Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Programme: Civil Engineering

Curriculum for
Third year of B. Tech

Program Outcomes(PO) and Program Specific Outcomes (PSOs) of Civil Engineering Program

POs:
Students in the UG Civil Engineering programme at the time of their graduation are expected to have:
a. An ability to identify and understand civil engineering problems.
b. An ability to analyse real life civil engineering problems.
c. An ability to apply civil engineering knowledge for design, construction, operation and maintenance of constructed facilities within realistic constraints such as technical, economic, environmental, political, social, safety and sustainability.
d. An ability to formulate, solve and simulate complex real life civil engineering problem using the imparted knowledge of mathematics, science, engineering, technology and optimization.
e. An ability to work on projects of societal concerns independently and in teams.
f. Demonstrate professional practice through participation in multidisciplinary activities.
g. Demonstrate high regards for engineering ethics and ethical responsibility.
h. An ability to apply the techniques, skills and modern engineering tools necessary for engineering practice.
i. An ability to understand contemporary issues.
j. Ability for effective communication and interaction.
k. An ability to engage in lifelong learning in relation with global, economic, environmental and societal context, through civil engineering projects.

PSOs:

l. The student will demonstrate ability to acquire in depth knowledge to practice in the field of civil engineering profession globally
m. The student will demonstrate the ability to apply the knowledge in desirous form in respective specialisation of civil engineering
n. The student will develop awareness towards environment and society for sustainable development while execution of civil engineering projects.

Government College of Engineering, Karad
Third Year B. Tech.
CE501:Design of Steel Structures

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Duration of ESE	3 Hrs.

Course Objectives

1. To introduce students the theory and application of analysis and design of steel structures.
2. To develop students with an understanding of behavior and design of steel members and systems.
3. To prepare students for effective use of the latest industry standard formulae, tables, design aidsin the design of steel structures.

Course Contents

		Hours
Unit I	A. Introduction to Design of steel structures, Design Philosophy, comparison of LSM & WSM, advantages and disadvantages of steel structures, types of steel structures, grades of structural steel, various rolled steel sections, loads and load combinations partial safety factors for load and materials, load calculation for roof trusses. B. Types of bolts & welds, analysis and Design of axially and eccentrically loaded bolted and welded connections (subjected to bending and torsion).	07
Unit II	**Tension Members:** Common Sections, Netarea, modes of failure, load carrying capacity, Design of axially loaded tension members, Design of end connections (Bolted and welded).	07
Unit III	**Compression Members as Struts** Common sections, economical sections, effective length, slenderness ratio, modes of failure, classification of cross section, behavior of compression member, load carrying capacity, Design of compression members.	07
Unit IV	**A. Columns:** Design of column subjected to axial and eccentric loading, design of lacing, battening system, column splices. **B. Column Bases:** Design of slab bases & gusseted base subjected to axial and eccentric load and design of concrete pedestal	07

| Unit V | Types of sections, behavior of be a min flexure, design of laterally supported, unsupported beams and built up beam using flange plates, curtailment of flange plates, check for deflection, shear, web buckling and web crippling. Secondary and main beam arrangement, beam to beam connections. | 07 |

| Unit VI | **A. Gantry Girder:** | 07 |

Forces acting on gantry girder, commonly used sections, design of gantry girder as laterally unsupported beam, connection details

B. Plate Girder:

Introduction to plate girder and design concept. Design of plate girder: design of cross section, curtailment of flange plates, stiffeners and connections.

C. Lattice Girder: Introduction to lattice girder.

Note: Use of IS: 800-2007, IS: 875 part III and steel table is permitted for theory examinations.
The Design shall be as per IS: 800 – 2007 by limit state method.

Course Outcome (CO):
At the end of this course, student will be able to
1. recognize the material properties of steel products [POs: e]
2. recognize the design philosophy of steel structures and have concept on limit state
   design [POs: e]
3. understand the behavior of steel structures, in particular the various forms of failure
   for members and connections under tension, compression, bending and combined
   actions [POs: a,e]
4. apply the principles, procedures and current code requirements to the analysis and
   design of steel tension members, beams, columns, beam-columns and connections
   [POs: a,c,d,e]
5. ability to follow different structural design specifications and apply computer software to analyze steel structural systems under gravity and lateral loads [POs:a,c,e,k]

Text Books:
1. Design of Steel Structures, by Dr. N. Subramanian, Oxford University Press, New Delhi. Based on Limit Sate IS800:2007, 1st Ed.2008
2. Limit State Design of Steel Structures: S.K. Duggal, Tata Mc-Graw Hill India Publishing House 2nd Ed.2010
3. Limit state design in structural steel: Dr. M. R. Shiyekar, PHI publications. 2nd Ed, 2013.

References:
1. IS:800–2007,IS:875(partI,IIandIII),SP6(1)&SP6(6),IS:816,IS:808.
2. LRFD Steel Design: William T. Segui, PWS Publishing
3. Design of Steel Structures: Edwin H. Gaylord, Charles N. Gaylord James,

Stallmeyer, Mc-Graw-Hill
4 Design of Steel Structures: Mac. Ginely T.
5 Design of Steel Structures: Dayaratnam, WheelerPublications,NewDelhi.
6 Design of Steel Structures: Kazimi S.M.and Jindal R.S.,Prentice Hall India.
7 Design of Steel Structures: Breslar, LinScalzi, John Willey, NewYork
8 Limit State Design of Steel Structures: V. L. Shah and Veena Gore, Structures Publication, Pune. 3rd Ed. 2012.
9 Design of Steel Structures: K.S. Sairam, Pearson 2nd Ed Revised, 2010.

Useful Links:
1 Design of steel structures by Dr. SatishKumar, http://nptel.ac.in/courses/105106113/
2 Design of steel structures by Dr. SatishKumar,http://nptel.ac.in/courses/105106112/

Mapping of Course outcomes to Program outcomes

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

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	2	2	-	-
Understand	3	3	3	10
Apply	5	5	3	20
Analyze	-	-	-	-
Evaluate	5	5	-	30
Create	-	-	4	-
Total	15	15	10	60

Government College of Engineering Karad.

Third Year B. Tech

CE502: Town Planning & Transportation Engineering

Teaching Scheme			Examination Scheme	
Lecture	3 hr /Week		**CT 1**	15
Tutorial	--		**CT 2**	15
Total Credits	3		**TA**	10
			ESE	60
			Duration of ESE	2 hrs 30 min

Course Objectives

1	To familiarise students with applications of principle of Town Planning and Transportation Engineering.
2	To make students understand various terminologies involved in Town Planning and Transportation Engineering.
3	To provide students the knowledge of Town Planning and Transportation Engineering.
4	To make students learn the planning and designing aspect of Town Planning and Transportation Engineering.

Course Contents		Hours
Unit I	**Principles of Town Planning** Necessity, scope and principles of Town Planning, Brief history. Contribution of town planners in modern era such as Sir Patrick Geddes. Sir Ebenezer Howard. Clarence stein, Sir Patrick Abercrombie, Le Corbusier.	6
Unit II	**Constituents of Town Planning** Growth pattern of towns-natural and planned, elements of town, types of zoning and importance, Layout of residential units, neighborhood unit planning. Development control rules with respective to town planning. Different town planning works with reference to M.R.T.P. Act. (Brief idea about various provisions) Land acquisition act – necessity and procedure of acquisition	7
Unit III	**Highway Geometric Design**: Terrain classification, highway alignment-definition, requirements, factors controlling alignment, alignment of hill roads, cross-sectional elements, sight distances, horizontal alignment – super elevation, widening of pavement on horizontal curve, vertical alignment–gradient, vertical curves, design problems.	9
Unit IV	**Traffic Engineering**: traffic characteristics, traffic studies and analysis, traffic control devices – road marking, traffic sign, traffic signal, intersections. statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Control devices, signal design by Webster's method; Types of intersections and channelization; Highway capacity and level of service of rural highways and urban roads.	6
Unit V	**Pavement Design**: Pavement types, components, functions, design	8

	factors, a) Design of flexible pavements, CBR Method, IRC: 37-2012. b) Design of rigid pavement: Westergaard's analysis of wheel load stress, temperature stresses. Types of joints and their functions, IRC: 58-2011 method of design. c) Introduction to Road Health Audit	
Unit VI	**Highway Construction**: Highway materials, WBM roads, bituminous roads-BC, SDBC, DBM; concrete roads-DLC, PQC; soil stabilized road, MOST specifications. **Highway Drainage**: Necessity, surface and subsurface drainage, maintenance and repairs.	**6**

Course Outcome (CO):

1	Students will be aware about the applications of principle of Town Planning and Transportation Engineering.
2	Students will be able to understand various terminologies involved in Town Planning and Transportation Engineering.
3	Students will be able to understand various concepts of Town Planning and Transportation Engineering.
4	Students will learn the planning and designing aspect of Town Planning and Transportation Engineering.

