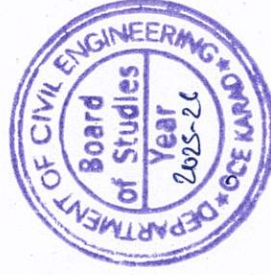
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
OE 2168: Open Elective: Waste to Energy				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE	20	
Tutorials	-	ISE	20	
Total Credits	03	ESE	60	
Course Outcomes (CO):		Duration of ESE	02.30hrs	
Students will able to:				
1.	Understand the knowledge about the operations of Waste to Energy Plants			
2.	Carry out Techno-economic feasibility for Waste to Energy Plants			
3.	Analyze the various aspects of Waste to Energy Management Systems.			
4.	Apply the knowledge in planning and operations of Waste to Energy plants			
Course Contents				
Unit 1	Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors		CO1	Hours (07)
Unit 2	Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.		CO1, CO2	(06)
Unit 3	Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.		CO1, CO2	(07)
Unit 4	Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.		CO3, CO4	(06)
Unit 5	Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification		CO3, CO4	(07)
Unit 6	Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.		CO3, CO4	(08)
Text Books				
1.	Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990			
2.	Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.			
3.	Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.			
Reference Books				
1.	Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.			
Useful Links				
1.	MOOCS/ Swayam Courses on Waste to Energy			



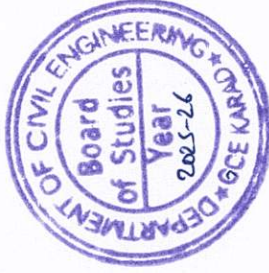

CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	2	-	-	1	-
CO 2	2	1	-	2	2	-
CO 3	1	2	-	-	1	-
CO 4	2	1	-	2	2	-

Assessment Pattern: (with revised Bloom's Taxonomy)

	Knowledge Level	MSE	ISE	ESE
Remember		5	4	15
Understand		5	4	15
Apply		5	4	12
Analyse		3	4	9
Evaluate		2	4	9
Create		-	-	-
Total		20	20	60



u

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. (Sem-I) Civil-Structural Engineering			
AU2119:Research Paper Writing			
Teaching Scheme			
Lectures	02Hrs/week	Audit Course	
Credit	-		
Course Outcomes (CO):			
Students will be able to:			
1.	Understand that how to improve your writing skills and level of readability		
2.	Learn about what to write in each section		
3.	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission		
Course Contents			
Unit I	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	CO1	Hours (04)
Unit II	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts.	CO1	(04)
Unit III	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	CO2	(04)
Unit IV	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	CO2	(04)
Unit V	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the conclusions	CO3	(04)
Unit VI	Useful phrases, how to ensure paper is as good as it could possibly be the first-time submissions	CO4	(04)
Text Books and Reference Books			
1.	Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)		
2.	Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press		
3.	Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.		
4.	Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011		
Useful Links			
1.	nptel.iitk.ac.in/		
2.	www.myeducationkey.com/		
3.	www.wikipedia.com/		

Mapping of COs and POs

PO →	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	3	2	1
CO 2	2	1	2	3	3	2
CO 3	2	3	3	3	3	2



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

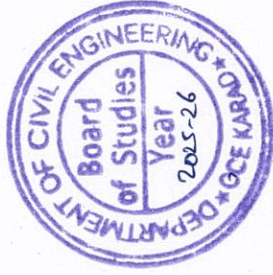
Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil-Structural Engineering				
AU2129: DISASTER MANAGEMENT				
Teaching Scheme		Audit course		
Lectures	02Hrs/week			
Tutorials	-			
Total Credits	-			
Course Outcomes (CO):				
Student will be able to understand:				
1. Apply the dynamic programming to solve problems of discrete and continuous variables.				
2. Apply the concept of non-linear programming.				
3. Carry out sensitivity analysis.				
4. Model the real world problem and simulate it.				
Course Contents				
Unit 1	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	CO1	CO1	Hours (04)
Unit 2	Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	CO1	CO1	Hours (04)
Unit 3	Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	CO2	CO2	Hours (04)
Unit 4	Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	CO2	CO2	Hours (04)
Unit 5	Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	CO3	CO3	Hours (04)
Unit 6	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	CO4	CO4	Hours (04)
Text Books				
1	R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.			
2	Sahni, PardeepEt.Al. (Eds.), " Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.			
3	Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			
3.	www.wikipedia.Newton.com/			




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	3
CO 2	3	3	3	3	2	3
CO 3	2	3	3	2	2	3
CO 4	2	3	3	2	3	2

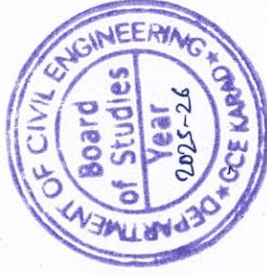


CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-I) Civil -Structural Engineering				
AU2139: Sanskrit for Technical Knowledge				
Teaching Scheme		Audit course		
Lectures	02Hrs/week			
Credit	-			
Course Outcomes (CO):				
Students will be able to:				
1. Understanding basic Sanskrit language.				
2. Ancient Sanskrit literature about science & technology can be understood.				
3. Being a logical language will help to develop logic in students.				
Course Contents				
Unit I	- Alphabets in Sanskrit, - Past/Present/Future Tense, - Simple Sentences			COs Hours CO1 (08)
Unit II	- Order - Introduction of roots - Technical information about Sanskrit Literature			CO2 (08)
Unit III	Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics			CO3 (08)
Text Books and Reference Books				
1.	Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi			
2.	“Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication			
3.	“India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.			
Useful Links				
1.	www.wikipedia.com/			

Mapping of COs and POs

PO →	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO ↓						
CO 1	1	2	3	2	3	2
CO 2	2	2	3	3	3	2
CO 3	3	2	2	2	2	2