Text Books

1	Modak N.V. and V.N. Ambdekar, "Town and Country Planning and Housing", Orient Longman Ltd., New Delhi.
2	Hiraskar G.K. "Fundamentals of Town Planning", Dhanpat Rai& Sons, Delhi.
3	A Course in Highway Engineering – S.P. Bindra, DhanpatRai and Sons, Delhi.
4	Principles of Transportation Engineering – Partha Chakraborty, Animesh Das, Prentice Hall of India Pvt. Ltd., New Delhi.

Reference Books

1	Town and country planning – N. K. Gandhi M. N. Shah Mumbai
2	Rural development planning:-design and method – Misra S. N. Satwahan Publication New Delhi
3	Principles and Practice of Highway Engineering - L.R. Kadiyali Nai Sarak, Delhi: Khanna Publisher
4	Highway Engineering - P.H. Wright and K. Dixon, Hoboken, NJ : Wiley Publisher
5	Introduction to Transportation Engineering - J.H. Banks McGraw-Hill Publisher
6	Transportation Engineering and Planning - C.S. Papacostas and P.D. Prevedouros Prentice Hall Publisher
7	Gallion A.B. and Simon Eisner, "The Urban Pattern", CBS Publishers, Delhi.
8	Reading Materials-Institute of Town Planners, India, New Delhi. Vol I to XI
9	Highway Engineering – Rangawala, Charotar publishing House, Anand 388001 (Gujrat)
10	Principles of Transportation Engineering – G.V. Rao Tata Mac Graw Hill Publication

Useful Links

1	Introduction to Transportation by Dr. Bhargab Maitra, Dr. K.S. Reddy ,IIT Kharagpur http://nptel.ac.in/courses/105105107/
2	Transportation Engineering (web course) by Dr. Tom V Mathew ,IIT

	Bombay http://nptel.ac.in/courses/105101087/
3	Urban Transportation Planning(web course) by Dr. M. Parida ,IIT Roorkee http://nptel.ac.in/courses/105107067/
4	Urban Transportation Planning by Dr. V. Thamizh Arasan ,IITMadras http://nptel.ac.in/courses/105106058/
5	Advance Transportation Planning by Prof. A. Das, Prof. Partha Chakraborty ,IITKanpur http://nptel.ac.in/courses/105104098/

Mapping of CO and PO

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

Assessment Pattern

Knowledge Level	CT 1	CT 2	TA	ESE
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad.
Third Year B. Tech.
CE 503: Analysis of Determinate Structures

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

Course Objectives:

1 To understand the effect of external actions on elastic body.

2 To analyze the stress, strain and deformation of elastic bodies under external actions.

3 To analyse determinant and indeterminate structure.

Course Contents

		Hours
Unit I	Principal stress and strain in two dimensions, Introduction to graphical method. Principal stress in beams and thin cylinders. Combined bending, torsion and axial thrust. Theories of failure.	07
Unit II	A) Combined direct and bending stresses, eccentric loads, stability analysis of gravity dams, retaining walls and chimneys. B) Analysis of long columns, Euler's and Rankine's theory.	07
Unit III	Influence line diagrams for determinate compound beams and trusses. Rolling load on simply supported beams.	07
Unit IV	Slope and deflection method for determinate beams - double integration method, Macaulay's method, moment-area method and conjugate beam method.	08
Unit V	A) Concept of determinacy and indeterminacy, Degrees of freedom and structural redundancy, Methods of analysis. B) Consistent deformation method: propped cantilever with uniform section, fixed beam, portal frame.	06

Unit VI   A) Force method: Clapeyeron's theorem of three moments in continuous   07
beam, sinking of support, beam with different flexural rigidity
 B) Analysis of three hinged arches.

Course Outcome (CO):

1   Students will be able to learn stresses and strains developed in a body when loaded.

2   Student will be able to understand stability of structures and effect of eccentricity.

3   Students will be able to draw Influence line Diagrams to understand behaviour of structural elements and to find out response of structure and deformations.

Text Books

1   "Mechanics of Structure" (Vol. I & II), By Junnarkar S.B. and Advi, Charotar publication , Second edition, 1957, ISBN 8185594678.
2   "Mechanics of Materials" Vol. I & II by B.C. Punmia, Jain, Laxmi Publications, Edition 2016, ISBN- 8131806454.
3   "Structural Mechanics", by Dr. S. K. Hirde, Dr Manoj Hedaoo, Techmax Publication. First edition, 2014.

References

1   "Mechanics of Materials" by Gere and Timoshenko, CBS publishers, edition 2006, ISBN 8123908946.
2   "Strength of Material" by F. L. Singer and Pytel, Fourth edition,1987. Harper Collins, New Delhi.
3   "Mechanics of Material" by Beer and Johnston, Sixth edition 2015, DeWolf, Mazurek.

4   Introduction to Mechanics of Solids" by E.P. Popov, edition 1990 , Prentice hall publications .
5   "Mechanics of Materials" by R.C. Hibbler, Edition 2016 Pearson Education.
6   "Theory of Structures" by Dr. S. K. Hirde , Dr. Manoj Hedaoo, Techmax Publication. First edition, 2014.

Useful Links

1   NPTEL   link: http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html Prof. K. Bhattacharya.
2   http://www.nptelvideos.in/2012/11/structural-analysis-ii.html. Prof. P. Banerjee.
3   http://www.nptelvideos.in/2012/11/advanced-structural-analysis.html. Prof. Devdas Menon. IIT Madras

Mapping of Course outcomes to Program outcomes

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

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	2	2	-	-
Understand	3	3	3	10
Apply	5	5	3	20
Analyze	-	-	-	-
Evaluate	5	5	-	30
Create	-	-	4	-
Total	15	15	10	60

Government College of Engineering Karad.
Third Year B. Tech
CE 504 : Water Supply Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	03 Hrs./week	**CT 1**	15
Tutorial	-	**CT 2**	15
Total Credits	03	**TA**	10
		ESE	60
		Duration of ESE:	2 Hrs. 30 Min.

Course Objectives

1   To introduce students the various aspects of water treatment in general and recent developments in particular.

2   To acquaint students with various aspects of water supply engineering problems.

3   To design various units of water treatment plant and water supply scheme.

Course Contents

		Hours
Unit I	**Introduction to water quality and water demands**	**6**

Sources of water: Various sources, quantity & quality of sources, Intake works, their types. Water quality: impurities in water, water quality parameters, characteristics & significance in water treatment, MPN, drinking water quality standards- BIS, WHO Standards. Demand of water: Water demand for domestic purpose and other various demands, factors affecting demand, fluctuations in demand, rate of water consumption, design period & population forecast.

Unit II	**Water Treatment**	**8**

Concept of water treatment, Flow diagram of conventional Water Treatment Plant; Aeration: purpose, types of aerators, design of cascade aerator. Coagulation: Theory, coagulants, types of dosing of coagulants, selection of coagulants, jar tests, design of flash mixer.
Flocculation: Theory, factors affecting, design of mechanical flocculator.
Sedimentation: Theory, types of settling, types of sedimentation tanks, design principles & design of settling tank, surface over flow rate, detention period, concept of tube and plate settler.

Unit III	**Filtration**	**7**

Objectives, Filter media, Types of filters- Slow sand filter, Rapid sand filter Number of filter units, Rate of filtration, Under-drainage system, Design of rapid and slow sand filters, Design of under-drainage system, pressure filters

Unit IV	**Disinfection and Water softening**	**6**

Objectives, factors affecting disinfection, methods of disinfection, chemistry of chlorination, Types of chlorination, Break point chlorination.
Water softening processes - lime-soda process, ion exchange. Effect of Fluoride, Fluoridation, De-fluoridation.

Unit V	**Water Distribution**	**8**

Water distribution systems, method of distributing water, Continuous 24 x 7 water supply and its salient features, layout pattern, basic system requirements for water distribution system, Losses, methods of network analysis: equivalent pipe method, Hardy-Cross method, design problem,

Unit VI	**Water supply appurtenances**	**7**

Sluice valve, air relief valve, gate valve, non-return valve, scour valve, fire hydrants water meter, service connections, maintenance & leak detection of water distribution system. Distribution reservoirs & service storages-necessity, location, head requirement, capacity determination by analytical & graphical method.

Note Submission of report based on visit to Water treatment plant is necessary which will be accounted for Teacher's Assessment (TA)

Course Outcomes (CO):
1 Student will be able to identify and understand water supply engineering problems.
2 Student will be able to analyse water supply engineering problems.
3 Student will be able to design various units of water treatment plant and water supply scheme.

Text Books
1 Water and Wastewater Technology by Mark J. Hammer, (7th edition 2012) John Wiley, and Sons Publisher
2 Water Supply and Sanitary Engineering by G.S. Birdie and J.S. Birdie, (25th edition 2010) DhanpatRai Publishing Company
3 Water Supply Engineering by S.K. Garg, (28thedition 2010), Khanna Publishers

References
1 Manual of water supply and treatment by Government of India publication (1999)
2 Water and Wastewater Engineering by Fair, Geyer and Okun,(3rd edition,2010) Wiley Publication.
3 Introduction to Environmental Engineering by M. L. Davis and Davis A. Cornwell (5th edition 2012), McGraw Hill
4 Introduction to Environmental Engineering & Sciences by G. M. Master, (3rd edition 2007)Prentice Hall of India.
5 Water supply and sewerage by T. J. McGhee, (6th edition 2007) McGraw Hill.
6 Environmental Engineering by H.S. Peavy, D.R. Rowe and Tchobanoglous, G., (1985) McGraw Hill

Useful Links

1. Water and Waste Water Engineering (Web Course)
   http://nptel.ac.in/courses/105104102/ by Dr.P. Bose
2. Water and Wastewater Engineering (Video Course)
   http://nptel.ac.in/courses/105106119/by Prof. C. Venkobachar

Mapping of Course outcomes to Program outcomes

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

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	2	2		8
Understand	5	5	3	20
Apply	3	3	2	12
Analyze	3	3	3	12
Evaluate	2	2	2	8
Create	-	-	-	-
Total	**15**	**15**	**10**	**60**

Government College of Engineering Karad.
B. Tech. Third year
CE505: Engineering Hydrology

Teaching Scheme

Lecture   3 Hrs./week

Total Credits   3

Examination Scheme

CT 1	15
CT 2	15
TA	10
ESE	60
Duration of ESE	2 Hrs 30 Min

Course Objectives

1 To understand the various terms in Hydrology.
2 To study the various statistical methods.
3 To study the various abstractions from precipitation.
4 To understand the concept of Rainfall-Runoff analysis, Hydrograph and Floods.

Course Contents

Hours

Unit I   **Introduction of Hydrology:** Definition, Importance and scope of hydrology, the hydrologic cycle, Weather and its precipitation potential.
Precipitation : Forms and types of precipitation, Methods of measurement, Factors affecting precipitation at location, Estimating missing data, Mass rainfall curves, Hyetograph, double mass analysis(Correcting precipitation data) Determination of average precipitation over the catchment, Determination of precipitation by RS and GIS, Indian Metrological Department (IMD) for Rainfall Estimation.   **8**

Unit II   **Descriptive Statistics:** Mean, Median, Mode, Standard deviation, Skewness
Correlation and Regression: Bi-variate distribution, Probability distribution function, Correlation coefficients, Regression lines, Formulas for Regression coefficients, Rank correlation
Curve Fitting: Fitting of Linear, Quadratic, Exponential and Logarithmic curves, Least squares method
Interpolation of Polynomials.   **8**

Unit III   **Evaporation and Evapotranspiration:** Factors affecting evaporation, measurement and control of evaporation upon reservoirs, Evapotranspiration - definition andmeasurement.
Infiltration: Process of infiltration, Factors affecting infiltration, Infiltration indices, Effect of infiltration on runoff and ground water recharge.   **6**

Unit IV   **Runoff:**Factors affecting runoff, catchment yield calculations, SCS curve number, Rainfall-runoff relationship
Hydrograph: Storm hydrograph, Base flow and Separation of base flow, direct runoff hydrograph, Synthetic Hydrograph,Unit hydrograph – theory – assumptions and limitations, Derivation and use of unit hydrograph, S-   **7**

curve hydrograph.

Unit V **Stream gauging:** Selection of site, various methods of discharge measurement, Area velocity method, Area slope method, other modern methods Floods: Definition, Factors affecting, Estimation of peak flow, Rational method and other methods, Design flood hydrograph – components, recurrence period, Flood Frequency Analysis, Flood routing and Flood forecasting. **6**

Unit VI **Ground water hydrology:** Occurrence and distribution of ground water, Specific yield of aquifer, Movement of ground water, Darcy's law, Permeability, Safe yield of basin. Hydraulics of well under steady flow conditions in confined and unconfined aquifers, Specific Retention. **7**

Course Outcomes (CO):

1 The student will have understanding of various terms in Hydrology.
2 Students will be able to work with various statistical methods.
3 Students will have understanding of various losses from precipitation.
4 Students will be able to construct Hydrograph.

Text Books

1 K. Subramanya, "Engineering hydrology", Tata McGraw Hill (3rd Edition)
2 P. N. Modi, "Irrigation, water resources and water power Engineering", Standard book House (20th Edition)
3 H. M. Raghunath, "Hydrology: Principles, Analysis and Design" New Age International Pvt Ltd Publishers (Latest Edition)

References

1 Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd (2nd Edition)
2 Asawa, G.L., "Irrigation Engineering", New Age International Publishers (2nd Edition)
3 Grewal, B.S., Numerical methods in engineering and science, Khanna Publishers, Delhi(10th Edition).
4 Ven Te Chow "Applied Hydrology" Tata McGraw-Hill Publishing Co (Latest Edition)
5 Dr Murtaza Ali "Land, Soil And Water Resources" Koros Press Limited; (First edition)
6 Garg, S.K., "Irrigation Engineering and Hydraulic Structures", Khanna Publications (23rd Edition)
7 P. Jaya Rami Reddy by "Hydrology", Firewall Media, (3rd Edition)

Useful Links

1 http://nptel.iitm.ac.in by Prof. R. Srivastav

Mapping of CO and PO

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

Assessment Pattern

Knowledge Level	CT 1	CT2	TA	ESE
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad.
Third Year B. Tech
CE506 : Transportation Engineering Lab

Teaching Scheme			Examination Scheme	
Practical	2 Hrs/week		**TA/CA**	25
Total Credits	2		**ESE**	25

Course Objectives

1	To familiarise students to procedure about the conducting test on highway material
2	To learn the objectives of conducting various test on highway material

Course Contents

Test on Aggregate

Experiment 1	Determination of Water Absorption & Specific Gravity Value by IS 2386 (Part III) 1963 method
Experiment 2	Determination of Los Angle's Abrasion Value by IS 2386 (Part IV) 1963 method
Experiment 3	Determination of soundness test by IS 2386 (Part V) 1963 method
Experiment 4	Determination of shape index by IS 2386 (Part I) 1963 method

Test on Bitumen

Experiment 5	Determination of Penetration Value by IS 1203 – 1978 method
Experiment 6	Determination of Softening Point Value by IS 1205 – 1978 method
Experiment 7	Determination of Flash & Fire Point Value by IS 1209 – 1978 method
Experiment 8	Determination of Ductility Value by IS 1203 – 1978 method
Experiment 9	Determination of Viscosity Value by IS 1206 – 1978 method
Experiment 10	Determination of Stripping Value by IS 6241 – 1971 method
Experiment 11	Determination of Marshal Stability Value
Experiment 12	Determination of CBR Value of soil by IS 2720 Part 16 1979 method
Note:	End semester exam will be evaluated on the basis of performance (15marks) and oral (10 marks)