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Government College of Engineering, Karad					
F. Y. M. Tech. (Sem- I) Civil -Structural Engineering					
AU2149: VALUE EDUCATION					
Teaching Scheme		Audit course			
Lectures	02Hrs/week				
Tutorials	-				
Total Credits	-				
Course Outcomes (CO):					
Student will be able to:					
1.	Understand value of education and self- development.				
2.	Imbibe good values in students.				
3.	Know about the importance of character.				
Course Contents					
Unit 1	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements			COS	Hours
				CO1	(04)
Unit 2	Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature ,Discipline			CO2	(04)
Unit 3	Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline.Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature			CO3	(04)
Unit 4	Character and Competence –Holy books vs Blind faith. Self-management and good health.Science of reincarnation.Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively			CO3	(04)
Text Books					
1	Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi				
Useful Links					
1.	www.wikipedia.Newton.com/				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	2	2	3
CO 2	3	2	3	2	2	2
CO 3	2	3	3	2	2	3

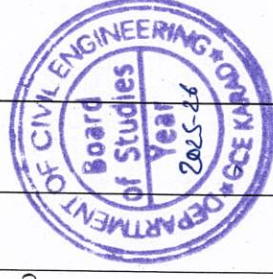


(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. Civil -Structural Engineering			
Semester II			
SE2201: Theory of Plates and Shells			
Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
Course Outcomes (CO):		Duration of ESE 03 Hrs	
Student will be able to:			
1. Understand analysis of 2D flat and curved surfaces.			
2. Numerical method for the analysis of 2d problems			
3. Understand the behavior of thick plates			
4. Understand the geometry and strength of shell structures			

Course Contents		COs	Hours
Unit 1	Introduction to Plate Theory: Thin and Thick Plates, small and large deflection theory of thin plates- assumptions, moment-curvature relations, stress resultants, Governing Differential Equation for bending of plates, various boundary conditions.	CO1	(06)
Unit 2	Rectangular plates -Navier's solution : Simply supported rectangular plates subjected to uniformly distributed and varying loads on entire area, parabolic loads, sinusoidal loads, partly loaded plates, concentrated loads and couples, distributed couples, symmetric & anti- symmetric loading. Rectangular plates -Levy's solution: Plates subject to uniformly distributed and varying loads and sinusoidal parabolic loads between simply supported edges. Conditions for other two edges simply supported, fixed, free, elastically restrained.	CO2	(06)
Unit 3	Energy methods: Use of potential energy principle, solution of rectangular plates with various boundary conditions and loadings. Buckling of rectangular plates, circular plates.	CO2	(06)
Unit 4	Circular Plates: Bending of circular plates with clamped & simply supported edges, Plate with a central hole, uniformly distributed and varying loads, conical loads, distributed couples, ring loads, semicircular plates, axisymmetric loaded plates.	CO3	(06)
Unit 5	Introduction to shells: Classification of shells on geometry, thin shell theory, equation of 05 Membrane analysis : a. Equation of equilibrium for synclastic shells, solution for shells subject to self-weight,live load. b. Equation of equilibrium in rectangular coordinate system. Hyper shells, use of Puncher's function, simple problems on hyperbolic paraboloids. Elliptic paraboloidal shells, conoids. c. Cylindrical shells: Equations of equilibrium, open shells with parabolic, circular, elliptical directrix, simple problems. d. Shells with closed directrix-circular, elliptical-simple problems. Problems on pipes carrying fluid/liquid under pressure, just filled & partly filled	CO3	(06)
Unit 6	Bending theory of cylindrical shells: Symmetrically loaded circular cylindrical shell. Derivation of Governing Differential Equation, resembling that for beam on elastic foundation, beam theory. Finsterwalder's theory: Derivation of governing differential equation of 8th order. D.K.J. theory,	CO4	(06)



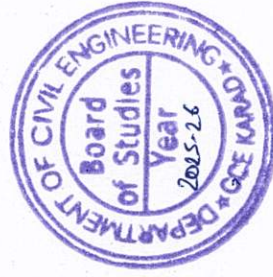
CHAIRMAN

Board of Studies

Department of Civil Engineering

Govt. College of Engineering, Karad.

	Donnell's equation. Characteristic equation. Schorer's theory: Derivation of differential equation.	
Text Books and reference books		
1.	Theory of plates & shells by Timoshenko & W. Kreiger, S W Tata Mc. Graw. Hill, Pub. Co. Ltd., Delhi, 1985, 2nd Edition.	
2.	Design of R. C. shell roofs by G.S. Ramaswamy, CBS Publisher and Distributors, 1st Edition 2003, Delhi.	
3.	Analysis of thin concrete shells by K. Chandrashekhara, Tata Mc. Graw Hill Pub. Co. Ltd, Delhi.	
Useful links		
1	nptel.iitk.ac.in/	
2	www.myeducationkey.com/	
3	www.wikipedia.Newton.com/	



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	2	2
CO 2	2	3	3	3	3	3
CO 3	2	3	2	3	2	3
CO 4	2	3	3	3	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE 2202: Advanced Design of Steel Structures				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE	20	
Tutorials	-	ISE	20	
Total Credits	03	ESE	60	
Course Outcomes (CO):		Duration of ESE 03 Hrs		
Student will be able to:				
1. Understand natural force systems.				
2. Develop skill of modeling and resolution of force system using mechanics.				
3. Solve industrial problems related to steel structures.				
4. Perform applications in composite construction.				
Course Contents				
Unit 1	Design of Trussed girder bridges and bearings. Deck type and through type bridges, bracing systems, end bearings, mechanical and elastomeric bearings.	CO1	CO1	Hours (06)
Unit 2	Multi-storey steel buildings, load transfer mechanism, lateral load resisting systems, Design of moment resistant frames, concentrically braced frames, interacting moment resisting frames with shear walls for seismic/ wind effects structural systems, framed tube structures, braced tube structures, tube in tube structures	CO1	CO1	(06)
Unit 3	Cold-formed light gauge steel sections, special design considerations for compression elements, design of compression elements, stiffened compression elements, multi stiffened elements, design of light gauge beams, behavior under repetitive loads and temperature effects.	CO2	CO2	(06)
Unit 4	Buckling of beam-column, buckling of sway and non-sway frame, various end conditions, elastically restrained conditions, stiffness and continuous factor, stability function.	CO2	CO2	(06)
Unit 5	Plastic analysis and design of portal frames, collapse mechanisms, analysis and design of gables, multistory-multiday frames, rectangular and tapered haunch knee, check for stability of frames, plastic moment distribution method, minimum weight design, variable repetitive loads, Introduction to limit states in steel design.	CO3	CO3	(06)
Unit 6	Concrete-Steel composite sections, elastic behavior of composite beams, shear connectors, behavior at ultimate load, design of composite beams, design of encased steel columns.	CO4	CO4	(06)
Text Books				
1. Design of steel structures-Vol. II by Ramchandran, standard book house Delhi				
2. Design of steel structures-A.S. Arya. J.L. Ajamani, Nemchand and brothers.				
3. Structural analysis and design of tall buildings by B.S. Taranath. McGraw-Hill.				
4. Steel skeletal Vol. II Plastic behavior and design by J.F.Bekar, M.R. Horne, J. Heyman. ELBS.				
5. Plastic methods of structural analysis by Neal B.G.Chapter and Hall.				
6. Teaching Resource for Structural Steel Design-Vol. III by IIT Madras, Anna University Chennai, SERC,				
7. Madras and Institute for Steel Development and Growth (INSDAG), Kolkata.				
7. Limit State Design in Structural Steel, by M. R. Shiyekar, Prentice Hall of India, 3 rd Edition.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.bis.org.in				