Course Outcome (CO):

1	Students will be aware about the procedure adopted for conducting test on highway material
2	Students will learn the objectives of conducting various test on highway material

References

1	IS 2386-Part I to V (1963) Method of test for aggregate for concrete
2	IS 1201 to 1220 (1978) Methods for testing Tar and Bituminous material
3	IS 6241 (1971) Method of test for determination of stripping value of road aggregate
4	IS 2720 Part 16 1979 method for California Bearing Ratio of Soil

Useful Links

1	Determination of Water Absorption & Specific Gravity Value by Dr. Hemant Sood, NITTTR, Chandigarhwww.youtube.com/watch?v=hqXFPq676iM
2	Determination of Impact Value by Prof. Ajay Duggal, NITTTR Chandiharh www.youtube.com/watch?v=Mn7aeorMpTs

Mapping of CO and PO

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

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	05	05	
CA													

Government College of Engineering Karad.
Third Year B. Tech
CE507: Building Planning and Design Studio

Teaching Scheme   **Examination Scheme**

Practical   4 Hrs/week   **CA**   50
Total Credits   4   **ESE**   25

Course Objectives

  1   To plan and design residential buildings.
  2   To study and draw municipal submission drawings and working drawings
  3   To Study planning of various public buildings as per building code SP-7 and by considering bye-laws.

Course Contents

Experiment 1   **Planning and designing of residential building.**

Experiment 2   **Full set of drawings for the building planned in residential buildings**
                           (a) Municipal Submission drawing. (b)Working drawings
                              1. Foundation / Center Line Drawing.
                              2. Furniture layout plan.
                              3. Electrification plan
                              4. Water supply and drainage plan.
                              5. Vertical and horizontal ventilation.

Experiment 3   **Drawing line plans of public buildings on graph paper**
                           (select one building from each of the following types)(7 line plans)
                           Types of public buildings
                              1) Educational buildings: younger age range, middle age range
                              2) Building for health - health centers, hospitals
                              3) Assembly buildings- recreational halls, cinema theatres, restaurants, hotels, clubs
                              4) Business and mercantile buildings- shops, banks, markets and malls
                              5) Industrial buildings- factories, workshops, cold storages
                              6) Office buildings- administrative buildings, corporate office
                              7) Buildings for transportation- Bus stations, railway / metro stations

Note: End semester examination will consist of performance for 25 marks.

Course Outcome (CO):

  1   Students will be able to plan and design residential buildings.
  2   Students will be able to read and understand municipal submission drawings and working drawings.
  3   Students will be able to plan various public buildings as per SP-7 and considering byelaws

Text Books

  1   Building Design by Shah, Kale, Patki. Tata Mc-Graw Hill Publications. (Edition 2015)
  2   Building Design by Bindra & Arora–S. Chand.(Edition 2008)

References

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

Useful Links
nptel.ac.in/courses/107103002 by Utpal Baura

Mapping of CO and PO

PO → CO ↓	A	B	C	d	e	f	g	h	i	J	k
1		√	√		√	√				√	√
2	√	√	√	√	√	√		√		√	√
3	√	√	√		√					√	√

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Avg
Task I	30	30	30	
Task II	10	10	10	
Task III	10	10	10	
CA				

Government College of Engineering Karad.
Third Year B. Tech
CE508: Computer Aided Drawing Lab

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

Course Objectives
1. To learn the basic commands of computer aided drawing.
2. To study and draw municipal submission drawings for residential building in CAD.
3. To study the application of CAD in drafting the civil engineering drawings.

Course Contents

Experiment 1   **Study of Auto CAD basic Commands.**
Arcs, lines, rectangles, Polygon, poly lines, points, circles, layers, grids, snaps and object snaps, text etc

Experiment 2   **Study of Auto CAD editing Commands.**
Move, scale, copy, offset, change, trim, extend, mirror, divide, measure, array, break, hatch, block, zoom, view, pan, fonts, etc.

Experiment 3   **Preparation of 2D Auto CAD drawing for 2 BHK house with minimum needs consisting of**
1. Line plan
2. Detailed plan

Experiment 4   **Preparation of 2D Auto CAD municipal submission drawing which should consists of**
1. Detailed plan
2. Elevation
3. Section

Experiment 5   **To study of Auto CAD drawing of ~~civil engineer~~ Civil Engineering structure (any one).**
a) Road cross section
b) Irrigation canal cross section
c) Cross drainage work

Note: **End semester examination will consist of performance for 50 marks.**

List of Submission:
1. Two assignments on Experiment 1 and Experiment 2.
2. Drawing sheets covering all drawings in Experiments no 3, 4 and 5.

Course Outcome (CO):
1. Students will be able to describe various Auto CAD commands and its use.
2. Students will be able to prepare municipal submission drawings for residential

building.

3   Students will able be to understand the use of Auto CAD in drafting the drawings for various civil engineering projects.

Text Books

1   Mastering AutoCAD 2016 and AutoCAD LT 2016 by George Omura and Brian C. Benton, Autodesk Official Press, 1st edition.

References

1   Engineering Drawing And Graphics + Auto CAD by K. Venugopal, New Age International publisher, fourth edition, 2005

2   AutoCAD 2008 and AutoCAD LT 2008: No Experience Required by David Frey and Jon McFarland, 2007.

Useful Links

1   NPTEL video course on Engineering Graphics by Dr. Nihar Ranjan Patra IIT Kanpur (Module 8 - Auto CAD)

Mapping of CO and PO

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

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Avg
Task I	30	30	30	30	30	
Task II	10	10	10	10	10	
Task III	10	10	10	10	10	
CA						

Government College of Engineering Karad.
Third Year B. Tech
HS003 –   General proficiency III

Teaching Scheme

Examination Scheme

Lectures	02 Hrs./week	**CA**	50
Practical	02 Hrs./week		
Total Credits	03		

Course Objectives

1   To understand the different components of selection process i.e. written test, GD & PI.

2   To equip the students with the ability to clear NACTECH, AMCAT & ELITMUS.

3   To develop a thorough understanding of these components through strong conceptual understanding, logical approach with various short cuts & practical techniques for manage speed and accuracy to clear the written test & participation in GD & PI

Course Contents

Hours

Unit I	**Soft skills**	**12**

The module Corporate Recruitment Training has four different topics that are**:**

- JAM
- Basics of Group Discussion
- Effective Resume' Writing
- Basics of Interview Skills

Unit II	**Basic concept 4**	**9**

The module basic concept 4 has the following topic**:**

- Ratios & proportions
- Partnerships
- Problems on ages
- SI & CI
- Averages
- Clocks & Calendars

| Unit III | **Logical Reasoning** | **9** |

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

- Venn diagrams
- Cubes
- Logical deductions
- Letter series
- Number series
- Odd man out

| Unit IV | **Basic concepts 5** | **6** |

The module basic concepts 5 has the following topic**:**

- Number system
- Mensurations
- Probability
- Permutations & combinations

| Unit V | **Reasoning** | **12** |

- Reasoning 3
- Reasoning 4
- Data interpretation
- Data sufficiency

| Unit VI | **Verbal Aptitude Skills** | **12** |

The module verbal aptitude has the following topics**:**

- Introduction to verbal aptitude & verbal pattern
- Synonyms & antonyms
- Spotting errors & Sentence correction
- Reading comprehension & sentence rearrangement

Note   **Delivery Methodology to be followed fully depends on the Skill sets as detailed below.**

Language Skills

- A new methodology of acquiring language which integrates LSRW through emotional connect & experiences in one's life.
- The integrated approach coupled with lot of interaction, group work & effective facilitation leads to overall improvement of one's communication skills

Soft Skills

- Pre & post assessment for each topic
- Comprehensive pre & post assessment capsule wise.
- Explanation of the concept
- Self-assessment inventory
- Activities for experiential learning
- Case studies for better understanding of the concept
- PPTs and videos

Aptitude Skills

- Pre & post assessment
- Explaining the concept
- Multiple approaches to the given problem
- PPTs

Verbal Aptitude Skills

- Pre & post assessment for each topic
- Comprehensive pre & post assessment capsule wise.
- Explanation of the concept
- Work sheet for each topic

References:

1. Understanding organizational Behavior by Uday Parek
2. Training instruments on HRD & OD by Uday Parek & Dr.Surabhi purohit
3. Language Instinct by Steven Pinker
4. Freedom from Imperial shakels by Dr.K.N. Anandan
5. Quantitative Aptitude by R.S. Agarwal
6. Quicker Maths by Tyra & khundan
7. Quantitative Aptitude by Abhijeet Guh

Course Outcomes
After completing this course students will be able:

- To understand different components of campus recruitment drive.
- To effectively present oneself &ideas in JAM ,GD& interview
- To draft a resume effectively and practice the questions asked from resume'
- To learn & practice different components of verbal topics
- To learn different methods in vocabulary building & contextually use them.
- To learn various bridges in analogies
- To learn different techniques & to spot the errors pertaining to

various grammatical rules & structures.