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	3
CO 2	2	3	3	2	2	3
CO 3	3	3	3	2	3	2
CO 4	2	3	3	2	2	2

Assessment Pattern (with revised Bloom's Taxonomy)

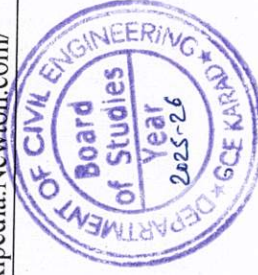
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-II) Civil -Structural Engineering				
SE2213 : ELEECIVE III: Earthquake Engineering				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
Course Outcomes (CO):		Duration of ESE		03 Hrs
Student will be able to:				
1. Understand the behavior of structure under dynamic loading				
2. Model the structure mathematically				
3. Understand the physics of the problem				
4. Understand the design of earthquake resistant structures				
Course Contents				
Unit 1	Earthquake seismology – Causes of earthquake, Plate tectonics, Earthquake fault sources, Seismic waves, Elastic rebound theory, Quantification of earthquake, Intensity and magnitudes, Earthquake source models.	COs	CO1	Hours (06)
Unit 2	Earthquake ground motion – Seismograph, Characteristics of ground motion, Effect of local site conditions on ground motions, Design earthquake, Design spectra, Development of site specification and code-based design.		CO2	(06)
Unit 3	Ground response analysis – One-dimensional ground response analysis: Linear approaches, Equivalent linear approximation of non-linear approaches, Computer code “SHAKE”.		CO2	(06)
Unit 4	Liquefaction and lateral spreading -Liquefaction related phenomena, Liquefaction susceptibility: Historical, Geological, Compositional and State criteria. Evaluation of liquefaction by cyclic stress and cyclic strain approaches, Lateral deformation and spreading, Criteria for mapping liquefaction hazard zones.		CO3	(06)
Unit 5	Seismic design of foundations, Seismic slope stability analysis: Internal stability and weakening instability and Seismic design of retaining walls.		CO4	(06)
Unit 6	Detailing of RCC and Masonry buildings, Provisions of IS- 13920, IS – 4326.		CO4	(06)
Tutorials				
A set of Tutorial per unit is to be submitted.				
Text Books				
1. Dynamics of Structures - R.W. Clough and J. Penziene, McGraw-Hill Pub				
2. Structural Dynamics - Roy Craig, John-Wiley & Sons.				
3. Dynamics of Structures- Theory & Application to Earthquake Engineering – A.K.Chopra. Prentice-H; Pub..				
4. Structural Dynamics - Madhujit Mukhopadhyay , Ane’s Student Edition, Ane Books India				
Reference Books				
1. Steven Kramer, “Geotechnical Earthquake Engineering”, Pearson,2008.				
2. Secoe Pinto, P., Seismic behavior of ground and Geotechnical structure, A. A.				
3. Naeim, F., The Seismic Design Handbook, Kluwer Academic Publication, 2ndEdition, 2001.				
4. Ferrito, J.M, Seismic design criteria for soil liquefaction, Tech. Report of Naval Facilities service center, Port Hueneme, 1997.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				



CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and PO

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	3	2	2	3	2
CO 3	3	2	2	2	2	3
CO 4	3	2	2	2	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

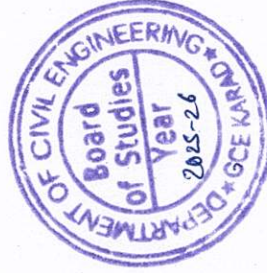
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE2223 :ELECTIVE III: Advanced Design of Foundations				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1. Decide the suitability of soil strata for different projects.				
2. Design shallow foundations deciding the bearing capacity of soil.				
3. Analyze and design the pile foundation.				
4. Understand analysis methods for well foundation.				
Course Contents				
Unit 1	Planning of Soil Exploration for Different Projects, Methods of Subsurface Exploration, Methods of Borings along with Various Penetration Tests.			CO1 (06)
Unit 2	Shallow Foundations, Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings and Rafts, Proportioning of Foundations using Field Test Data, Pressure - Settlement Characteristics from Constitutive Laws.			CO1 (06)
Unit 3	Pile Foundations, Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement, Laterally Loaded Piles, Pile Load Tests, Analytical Estimation of Load- Settlement Behavior of Piles, Proportioning of Pile Foundations, Lateral and Uplift Capacity of Piles.			CO2 (06)
Unit 4	Well Foundation, IS and IRC Code Provisions, Elastic Theory and Ultimate Resistance Methods.			CO3 (06)
Unit 5	Tunnels and Arching in Soils, Pressure Computations around Tunnels. Open Cuts, Sheet piling and Bracing Systems in Shallow and Deep Open Cuts in Different Soil Types.			CO3 (06)
Unit 6	Coffer Dams, Various Types, Analysis and Design, Foundations under uplifting loads, Soil-structure interaction			CO4 (06)
Tutorials				
A set of Tutorial per unit is to be submitted.				
Reference Books				
1. Design of foundation system, N.P. Kurian, Narosa Publishing House				
2. Foundation Analysis and Design, J. E. Bowles, Tata McGraw Hill New York				
3. Analysis and Design of Substructures, Sawmi Saran, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	2
CO 2	3	2	2	3	3	3
CO 3	3	3	3	2	2	3
CO 4	3	3	3	2	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

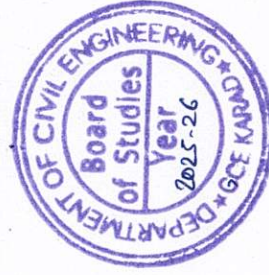
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE2233 :ELECIVE III: Soil Structure Interaction				
Teaching Scheme	Examination Scheme			
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE		03 Hrs
Course Outcomes (CO):				
Student will be able to:				
1. Understand soil structure interaction concept and complexities involved.				
2. Evaluate soil structure interaction for different types of structure under various conditions of loading and subsoil characteristics.				
3. Prepare comprehensive design oriented computer programs for interaction problems based on theory of sub grade reaction such as beams, footings, rafts etc.				
4. Analyze different types of frame structure founded on stratified natural deposits with linear and non-linear stress- strain characteristics.				
Course Contents				
Unit 1	Critical Study of Conventional Methods of Foundation Design, Nature and Complexities of Soil Structure Interaction.	CO1		(06)
Unit 2	Application of Advanced Techniques of Analysis such as FEM and Finite Difference Method.	CO2		(06)
Unit 3	Relaxation and Interaction for the Evaluation of Soil Structure Interaction for Different Types of Structure under various Conditions of Loading and Subsoil Characteristics.	CO2		(06)
Unit 4	Preparation of Comprehensive Design Oriented Computer Programs for Specific Problems, Interaction Problems based on Theory of Sub Grade Reaction Such as Beams, Footings, Rafts Etc.	CO3		(06)
Unit 5	Analysis of Different Types of Frame Structures Founded on Stratified Natural Deposits with Linear and Non-Linear Stress-Strain Characteristics.	CO3		(06)
Unit 6	Determination of Pile Capacities and Negative Skin Friction, Action of Group of Piles Considering Stress-Strain Characteristics of Real Soils, Anchor Piles and Determination of Pullout Resistance.	CO4		(06)
Tutorials				
A set of Tutorial per unit is to be submitted.				
Text Books				
1. Analysis & Design of substructures, Swami Saran, Oxford & IBH Publishing Co. Pvt. Ltd.				
2. Design of Foundation System- Principles & Practices, Kurian N. P., Narosa Publishing				
Reference Books				
1. Analytical and Computer Methods in Foundation, Bowels J.E., McGraw Hill Book Co., New York, 1974.				
2. Numerical Methods in Geotechnical Engineering, Desai C.S. and Christian J.T., McGraw Hill Book Co., New York.				
3. Soil Structure Interaction - The real behaviour of structures, Institution of Structural Engineers.				
4. Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg. Vol-17, Elsevier Scientific Publishing Company.				
5. Elastic Analysis of Soil-Foundation Interaction, Selvadurai A.P.S., Elsevier Scientific Publishing Company.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	2	2	3
CO 2	3	3	2	2	3	3
CO 3	2	3	2	2	3	2
CO 4	2	3	2	2	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

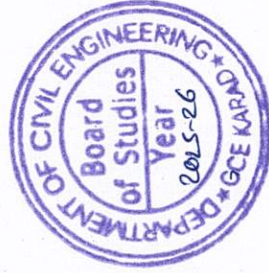
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-II) Civil -Structural Engineering				
SE2214: Elective IV- Design of R.C Bridges				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
Course Outcomes (CO):		Duration of ESE 03 Hrs		
Student will be able to:				
1. Understand different types of loads related to construction of roads and bridges.				
2. Develop skill of modeling and resolution of force system using mechanics.				
3. Apply structural mechanics for analysis of bridges.				
4. Acquire knowledge of behavior of bridges subjected to different types of situations.				
Course Contents				
Unit 1	General Basic bridge forms –beam, arch, suspension, various types of bridges, selection of type of Bridge and economic span length, super structure - philosophy, geometric alignment, drainage, road curb, wall foundation, pile foundation, open well foundation.			CO1 (07)
Unit 2	Design loads for bridges –dead load, vertical live load, IRC loading, wind load, longitudinal forces, centrifugal forces, buoyancy, water current forces, thermal forces, deformation and horizontal forces.			CO2 (06)
Unit 3	Design of R. C. deck slab, beam and slab, T beam, Pigeaud’s theory, Courbon’s theory, balanced cantilever bridge, box culvert.			CO2 (07)
Unit 4	Construction techniques -construction of sub structure footings, piles, cassetions, construction of reinforced earth retaining wall and reinforced earth abutments, super structure erection method bridge deck construction, by cantilever method, Inspection maintenance and repair of bridges.			CO3 (05)
Unit 5	Design of sub structure abutments, Piers, approach slab.			CO3 (05)
Unit 6	Bearing and expansion joints forces on bearings Types of bearings, design of unreinforced elastomeric bearings, expansion joints.			CO4 (06)
Tutorials				
A set of Tutorial per unit is to be submitted.				
Text Books				
1. Concrete Bridge Practice by Dr. V.K. Raina Tata McGraw Hill Pub. Co.				
2. Reinforced Concrete Structures Vol II by Dr. B. C. Punmia, Ashok Kumar Jain, Anil Kumar Jain – Laxmi Publications, 1992, 7th Edition.				
3. Essential of bridge Eng. By D Johnson Victor, Oxford & IBH Publishing Co. Pvt. Ltd.				
4. Concrete bridge design R. E. Rowe, John Wiley & sons, 1963, 1st Edition.				
5. Design of bridge structure by Jagadesh T. R. Jayram M A Prentice Hall of India Pvt. Ltd.				
6. Advanced Reinforced Concrete Design, by N KrishnaRaju, CBS Publication & distributors, 2000, 1st Edition.				
Useful Links				
1. nptel.iitk.ac.in/				
2. www.myeducationkey.com/				
3. www.wikipedia.Newton.com/				




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	2
CO 2	3	2	3	3	2	3
CO 3	3	2	2	3	3	2
CO 4	2	3	2	2	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

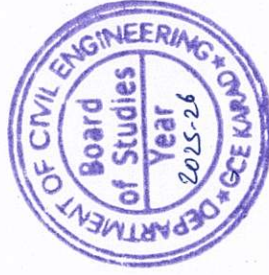
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60