- To explaining concepts and sharing different logics for faster computations in different topics of Aptitude and Reasoning.
- The students will be able to identify and use formula as a strategy for solving problems.
- Faster computations
- Identifying most commonly made mistakes and thereby improving upon their accuracy.

Government College of Engineering Karad.
Third Year B. Tech
OE611: Building Services

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

Course Objectives

1. To study various building services like plumbing systems, electrification, fire resistance, ventilation, air conditioning, acoustics etc.
2. To study standards regarding building services as per SP-7

Course Contents

Experiment 1   **To study plumbing systems.**

Plumbing systems, material used for service pipes, valves- function and types, fitting and taps, sanitary fittings- water closet, flushing cistern, wash basin, sink, urinals, traps- types and requirements, rain water harvesting system.

Experiment 2   **To study electrification in buildings.**

Concealed and open wiring, requirements and location of various points, accessories of electrical installation, concept of earthing.

Experiment 3   **To study fire resistance in buildings.**

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

Experiment 4   **To study ventilation and air conditioning in buildings.**

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

Air conditioning: - purpose, classification, principles, systems and various components of the same.

Experiment 5   **To study acoustics and sound insulation in buildings.**

Introduction to acoustics: Absorption of sound, various materials, conditions for good acoustics. Sound Insulation and methods of noise control.

Experiment 6   **To study thermal insulation and painting in buildings.**

Thermal insulation: - General concept, materials, methods
Paints: Different types and application methods.

Experiment 7   **To study vertical circulation in buildings.**

Stairs: Technical terms, requirements of a good stair, uses, types, ramps, lifts and escalator.

Experiment 8   **Site visit to study various building services.**

To study and identify various building services in building visited.

Note   The ESE Shall be based on Performance (25 Marks) and oral (25 marks)

Course Outcome (CO):

1 Students will able to understand various building services like plumbing systems, electrification, fire resistance , ventilation, air conditioning, acoustics etc.
2 Students will able to understand standards regarding various building services as per building code SP-7

Text Books

1 Building Design by Shah, Kale, Patki. Tata Mc-Graw Hill Publications. (Edition 2015)
2 Building Design by Bindra & Arora– S. Chand.(Edition 2010)

References

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

Submission

1. Write up on each experiment.
2. Visit report containing details of various building services studied in visited building.

Online Links:

https://ocw.mit.edu/courses/architecture/4-401-introduction-to-building-technology-spring-2006/lecture-notes/

Mapping of CO and PO

PO → CO ↓	a	b	c	d	e	f	g	h	I	j	K
1	√	√	√		√	√		√	√		√
2		√	√	√	√	√		√			√

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Avg
Task I	30	30	30	30	30	30	30	30	
Task II	10	10	10	10	10	10	10	10	
Task III	10	10	10	10	10	10	10	10	
CA									

Government College of Engineering, Karad
Third Year B. Tech.
CE602: Analysis of Indeterminate Structures

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	1 Hrs/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	3 Hrs.

Course Objectives: Students will be able**:**
1. To study various methods for analysis of indeterminate structures.
2. To study plastic analysis of structures.
3. To study matrix analysis of structures.

Course Contents

		Hours
Unit I	A) Force method: Clapeyeron's theorem of three moments in continuous beam, sinking of support, beam with different. flexural rigidity B) Energy Theorems- Bettie's Law, Maxwell's reciprocal theorem, Castiglione's theorem and unit load method. Statically indeterminate beam, truss (lack of fit and temperature variation effect), two hinged parabolic arch with supports at same level.(Degree of S.I. $\leq$ 2).	7
Unit II	Displacement Method: Slope deflection method, Modified slope deflection equation application to beams, sinking of supports, portal frames without sway, with sway.	6
Unit III	Displacement Method: Moment distribution method: application to beam, sinking of supports, portal frames without sway and with sway.. Application to multi bay, Two-storyed symmetrical frames subjected to symmetric loads only.	7
Unit IV	Displacement Method: Application to beam, sinking of supports, portal frames without sway and with sway. Application to multibay, two storyed symmetrical frames subjected to symmetric loads only.	7
Unit V	Matrix Methods: Flexibility coefficients, development of flexibility matrix, analysis of beams and portals, Stiffness coefficients, development of stiffness matrix, analysis of beams and portals (Degree of S.I. < 2)	7
Unit VI	Introduction to plastic analysis of steel structures, shape factor, plastic section modulus, upper and lower bound theorems, Plastic analysis of beams, single bay, single-storyed portals.	6

TERM WORK-

Term work shall consist of minimum six assignments based on above syllabus with at least four problems from each unit.

Course Outcome (CO):
At the end of this course, student will :
1   Students will be able to analyse indeterminate structure using various methods of analysis.
2   Students will be able to carry out plastic analysis of beams and portal frames.
3   Students will be able to analyse beams and portal frames using flexibility and stiffness matrix method.

Text Books:
1   BasicStructuralAnalysis:C.S.Reddy,3rd Edition, 2014 Tata McGraw Hill Publishing House, New Delhi.
2   Structural Analysis: L. S. Negi and R.S. Jangid, Tata Mc-Graw Hills Publishing House, New Delhi
3   Theory of Structures, by Dr. S. K. Hirde , Dr Manoj Hedaoo, Techmax Publication.

References:
1   Theory of Structures : Timoshenko S. P. and Young D. H., , Tata McGraw Hill, New Delhi 2ND EDITION , 1965
2   Elementary Structural Analysis : C.H. Norris, J.B. Wilbur and S. Utku, , Tata McGraw Hill, 1st edition 1948, New York.
3   Indeterminate Structural Analysis: C.K. Wang, Tata McGraw Hill, New Delhi 2014, ISBN – 007068135X
4.   Structural Analysis: Devdas Menon, Narosa Publishing house, (2008) New Delhi ISBN - 8173197504
5   Advanced Structural Analysis: Devdas Menon, Alpha science international, 2009 ISBN - 1842654977
6   Basic Structural Analysis: K. U. Muthu, Azmi Ibrahim, M. Vijyan, Maganti Janadharn. I. K. International Publishing House Pvt.Ltd.2011
7   Sructural Analysis- Matrix approach by Pandit & Gupta, 2ND edition, Mc Graw Hill publications, 2005.
8   Matrix analysis of structures by Gere & Weaver, Waveland press, 1994, ISBN- 1577661435 .
9   Mechanics of Structures(Vol-II) : S. B. Junnarkar, Charotar Publishers, 2015
10   Analysis of Structures: Vol. I II, Vazirani and Ratwani, Khanna Publishers,2002 ISBN – 8174092056
Useful Links:
1   http://www.nptelvideos.in/2012/11/advanced-structural-analysis.html. Prof. Devdas Menon. IIT Madras
2   http://www.nptelvideos.in/2012/11/structural-analysis-ii.html. Prof. P. Bannerjee.

Mapping of Course outcomes to Program outcomes

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

Government College of Engineering, Karad
Third Year B. Tech.

CE603: Water Resource Engineering

Teaching Scheme

Lectures	4 Hrs/week
Total Credits	4

Examination Scheme

CT1	15
CT2	15
TA	10
ESE	60
Duration of ESE	2 hrs. 30 min.

Course Objectives

1. Enable students to select appropriate hydraulic structure and suitable site for the same.
2. To check stability of earthen dam and gravity dam.
3. To make students capable to design suitable hydraulic structure/dam/canal.
4. To select and design suitable river training work.