Ca

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE2224: Elective-IV Repairs and Rehabilitation of Structures				
Teaching Scheme		Examination Scheme		
Lectures	03Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1.	Understand causes of deterioration, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection.			
2.	Understand causes of distress in concrete /steel structures			
3.	Learn Damage assessment and evaluation models.			
4.	Learn methods of repair and rehabilitation and should perform Seismic Retrofitting of reinforced concrete buildings.			
Course Contents				
Unit 1	Introduction to deterioration of structures with aging; Need for rehabilitation. Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.	CO1	Hours	(06)
Unit 2	Distress in concrete /steel structures Types of damages; Sources or causes for damages; effects of damages; Case studies, Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete – Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness.	CO2		(06)
Unit 3	Damage assessment and evaluation models Damage testing methods; Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.	CO2		(06)
Unit 4	Rehabilitation methods Grouting; Detailing; Imbalance of structural stability; Polymer concrete, Sulphur infiltrated concrete, Fiber reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes. Case studies	CO3		(06)
Unit 5	Methods of Repair Shortcreting; Grouting; Epoxy-cement mortar injection; Crack ceiling Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – DEMOLITION TECHNIQUES – Engineered demolition methods – Case studies.	CO4		(06)



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Unit 6	Seismic Retrofitting of reinforced concrete buildings Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame building – Structural damage due to discontinuous load path; Structural damage due to lack of deformation; Quality of workmanship and materials; Classification of retrofitting techniques; Retrofitting strategies for RC buildings – Structural level (global) retrofit methods; Member level (local) retrofit methods; Comparative analysis of methods of retrofitting	CO4 (06)
Text Books and Reference Books		
1.	Denison Campbell, Allen and Harold Roper, “Concrete Structures, Materials, Maintenance and Repair”; Longman Scientific and Technical UK, 1991.	
2.	Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1987	
3.	DovKominetzky.M.S., “Design and Construction Failures”, Galgotia Publications Pvt. Ltd., 2001	
4.	Ravishankar.K, Krishnamoorthy.T.S, “Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures”, Allied Publishers, 2004.	
5.	Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt. Ltd., Mumbai, 1994	
6.	Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.	
7.	Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002.	
Useful Links		
1.	nptel.iitk.ac.in/	
2.	www.myeducationkey.com/	
3.	www.wikipedia.Newton.com/	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	3	3	3
CO 2	2	3	2	3	2	2
CO 3	2	3	2	3	2	3
CO 4	2	3	2	3	2	2

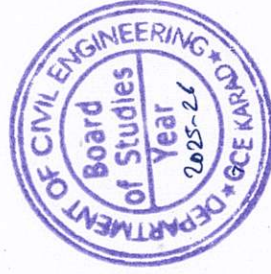
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Government College of Engineering, Karad					
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering					
SE 2234: Elective IV- Structural Health Monitoring					
Teaching Scheme		Examination Scheme			
Lectures	03 Hrs/week		MSE		20
Tutorials	-		ISE		20
Total Credits	03		ESE		60
Course Outcomes (CO):			Duration of ESE 03 Hrs		
Student will be able to:					
1. Understand distress and causes.					
2. Understand meaning of audit.					
3. Perform testing on site.					
4. Provide measures to retrofit structure.					
Course Contents					
Unit 1	Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance.			COs	Hours
Unit 2	Structural Health Monitoring: Concepts Various Measures, Structural Safety in Alteration.			CO1	(06)
Unit 3	Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation, Management, SHM Procedures.			CO1	(06)
Unit 4	Static Field Testing: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.			CO2	(06)
Unit 5	Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.			CO3	(06)
Unit 6	Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), piezo– electric material and other smart materials, electro– mechanical impedance (EMI) technique, adaptations of EMI technique.			CO4	(06)
Text Books and Reference Books					
1. Structural Health Monitoring, Daniel Balageas, Claus_Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.					
2. Health Monitoring of Structural Materials and Components _Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.					
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.					
Useful Links					
1. nptel.iitk.ac.in/					
2. www.myeducationkey.com/					
3. www.wikipedia.Newton.com/					




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	2	2
CO 2	2	3	2	3	3	3
CO 3	2	3	3	3	3	2
CO 4	2	3	2	2	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE2215: Elective V- Finite Element Method				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1. Learn the fundamentals of the finite element method for the analysis of engineering problems arising in solids and structures				
2. Learn how to judge the quality of the numerical solution and improve accuracy in an efficient manner by optimal selection of solution variables.				
3. Formulate the design problems into FEA				
4. Use commercially available, state-of-the-art finite element analysis software to analyze complex structural systems, including interfacing with CAD models and solving nonlinear structural analyses.				
Course Contents				
Unit 1	Introduction to Finite Element Method: Principle of minimum potential energy. Variational principle, Galerkin approach, RayleighRitz method, finite element procedure.	COs	Hours	
		CO1		(06)
Unit 2	1D problems: Discretization, nodes, element incidence, displacement model, shape function, selection of order of polynomials, application to bars with constant and variable cross sections subjected to axial forces. 2D problems: Development of element stiffness matrix and nodal load vector for truss, beam and plane frame elements. Transformation of matrices, relevant structural engineering applications. 2D elements of triangular and quadrilateral shapes for plane stress and plane strain problems. Pascal's triangle, convergence requirements and compatibility conditions, shape functions, boundary conditions, element aspect ratio, applications to a continuum.	CO2		(06)
Unit 3	3D problems: Development of element stiffness matrix and nodal load vector for Tetrahedron, Hexahedral elements.	CO2		(06)
Unit 4	Isoparametric Elements: Shape function. Natural coordinate systems, classification - isoparametric, subparametric, superparametric elements, 1D & 2D isoparametric elements, Gauss quadrature integration.	CO3		(06)
Unit 5	Axisymmetric Elements : Development of element stiffness matrix and nodal load vector	CO3		(06)
Unit 6	Plate and Shell Elements: Formation of stiffness matrix for plate bending elements of triangular and quadrilateral shapes, cylindrical thin shell elements.	CO4		(06)
Text Books and reference books				
1.	The Finite Element Method (fourth edition) vol I & II by O.C. Zienkiewicz & R. L Taylor, Tata McGraw Hill Publication Co. Ltd.			
2.	An introduction to the finite element method by J. N. Reddy, Tata McGraw Hill Publication Co. Ltd.			
3.	Concepts & applications of finite element analysis by R. D. Cook, John Wiley & Sons Ltd.			
4.	Introduction to finite element method by C.S. Desai, CBS Publication on & Distributors			
5.	Programming in finite element method by C. S. Krishnamoorthy, Tata McGraw Hill Publication Co. Ltd.			
6.	Introduction to finite element in engineering by T. R. Chandrupatla and Belegundu, Prentice Hall of India.			
Useful links				
1	nptel.iitk.ac.in/			
2	www.myeducationkey.com/			
3	www.wikipedia.Newton.com/			



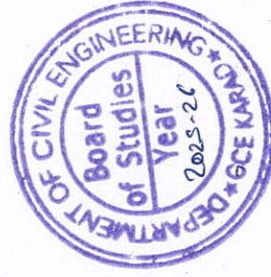
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	3
CO 2	3	3	2	3	3	2
CO 3	3	3	2	3	3	3
CO 4	3	2	2	2	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



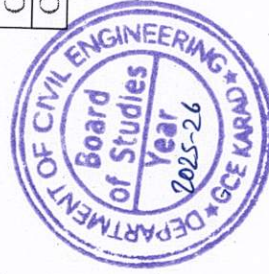
(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad					
F. Y. M. Tech. (Sem-II) Civil -Structural Engineering					
SE2225: Elective V- Fracture Mechanics					
Teaching Scheme		Examination Scheme			
Lectures	03 Hrs/week		MSE		20
Tutorials	-		ISE		20
Total Credits	03		ESE		60
			Duration of ESE		03 Hrs
Course Outcomes (CO):					
Student will be able to:					
1. Identify and classify cracking of concrete structures based on fracture mechanics.					
2. Implement stress intensity factor for notched members.					
3. apply fracture mechanics models to high strength concrete and FRC structures.					
4. Compute J-integral for various sections understanding the concepts of LEFM.					
Course Contents					
Unit 1	Introduction: Basic Fracture Mechanics, Crack in a Structure, Mechanisms of Fracture and Crack Growth, Cleavage Fracture, Ductile Fracture, Fatigue Cracking,		CO1		(06)
Unit 2	Environment assisted Cracking, Service Failure Analysis.		CO2		(06)
Unit 3	Stress at Crack Tip: Stress at Crack Tip, Linear Elastic Fracture Mechanics, Griffith's Criteria,		CO2		(06)
Unit 4	Stress Intensity Factors, Crack Tip Plastic Zone, Erwin's Plastic Zone Correction, R curves, Compliance, J Integral, Concept of CTOD and CMD.		CO3		(06)
Unit 5	Material Models: General Concepts, Crack Models, Band Models, Models based on Continuum Damage Mechanics, Applications to High Strength Concrete,		CO3		(06)
Unit 6	Fiber Reinforced Concrete, Crack Concepts and Numerical Modeling		CO4		(06)
Text Books and References					
1.	Elementary engineering fracture mechanics , David Broek – Sijthoff & Noordhoff , Alphen anadem Rijn, Netherlands				
2.	Fracture mechanics of concrete structures , Theory and applications, Rilem Report, Edited by L. Elfgreen, Chapman and Hall , 1989.				
3.	Fracture mechanics, Applications to concrete, Edited by Victor, C. Li, & Z.P. Bazant, ACI SP 118				
4.	Valliappan S. "Continuum Mechanics Fundamentals" (1982), Oxford IBH, N D. New Delhi.				
5.	Venkataraman and Patel "Structural Mechanics with introduction to Elasticity and Plasticity" – McGrawHill, 1990.				
6.	Shane's "Introduction to Solid Mechanics , II Edition, PH, 1989				
Useful Links					
1.	nptel.iitk.ac.in/				
2.	www.myeducationkey.com/				
3.	www.wikipedia.Newton.com/				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	3	3	2
CO 2	2	3	3	2	3	3
CO 3	2	3	3	2	3	2
CO 4	2	3	3	2	3	3



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Assessment Pattern (with revised Bloom's Taxonomy)

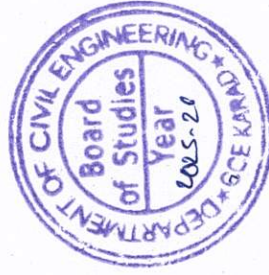
Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



A handwritten signature in blue ink, appearing to be "A. S. S.", located below the stamp.

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-II) Civil-Structural Engineering				
SE2235: Elective V-Design of High Rise Structures				
Teaching Scheme		Examination Scheme		
Lectures	03 Hrs/week	MSE		20
Tutorials	-	ISE		20
Total Credits	03	ESE		60
		Duration of ESE 03 Hrs		
Course Outcomes (CO):				
Student will be able to:				
1.	Analyze, design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.			
2.	Analyze, design and detail the RC and Steel Chimney.			
3.	Analyze, design and detail the tall buildings subjected to different loading conditions using relevant codes.			
4.	Able to model analytically tall structures.			
Course Contents				
Unit 1	Design of transmission/ TV tower, Mast and trestles: Configuration, bracing system,	COs	Hours	
Unit 2	Design of transmission/ TV tower: analysis and design for vertical transverse and longitudinal loads.	CO1	(06)	
Unit 3	Analysis and Design of RC and Steel Chimney, Foundation design for varied soil strata.	CO2	(06)	
Unit 4	Tall Buildings: Structural Concept, Configurations, various systems, Wind and Seismic loads, Dynamic approach,	CO3	(06)	
Unit 5	Tall Buildings: structural design considerations and IS code provisions. Firefighting design provisions.	CO3	(06)	
Unit 6	Application of software in analysis and design.	CO4	(06)	
Reference Books				
1.	Structural Design of Multi-storied Buildings, Varyani U. H., 2nd Ed., South Asian Publishers New Delhi, 2002.			
2.	Structural Analysis and Design of Tall Buildings, Taranath B. S., McGraw Hill, 1988.			
3.	illustrated Design of Reinforced Concrete Buildings(GF+3storeyed), Shah V. L. & Karve S. R., Structures Publications, Pune, 2013.			
4.	Design of Multi Storied Buildings, Vol. 1 & 2, CPWD Publications, 1976.			
5.	Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India. 1991.			
6.	High Rise Building Structures, Wolfgang Schueller, Wiley., 1971.			
7.	Tall Chimneys, Manohar S. N., Tata McGraw Hill Publishing Company, New Delhi			



Q.