Course Contents

		Hours
Unit I	**Introduction to irrigation:** Terminology and necessity of irrigation, micro-irrigation Types of irrigation, Water logging and land drainage, Water requirement of crops, depth and frequency of irrigation, Duty, delta, base period, methods of improving duty, Gross command area, culturable command area and command area calculations based on crop water requirement. Estimation of Evapo-transpiration by Blaney-Criddle method and modified penman method Introduction to Irrigation Network.	9
Unit II	**Introduction to Dams**: - Types of dams, Classification of dams (Gravity dams, Earthen dams, Arch dams), Reservoir Planning, Selection of site for dams, Selection of type of dam, preliminary and final investigations for dams, Control Levels, Silting of reservoir, Area-capacity curve. rock dams, storage space allocations, instrumentation area capacity. **Dam Safety**: - I.S. Guidelines and recommendations, maintenance of dams, Field Monitoring.	8
Unit III	**Concrete Dams** **Gravity Dams**: - Introduction, Components of Gravity dam, forces acting on gravity dam, Theoretical and practical profile, low and high dams, Methods of construction, galleries and joints in dams, introduction to arch dam, fixing control levels of dam by empirical area method, Introduction to canals.	8
Unit IV	**Earth and Rock fill Dams** **Earthen dam**: - Types of earthen dams, limitations, components and their functions, Methods of construction, Types of failure, seepage and seepage control methods (introduction only), Drainage and filters, Design criterion. Sudden drawdown of earthen dams.	8

Unit V	**Spillway and Diversion head works: -**	
	Introduction, requirements of spillway, components and their functions, types of spillways.	
	Diversion head works: - Introduction, components and their functions, types of weir and barrages, causes of failure and remedies.	**9**
	Theory of seepage, Khosla's theory.	
Unit VI	**Canals and river Training Works: -**	
	Canals: - Types, alignment, typical section of canals, canal lining purpose, head regulator, cross regulator, canal escape.	
	River Training works: - Classification and type pf rivers, meandering phenomenon, classification of marginal bunds, guide banks. Hydro power, importance, typical layout, functions of components and parts, intakes, power house, Types of hydro power plants.	**8**

Course Outcomes (CO):

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

1. Select appropriate hydraulic structure and suitable site for the same.
2. Check stability of earthen dam and gravity dam.
3. Design suitable hydraulic structure/dam/canal

Text Books:

1. Irrigation Engineering and Hydraulic Structures., S. K. Garg, Khanna Publications Ed. 2006
2. Irrigation water resources and water power Engineering., Dr. P. M. Modi, 9th Ed. 2014
3. Irrigation and water power Engineering by Dr. B. C. Punmia, Dr. B. B. Lal, Dr. Ashok Kumar Jain, Dr. Arun Kumar Jain, 16th Ed. 2009

Reference Books

1. Design of Small Dams- United States Department of the Interior, Bureau of Reclamation revised reprint 1974, Oxford and IBH Publishing Co.
2. Irrigation and Water Resources Engineering- Asawa G.L- New Age International (P)Ltd. Publishers, first edition, 2005.
3. Irrigation Engineering and Hydraulic Structures- Garg S.K- Khanna Publishers N.D. 14th edition, 2005.
4. Hydraulic Structures, Vol. 1. & Vol. 2- Grishin M.M- Mir Publishers, Moscow, 1982.
5. Design Textbook in Civil Engineering: Volume Six: Dams- Leliavsky, Serge – Oxford and IBH Publishing Co. Pvt. Ltd., 1981.
6. Roller Compacted Concrete Dams- Mehrotra V.K- Standard Publishers Distributors, Delhi, 1st ed, 2004.

Useful Links:

1. http://www.civilenggforall.com/2015/09/irrigation-engineering-and-hydraulic-structures-water-resources-engineering-santosh-kumar-sk-garg-free-download-pdf-civilenggforall.html
2. http://nptel.ac.in/courses/105104103/
3. https://youtu.be/2MkylO8HC1E

Mapping of Course outcomes to Program outcomes

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

Assessment Pattern

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

Government College of Engineering, Karad.
Third Year B. Tech
CE 604: Transportation Engineering

Teaching Scheme			Examination Scheme	
Lecture	3 Hr /Wk		CT 1	15
Tutorial	--		CT 2	15
Total Credits	3		TA	10
			ESE	60
			Duration of ESE	2 Hrs30 min

Course Objectives

1	To familiarize students with sub-branches of Transportation Engineering such as railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.
2	To make students learn various terminologies related with railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.
3	To study the various components involved in railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.
4	To understand the planning aspect involved in railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.

Course Contents		Hours
Unit I	**Railway Engineering** Transportation material, transportation planning Introduction, permanent way: components, Geometric design: alignment, gradient, horizontal curves, Points & crossing: terms used standard points and crossings, Harbouring and interlocking— introduction, Construction and maintenance of railway track: methods, material required per km of track, tools and plant used for plate laying, maintenance of track, modern trends in railways. Introduction to Metro Transit System	8
Unit II	**Bridge Engineering** Classification of bridges, selection of site, bridge hydrology: determination of design discharge, linear water way, economical span, location of piers and abutments, afflux, scour depth, design problems on above topics. Standard specification for bridges: - IRC loads, railway bridge loading, forces acting on super structure. Design considerations,	7
Unit III	Types of bridge foundations, bridge piers, Abutments, Wing walls, bearings. Construction and maintenance of bridges—Introduction; Recent trends in bridges.	5
Unit IV	**Airport Engineering** Introduction: terminology, airport classification ICAO, Airport planning: airport surveys, site selection, airport obstructions, layouts,	7

		zoning laws, environmental considerations. Air traffic control: VFR, IFR, visual aids, airport lighting and marking. Runways: orientation, wind rose, basic runway length, geometric design, airport capacity, runway patterns. Taxiways: layout, geometrical standards, exit taxiways. Terminal buildings: site selection, facilities, aprons, parking systems.	
Unit V	**Tunnel Engineering** Introduction, consideration in 37arbor37ng, geological investigation, tunnel alignment, tunnel shafts, pilot tunnels. Tunnelling in hard rock, (Tunnel Boring Machine). Tunnelling in soft materials: shield methods, tunnel lining (rock bolting and guniting), Safety measures, ventilation, lighting and drainage of tunnels.	**8**
Unit VI	**Dock And Harbour Engineering** Introduction inland water transport in India, tides , waves, erosion, beach drift, littoral drift sand bars, coast protection, classification of ports and harbours, sites selection, break waters, jetties, wharves, piers, facilities required. Types of dock, navigational aids, lighthouses, terminal buildings, special equipment's, containerization.	**7**

Course Outcome (CO):

1	Students will aware about the sub-branches of Transportation Engineering.
2	Students will learn various terminologies related with railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.
3	Students will get the knowledge about various components involved in railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.
4	Students understand the planning aspect involved in railway engineering, bridge engineering, airport engineering, tunnel engineering, dock and Harbour engineering.

Text Books

1	Saxena and Bindra 'Principals of Railway Engineering' Published by Ish Kapur for Dhanpat Rai& Sons
2	Tunnel, Bridge and Railway Engineering Published by Dhanpat Rai& Sons 6
3	Bridge Engineering – S. P. Bindra DhanpatRai Publication
4	S.P.Bindra, Arora, 'Airport Engineering', Chartor Publishing House Pvt Ltd.
5	Subhash C. Saxena "Tunnel Engineering Published by Dhanpat Rai& Sons
6	Dock and Harbour Engineering – Hasmukh P. OzaGautam H. Oza Charotar Publishing House Pvt. Ltd

Reference Books

1	Railway Engineering- Satish Chandra, M.M. Agarwal Oxford Press New Delhi
2	Bridge Engineering – S. Ponnuswamy McGraw-Hill Publisher
3	Airport Engineering: Planning, Design and Development of 21st Century Airports, 4th Edition Norman J. Ashford, Saleh Mumayiz, Paul H. Wright John wiley & sons new jersey
4	Handbook of Tunnel Engineering, Bernhard Maidl, Markus Thewes, Ulrich Maidl Wiley VCH
5	The Dock and Harbour Engineer's – Brysson Cunningham C. Griffin, limited

Useful Links

1	Railway Engineering by Prof. Rajat Rastogi ,IIT Roorkeehttp://nptel.ac.in/courses/105107123/

Mapping of Course outcomes to Program outcomes

Assessment Pattern

Knowledge Level	CT 1	CT 2	TA	ESE
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	3	3	2	12
Total	15	15	10	60

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

Government College of Engineering Karad.
Third Year B. Tech
CE 605: Wastewater Engineering and Pollution Control

Teaching Scheme		**Examination Scheme**	
Lectures	03 Hrs./week	CT 1	15
Tutorial	-	CT 2	15
Total Credits	03	TA	10
		ESE	60
		Duration of ESE :	2 Hrs. 30 Min.