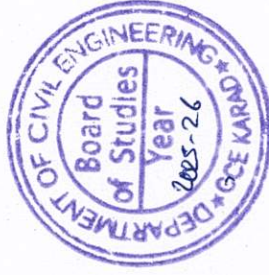
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	2	3	2
CO 2	2	3	3	2	3	2
CO 3	2	3	2	2	3	2
CO 4	2	3	3	2	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyze	3	3	9
Evaluate	3	3	9
Create	3	3	9
TOTAL	20	20	60



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-II) Civil -Structural Engineering				
SE 2206 : Structural Design Lab II				
Teaching Scheme		Examination Scheme		
Practical	4 Hrs/week	ISE	25	
Total Credits	2	ESE	25	
Course Outcomes (CO):		TOTAL	50	
Student will be able to:				
1. Develop skill of modelling and resolution of force system using software.				
2. Model the structure mathematically				
3. Understand advanced applications in structural design				
4. Interpret results of software and check by manual approach.				
Course Contents				
Unit 1	Steel Railway Truss Bridges:	COs	Hours	
	- Economical span of railway truss bridges. - Economical truss configuration. - General Arrangement and preliminary design. - Preliminary design. - Calculation of dead loads, live loads (Broad Gauge), wind loads, centrifugal loads, racking loads as per Bridge Rules (IRS), analysis and design of truss members.	CO1 ,2	(16)	
Unit 2	Liquid Retaining Structures:	CO3	(32)	
	- Basic design philosophy. - Analysis and design of single cell rectangular water tanks subjected to hydrostatic loading based on plate theory.	,4		
OR				
Unit 2	Earth Retaining Structures:	CO3	(32)	
	- Basic design philosophy. - Calculation of lateral earth pressure based on Rankine's theory. - Analysis and design of RC gravity walls, cantilever walls and Counterfort walls. Introduction to soil-structure interaction.	,4		
List of Submission				
1. Minimum two projects analysed by software.				
2. Design basis report of two project.				
3. Preparation of detailed structural drawings in AutoCad.				



(Signature)

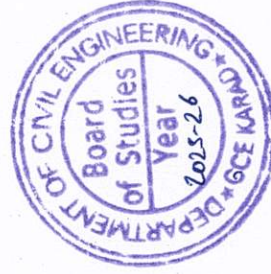
CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	3	3	2
CO 2	3	2	2	3	3	3
CO 3	2	3	2	3	3	2
CO 7	2	3	2	3	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	3	3
Understand	3	3
Apply	3	3
Analyse	2	2
Evaluate	2	2
Create	2	2
TOTAL	25	25



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem-II) Civil-Structural Engineering				
SE2207 : Mini Project				
Teaching Scheme		Examination Scheme		
Practical	4 Hrs/week	ISE	50	
Total Credits	2	ESE	---	
Course Outcomes (CO):		TOTAL	50	
Student will be able to:				
1. Understand the reading, understanding the research paper and able to develop skill to summarize it with optimum words				
2. Understanding and given preference to new ideas, concepts, technologies in Structural engineering.				
3. Work on the solutions given and present solution by using his/her technique applying engineering principles.				
4. Prepare new method, technology.				
Course Contents			COs	Hours
Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available. End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution. Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the departmental committee.			CO1	(64)
			2,3,4	
List of Submission				
1. Report based on site visit, literature review.				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	3	2	2
CO 2	2	2	2	3	2	3
CO 3	2	2	2	3	3	2
CO 4	2	2	2	3	3	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE
Remember	6
Understand	6
Apply	6
Analyze	4
Evaluate	4
Create	4
TOTAL	50



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

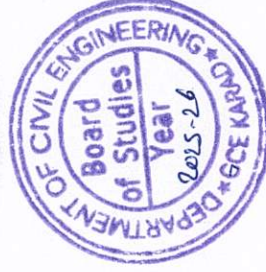
Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
SE 2208 : Seminar				
Teaching Scheme		Examination Scheme		
Practical	4 Hrs/week	ISE	100	
Total Credits 2		ESE	---	
Course Outcomes (CO):		TOTAL	100	
Student will be able to:				
1. Represent knowledge that they gain from course.				
2. Acquire recent trends in civil engineering.				
3. Acquire skills of demonstration/presentation.				
4. Compile data and suggest for additional work.				
Course Contents			COs	Hours (48)
The topic of seminar shall be based on area of Structural Engineering & preferably considering new ideas, concepts, technologies & developments in the field of Structural Engineering. At least two oral presentations and submission of report in soft & hard copies is expected. Students shall deliver Seminar on the State-of-the-Art topic in front of Examiners and Student-colleagues. Prior to presentation, he/she shall carry out the detailed literature survey from Standard References such as International Journals and Periodicals, recently published reference Books etc. and submit a report on the same along with computer based presentation copy to the concerned examiner/guide at the end of the seminar. The assessment shall be based on selection of topic, its relevance to the present context, report documentation and presentation skills.			CO1, 2,3,4	
List of Submission				
1. Report based on site visit, literature review.				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	3	3	2
CO 2	2	3	2	3	3	2
CO 3	2	3	2	3	3	3
CO 4	2	3	2	3	3	2

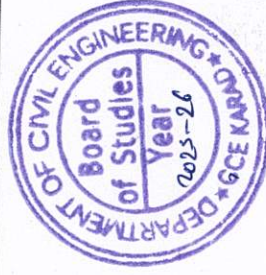
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE
Remember	20
Understand	20
Apply	10
Analyse	10
Evaluate	10
Create	30
TOTAL	100



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
AU2219 : CONSTITUTION OF INDIA				
Teaching Scheme		Audit course		
Lectures	02Hrs/week			
Tutorials	-			
Total Credits	-			
Course Outcomes (CO):				
Student will be able to:				
1.	Understand value of education and self-development.			
2.	Imbibe good values in students.			
3.	Know about the importance of character.			
4.	Understand political scenario.			
Course Contents				
Unit 1	History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)	CO1	Hours	(06)
Unit 2	Philosophy of the Indian Constitution: Preamble Salient Features	CO2		(06)
Unit 3	Contours of Constitutional Rights & Duties: - Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.	CO2		(06)
Unit 4	Organs of Governance: - Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions	CO3		(06)
Unit 5	Local Administration: - District's Administration head: Role and Importance, - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. - Pachayatiraj: Introduction, PRI: ZilaPachayat. - Elected officials and their roles, CEO ZilaPachayat: Position and role. - Block level: Organizational Hierarchy (Different departments), - Village level: Role of Elected and Appointed officials, - Importance of grass root democracy	CO3		(06)

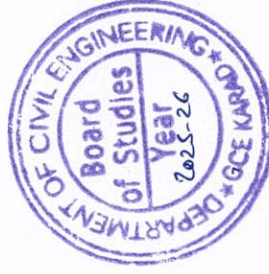


CHAIRMAN
Board of Studies
Department of Civil Engineering,
Govt. College of Engineering, Karad.

Unit 6	Election Commission: • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. • Institute and Bodies for the welfare of SC/ST/OBC and women.	CO4	(06)
Text Books			
1	Chakraborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi		
Useful Links			
1.	nptel.iitk.ac.in/		
2.	www.myeducationkey.com/		
3.	www.wikipedia.Newton.com/		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	2	2	3
CO 2	2	3	3	2	3	3
CO 3	3	3	3	2	2	3
CO 4	2	3	3	3	3	3



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

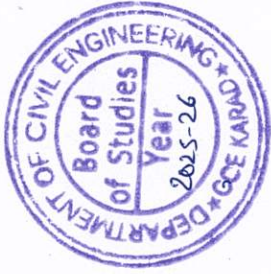
Government College of Engineering, Karad				
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering				
AU2229: PEDAGOGY STUDIES				
Teaching Scheme		Audit course		
Lectures	2hrs/week			
Credit	-			
Course Outcomes (CO):				
Student will be able to:				
1.	Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers.			
2.	Identify critical evidence gaps to guide the development.			
3.	Understand student psychology.			
4.	Understand student-teacher relationship.			
Course Contents				
Unit I	Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and Terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions, Overview of methodology and Searching.			COs CO1 (04)
Unit II	Thematic overview: Pedagogical practices are being used by teachers in formal And informal classrooms in developing countries, Curriculum, Teacher education.			CO2 (05)
Unit III	Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies, How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy, Theory of change, Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.			CO2 (05)
Unit IV	Professional development: alignment with classroom practices and follow up. Support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes			CO3 (05)
Unit V	Research gaps and future directions Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.			CO4 (05)
Text Books and Reference Books				
1	Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.			
2	Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.			
3	Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.			
4	Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basicmaths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272-282.			
5	Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell			
6	Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.			
7	www.pratham.org/images/resource%20working%20paper%202.pdf.			
Useful Links				
1.	nptel.iitk.ac.in/			
2.	www.myeducationkey.com/			
3.	www.wikipedia.com/			



CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	3	2	2
CO 2	3	2	3	3	2	2
CO 3	3	3	3	3	3	2
CO 4	2	2	2	3	2	2



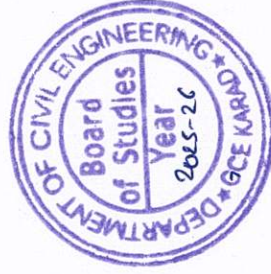
A handwritten signature in blue ink, appearing to be "D. S. K." or similar, written over the printed name.

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad					
F. Y. M. Tech. (Sem- II) Civil -Structural Engineering					
AU2239: STRESS MANAGEMENT BY YOGA					
Teaching Scheme		Audit course			
Lectures	2hrs/week				
Credit	-				
Course Outcomes (CO):					
Student will be able to:					
1	Achieve overall health of body and mind.				
2	Overcome stress.				
Course Contents					
Unit I	Definitions of Eight parts of yoga. (Ashtanga)			COs	Hours
Unit II	Yam and Niyam.			CO1	(08)
	Do's and Don'ts in life.			CO2	(08)
	i) Ahimsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan				
Unit III	Asan and Pranayam			CO2	(08)
	i) Various yoga poses and their benefits for mind & body				
	ii) Regularization of breathing techniques and its effects-Types of pranayam				
Suggested reading					
1	'Yogic Asanas for Group Training-Part-I' :Janardan Swami Yogabhyasi Mandal, Nagpur				
2	"Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata				
Useful Links					
1.	nptel.iitk.ac.in/				
2.	www.myeducationkey.com/				
3.	www.wikipedia.com/				

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	2	2	3	3
CO 2	2	3	3	2	2	2



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad			
F. Y. M. Tech. (Sem-II) Civil-Structural Engineering			
AU2249: Personality Development Through Life Enlightenment Skills			
Teaching Scheme			
Lectures	2hrs/week	Audit course	
Credit	-		
Course Outcomes (CO):			
Student will be able to:			
1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.		
2	Know the person who has studied Geeta will lead the nation and mankind to peace and prosperity.		
3	Study of Neetishatakam will help in developing versatile personality of students.		
4	Study of Indian culture.		
Course Contents			
Unit I	Neetisatakam-Holistic development of personality - Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) - Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)	CO1,2	(08)
Unit II	- Approach to day to day work and duties. - Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48, - Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, - Chapter 18-Verses 45, 46, 48.	CO2,3	(08)
Unit III	Statements of basic knowledge. - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 - Chapter 12 -Verses 13, 14, 15, 16,17, 18 - Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, - Chapter 4-Verses 18, 38,39 - Chapter18 – Verses 37,38,63	CO4	(08)
Suggested reading			
1	“ Srimad Bhagavad Gita” by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata		
2	Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.		
Useful Links			
1.	www.wikipedia.com/		




CHAIRMAN
 Board of Studies
 Department of Civil Engineering
 Govt. College of Engineering, Karad.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	2	2	2
CO 2	3	2	3	2	2	3
CO 3	2	3	3	2	3	2
CO 4	3	2	3	2	2	3



(Signature)

CHAIRMAN
Board of Studies
Department of Civil Engineering,
Govt. College of Engineering, Karad.