Course Objectives

1 To introduce students the various aspects of wastewater engineering, solid waste management and air pollution.
2 To acquaint students with various aspects of wastewater engineering problems.
3 To design of various units of wastewater treatment plant and sewerage system.

Course Contents

		Hours
Unit I	**Quantity and Quality of Wastewater**	6

Components of wastewater flows, wastewater sources and flow rate, Variations in flow rates and strength, wastewater constituents, Characteristic of Municipal wastewater, First order B.O.D equation. C.O.D, solids, Quantity of storm water, Ground water infiltration. Self-Purification, DO sag curve, Streeter–Phelps equation, Stream classification, effluents standards for stream and land disposal as per MPCB and CPCB standards.

Unit II	**Sewerage system**	7

Sewage, Types of sewerage system, Layout, Types of sewers, Collection system, Appurtenances, Design of sanitary and storm water sewers, Maintenance of sewerage systems Sewage and Sludge pumping, Location, Capacity, Types of pumps, Pumping station design.

Unit III	**Primary and secondary treatment of wastewater**	8

Flow diagram of conventional STP, Primary Treatment-Screening, Grit removal, Oil and Grease Trap Primary settling tank.

Secondary Treatment-Activated sludge process, Process design and operating parameters, modification of ASP, Operational problems, Concept of trickling filter, Secondary Settling Tank

Unit IV	**Wastewater treatment technologies**	8

Sludge characteristics, Treatment and disposal, Concept of anaerobic digestion, types of reactors. Low cost wastewater treatment methods-Principles of waste stabilization pond. Design and operation of oxidation pond, aerobic & anaerobic Lagoons, Aerated Lagoon, Oxidation ditch, Septic tank. Selection of alternative Treatment process flow sheets, Concept of recycling of sewage.

| **Unit V** | **Air pollution and Noise pollution** | **7** |

Air Pollution-Definition, Sources and classification of pollutants, Effects on man material and vegetation. Introduction to Meteorological aspects such as atmospheric stability, mixing heights, and plume behaviour. Control of industrial air pollution-Settling Chamber, Bag Filters, Cyclone separators, Scrubbers, Electrostatic precipitators, Introduction to global issues – Global warming, Acid rain, Ozone depletion, Photochemical Smog. Ambient air quality standards.

Noise Pollution-Decibel scales, Noise characteristics and measurements, Levels of noise and standards, control measures of community and industrial noise.

| **Unit VI** | **Solid waste management** | **6** |

Solid wastes Definition, Types, Sources, Characteristics, Functional outlines-storage, Collection, Processing techniques, Methods of treatment of solid waste-Composting, Incineration, Pyrolysis, and Sanitary land-filling. Concept of Hazardous waste management.

Introduction to Environmental Impact Assessment and Environmental Legislation.

Course Outcomes (CO):

1. Student will be able to identify and understand problems in wastewater treatment, solid waste management and air pollution.
2. Student will be able to analyze waste water engineering problems.
3. Student will be able to design various units of wastewater treatment plant and sewerage system.

Text Books

1. Water and Wastewater Technology by Mark J. Hammer, (7th edition 2012) John Wiley, and Sons Publisher
2. Water Supply and Sanitary Engineering by G.S. Birdie and J.S. Birdie, (2010) Dhanpat Rai Publishing Company
3. Environmental Engineering by H.S. Peavy, D.R. Rowe and Tchobanoglous, G., (1985) McGraw Hill

References

1. Wastewater Engineering: Treatment and Reuse by Metcalf and Eddy, (4th edition , 2002) McGraw-Hill Higher Education
2. Water and Wastewater Engineering by Fair, Geyer and Okun,(3rd edition,2010) Wiley Publication.
3. Introduction to Environmental Engineering by M. L. Davis and Davis A. Cornwell (5th edition 2012), McGraw Hill
4. Introduction to Environmental Engineering & Sciences by G. M. Master, (3rd edition 2007) Prentice Hall of India.
5. Manual on sewerage and sewage Treatment-Government of India Publication (2013)
6. Manual on Municipal Solid Waste Management, Ministry of Urban Development Govt. of India. (2000)
7. Air pollution by Rao. M. N. and Rao H.V. (1st edition2001) Tata McGraw Hill
8. Water supply and sewerage by T. J. McGhee, (6th edition 2007) McGraw Hill.

Useful Links

1. Wastewater Management (Web course)
   http://nptel.ac.in/courses/105105048by Prof. M.M. Ghangrekar
2. Water and Wastewater Engineering (Video Course)
   http://nptel.ac.in/courses/105106119/ by Prof. C. Venkobachar

Mapping of Course outcomes to Program outcomes

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

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	2	2		8
Understand	5	5	3	20
Apply	3	3	2	12
Analyze	3	3	3	12
Evaluate	2	2	2	8
Create	-	-	-	-
Total	**15**	**15**	**10**	**60**

Government College of Engineering Karad.
B. Tech. Third year
CE606: Foundation Engineering

Teaching Scheme

Lecture	3 Hours/week
Total Credits	3

Examination Scheme

CT 1	15
CT 2	15
TA	10
ESE	60
Duration of ESE	2 Hrs 30 Min

Course Objectives

1. To learn soil and rock exploration methods
2. To study stability of slopes and bearing capacity
3. To study and analyze shallow and pile foundation, well foundation, caissons and cofferdams
4. To develop feel for modern foundation techniques

Course Contents

Hours

Unit I **Soil & Rock Exploration:** Purpose, importance, methods of soil exploration, subsurface exploration, trial pits, boring: method of borings. Number of boreholes, depth and spacing of boreholes, types of test to suit the soil conditions, Location of water table, Sampling: Disturbed and Undisturbed Samples, Rock drilling and sampling, Mechanical properties of rock, behaviour of rocks in uniaxial compression, tensile strength of rocks, Core barrels, Core boxes, core recovery, RQD, Introduction of sophisticated instrumentation methods in soil and rock exploration such as Nuclear probe, sounding method etc. **8**

Unit II **Stability of Slope:** Slope classification, slope failure, modes of failure. Infinite slope in cohesive and cohesion less soil, Taylor's stability number, Swedish slip method and concept of Friction circle method, Landslides**.** **7**

Unit III **Bearing Capacity Evaluation:** Definitions, Modes of failure, Terzaghi's bearing capacity theory, I.S. Code method of bearing capacity evaluation & computation (IS 6403), Effect of various factors on bearing capacity(Size & Shape, Depth, WT, Eccentricity), Bearing capacity evaluation from Plate load test, S.P.T. (By I.S. Code method) and pressure meter tests with detailed procedure. Bishop's method of stroke **7**

Unit IV **Shallow Foundation:** Types and their selection, minimum depth of footing, Assumptions & limitations of rigid design analysis. Geotechnical Design of Isolated, combined, strap footing (Rigid analysis), Raft foundation (elastic analysis), floating foundations (R.C.C. Design is not expected) **6**

Unit V **Pile Foundation**: Classification and their uses, single pile capacity evaluation by static and dynamic methods, pile load test. Negative skin friction, Group action piles, spacing of piles in a group, Group efficiency. Under reamed piles – equipment, construction and precautions **7**

Unit VI **Well foundations, Caisson, Sheet pile, Coffer Dam :** Element of wells, types, **7** methods of construction, tilt and shift, remedial measures. Pneumatic caissons: sinking method- Sand island method, Caisson disease. Types and material used for sheet piling Common types of cofferdams, Soil pressure distribution, Braced cofferdam.

Modern Foundation Techniques: Stone columns, Vibroflotation, Preloading technique.

Course Outcomes (CO):

1 Student will have understanding of different soil/rock strata.
2 Student will be able to understand the classical theories of load bearing capacity and the concepts of the stability of slopes.
3 Student will have erudition of geotechnical aspects of shallow and deep substructures.
4 Student will be able to understand modern substratum techniques.

Text Books

1 Gopal Ranjan and A S Rao, "Basic and Applied Soil Mechanics", New Age International Publishers, (1st Edition).
2 K. Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers, 2009(Latest Edition)
3 V. N. S. Murthy, "Soil Mechanics and Foundation Engineering", CBS; (1st edition)

References

1 J. E. Bowles, "Foundation Analysis and Design", McGraw-Hill International (5th edition)
2 B. M. Dass, "Foundation Engineering", Cengage Learning; (7th edition)
3 N.V. Nayak, "Foundation Design Manual", Dhanpat Rai and Sons,(1st edition).
4 B.C. Punmia, "Soil Mechanics and Foundation Engineering", Laxmi Publication (16th edition).

Useful Links

1 http://nptel.iitm.ac.in by Prof. B. V. S. Viswanadham and Prof. G. Venkatachalam

Mapping of CO and PO

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

Assessment Pattern

Knowledge Level	CT 1	CT2	TA	ESE
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Third Year B. Tech.
CE607 : Design & Drawing of Steel Structures

Teaching Scheme		Examination Scheme	
Laboratory	4 Hrs/week	CA	25
Total Credit	2	ESE	25
		Total	50

Course Objectives:

1. To plan and analyse steel structures.
2. To design steel structural components such as beam, column, girders, truss etc as per the IS code specification.
3. To prepare detailed structural drawings of the various components designed as per IS code.
4. To prepare steel structural detailing using any drafting software..

Course Contents

The term work shall consist of detailed structural design and drawing of the following steel structure along with necessary drawings.

Experiment 1   Design of industrial building including roof truss, purlin, bracings, gantry girder, column, column base and connections.
Three full imperial size drawing sheets.

Experiment 2   Design of **any one** of the following

1. Design of welded plate girder, design of cross section, curtailment of flange plates, stiffeners and connections. Simple sketches of lattice girder. One full imperial size drawing sheets.

2. Design of building including primary and secondary beams, column, column base and connections. One full imperial size drawing sheet.

3. Design of Foot Bridge: Influence lines, cross beam, main truss, raker joint details, support details.

Note   ESE shall be based on performance (15 Marks) and oral (10 Marks)

Course Outcomes: After completion, of course student will be able to

1. analyse and design components of steel structures as per IS specifications.
2. prepare steel structural detailing using any drafting software.

Note:

1. Analysis and design shall be compared with the results of any standard software package.
2. The Design shall be as per IS:800–2007 by limit state method.
3. Minimum two drawing sheets shall be drawn manually and other drawing sheets

shall be drawn by using any drafting software.

Mapping of Course Outcomes to Program Outcomes

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

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Avg
Task I	15	15	
Task II	05	05	
Task III	05	05	
CA			

Government College of Engineering Karad.
Third Year B. Tech
CE608: Environmental Engineering Lab

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

Course Objectives
1. To understand basic concepts of determination of various parameter of water and wastewater.
2. To understand various laboratory experiments and decide appropriate technology to treat water and wastewater.
3. To design various units of wastewater treatment plant

Course Contents

Experiment 1	Determination of pH of water and wastewater
Experiment 2	Determination of Turbidity of water
Experiment 3	Determination of optimum coagulant dose by using jar test
Experiment 4	Determination of Hardness of water
Experiment 5	Determination of Acidity and Alkalinity of water and wastewater
Experiment 6	Determination of Solids of water and wastewater
Experiment 7	Determination of Chlorides (Chloride content) of water and wastewater
Experiment 8	Determination of DO of water and wastewater
Experiment 9	Determination of COD of wastewater
Experiment 10	Determination of BOD of wastewater
Experiment 11	Report based on visit to sewage treatment plant
Experiment 12	Design of sewerage system and wastewater treatment system for small urban area (town/industry/village/institute/organisation)

Note-
1. Any eight experiments from Exp.No.1 to Exp. No. 10
2. Exp. No.11 and Exp.No.12 are compulsory.
3. Refer IS 10500: 2012 for drinking water standards.
4. Refer IS 4764: 1973, IS 2490: 1974, IS3306: 1974 for wastewater parameters.

Course Outcomes (CO):
1. Students will be able to know basic concepts of determination of various parameters of water and wastewater.
2. Students will be able to perform various laboratory experiments and decide appropriate technology to treat water and wastewater.
3. Students will be able to design various units of wastewater treatment plant and

Mapping of Course Outcomes to Program Outcomes

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

Assessment Pattern

For individual student, every experiment will be assessed as per following criteria and average marks will be awarded to the student.

Task-I	Proactive Attentiveness: Punctual in attending laboratory sessions/Field visits	30 Marks
Task-II	Core Competency: Performance/Teamwork/Learning Attitude	10 Marks
Task-III	Submission/Neatness/Writing Skills/Analysis and Interpretation	10 Marks

Government College of Engineering Karad
Third Year B. Tech
CE609: Minor Project

Laboratory Scheme   **Examination Scheme**

Practical   2Hrs/week   **CA**   50
Total Credits   2   **ESE**   50

Course Objectives:
The main aim of this course is to demonstrate the important attributes like critical thinking, creativity, collaborative efforts and communication skills in students. The aim is also to make students aware with the process involved in making product from idea. Not more than two students may carry out the minor project together. One supervisor from the department shall be assigned five project batches of the minor project.

The steps involved for completion of minor project includes, but not limited to:

1. Conceptualization of innovative idea through literature and market survey; site visits; interaction with community or industry, socio-economic survey etc.
2. Design of product, processes, methods and systems using multidisciplinary knowledge
3. Fabrication of product, development of software, measurement methods etc.
4. Deployment, implementation and demonstration of project.
5. Presentation of project

Minor projects shall consist of followings but not limited to

Minor experimental work of various techno-social issues, computer based analysis and design, structural design, Structural audit of various civil engineering works, health monitoring of structures, Innovative civil engineering materials, Environmental impact assessment, design of small water supply schemes, irrigation schemes, water harvesting, sewerage system, waste management system, etc. related to civil engineering.

(For purchase of consumables required for completion of project, every project batch shall receive funding from institute with maximum limit decided by BOM)

Project Report Format:
Project report should be of 15 to 20 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.
 1. Page Size: Trimmed A4
 2. Top Margin: 1.00 Inch
 3. Bottom Margin: 1.32 Inches
 4. Left Margin: 1.5 Inches
 5. Right Margin: 1.0 Inch
 6. Para Text: Times New Roman 12 Point Font

7. Line Spacing: 1.5 Lines

8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman

9. Headings: Times New Roman, 14 Point Bold Face

10. Certificate: All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/ Director.

11. Index of Report:
   a. Title Sheet
   b. Certificate
   c. Acknowledgement
   d. Table of Contents
   e. List of Figures
   f. List of Tables

12. References: References should have the following format
   For Books: "Title of Book", Authors, Publisher, Edition
   For Papers: "Title of Paper", Authors, Journal/Conference Details, Year

List of Submission
   1 Working model of the project
   2 Project Report
   3 Presentation and demonstration of project in exhibition

Course Outcome(CO):
   1 Ability to understand community needs
   2 Ability to covert idea in to product
   3 Ability to work in group

   4 Ability to communicate effectively with customers

Mapping of CO and PO

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

Assessment pattern

The continuous assessment shall be done by the supervisor based on attributes like critical thinking, creativity, collaborative efforts and communication skills in students. The end semester assessment shall be done by external referee one week before the term end. The department shall arrange exhibition (all department will arrange the exhibition on same day) of the minor projects done by students and the referee will judge the project work in accordance with the outcomes of the course by interacting with students and marks will be awarded to individual student. This exhibition will remain open for all students, parents, and other citizens visiting the exhibition.

Teaching Load

One supervisor from the department shall be assigned five project batches of the minor project. The weekly load for the supervisor is 2Hr/week