PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)
B.E. CIVIL ENGINEERING
CURRICULUM
REGULATIONS 2015

SEMESTER III

Course Code	Course Title	L	T	P	C
MA15301	Transforms and Boundary Value Problems	3	2	0	4
CE15301	Applied Geology	3	0	0	3
CE15302	Mechanics of Solids	3	0	0	3
CE15303	Mechanics of Fluids	3	0	0	3
CE15304	Construction Technology	3	0	0	3
CE15305	Surveying- I	3	0	0	3
CE15306	Survey Practical – I	0	0	4	2
CE15307	Construction Lab and Practice	0	0	4	2
CE15308	Computer Aided Building Drawing	0	0	2	1

SEMESTER IV

Course Code	Course Title	L	T	P	C
MA15404	Numerical Methods	3	2	0	4
CE15401	Basic structural design I (Masonry and Steel)	3	0	0	3
CE15402	Strength of Materials	3	0	0	3
CE15403	Applied Hydraulic & Fluid Machines	3	0	0	3
CE15404	Surveying – II	3	0	0	3
CE15405	Water Supply Engineering	3	0	0	3
CH15403	Environmental Science and Engineering	3	0	0	3
CE15406	Hydraulic Engineering Laboratory	0	0	4	2
CE15407	Survey Practical – II	0	0	4	2
CE15408	Strength of Materials Laboratory	0	0	4	2
EN15401	Business English Course Laboratory	0	0	2	1

SEMESTER III

MA15301 TRANSFORMS AND BOUNDARY VALUE PROBLEMS 3 2 0 4

COURSE OBJECTIVES

- introduce Fourier series analysis which is central to many applications in engineering apart fromits use in solving boundary value problems
- acquaint the students with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- formulate Partial Differential Equations and use Mathematical tools for the solution of PDE that model several physical processes
- develop the modeling of one dimensional equation of heat conduction, wave equation and two dimensional Laplace equation
- develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform does for continuous systems, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 15

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Gibb's Phenomenon – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 15

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 15

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 15

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 15

Z-transforms –Elementary properties – Inverse Z-transform – Convolution theorem –Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL : 75 PERIODS

COURSE OUTCOMES

At the end of the course the students would

- have gained a well founded knowledge of fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair and specialization on fourier transform pair, their properties.
- have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the fourier series method of solution, solve them and interpret the results.
- be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- have learnt the basics of z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the z – transform technique bringing out the elegance of the procedure involved.

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Narayanan S., ManickavasagamPillai.T.K and Ramanaiah.G"Advanced Mathematics for Engineering Students",Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

REFERENCES

1. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics",3rd Edition, Pearson Education 2007.
4. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th edition, Wiley Publications.
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
6. Datta K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi, 2013.

WEB LINKS

1. https://www.youtube.com/watch?v=coe-UA5ONI0
2. https://www.youtube.com/watch?v=gZNm7L96pfY
3. https://www.youtube.com/watch?v=4GHY8sRKPaU
4. http://172.16.100.200/NPTEL/displayweb.html?type1=111103021%2F35.pdf
5. http://172.16.100.200/NPTEL/displayweb.html?type1=111104031%2Flectures.pdf%23page%3D101.

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	-	-	-	-	-	-	-	2	3	3
CO2	3	2	3	2	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	3
CO4	3	2	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	2	3	-	-	-	-	-	-	-	3	3	3

CE15301 APPLIED GEOLOGY 3 0 0 3

COURSE OBJECTIVES

- To understand weathering process and mass movements.
- To distinguish geological formations.
- To identify geological structures and processes for rock mass quality.
- To know subsurface information and ground water potential sites through geophysical investigations.
- To apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.

UNIT I GENERAL GEOLOGY 9

Geology in civil engineering- Branches of geology; Earth structures and composition- Elementary knowledge on continental drift and plate tectonics; Earth processes- Weathering - Geological work of rivers, wind and sea - Engineering importance; Earthquake belts in India; Groundwater- Mode of occurrence - Prospecting -Importance in civil engineering.

UNIT II MINERALOGY 9

Introduction -Study of rock forming minerals - Felspar group, Quartz Group- hornblende - Mica group- Muscovite, biotite; Oxide minerals - Quartz, corundum; Carbonate minerals- Calcite, dolomite, magnesite; Coal and petroleum- Origin and occurrence in India.

UNIT III PETROLOGY 9

Classification of rocks; Distinction between igneous, sedimentary and metamorphic rocks; Occurrence, engineering properties and distribution; Igneous rocks- Granite, syenite, diorite, gabbro, pegmatite, dolerite and basalt; sedimentary rocks- Sandstone, limestone, shale, conglomerate and breccia; Metamorphic rocks- quartzite, marble, slate, phyllite, gneiss and schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD 9

Introduction- Study of structural features- Folds, faults and joints; Engineering considerations - Geophysical investigations- Seismic and electrical.

UNIT V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9

Geological conditions necessary for construction of dams, tunnels, buildings, road cuttings- Landslides – Causes and preventions- improvement of sites.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- classify the various geological agents and processes involved.
- identify the available minerals by their properties and behavior.
- understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbour.
- choose the types of foundations and other related aspects.

TEXTBOOKS

1. Parbin Singh, "Engineering and General Geology", S.K.Kataria& Sons, 2008.
2. MarlandP.Billings, "Structural Geology", PHI Learing Pvt. Ltd. New Delhi, 2012

REFERENCES

1. F.G.Bell, "Engineering Geology", Butterworth –Heinemann (An Imprint of Elsevier), 2007.
2. F.G.H. Blyth and M.H.de Freitas, "A Geology for Engineers", Butterworth –Heinemann (An Imprint of Elsevier), 2006.
3. Rutleys "Mineralogy"
4. Leverson "Petroleum Geology"
5. Tyrell "Petrology"

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	-	-	-	-	2	2	-	-	-	-	-	2	-
CO2	2	-	-	2	2	-	-	-	2	-	-	-	2	-
CO3	2	2	1	1	-	-	-	-	2	-	-	-	2	-
CO4	2	2	-	1	2	2	2	2	-	-	2	2	2	-
CO5	-	-	1	1	-	2	2	2	2	1	2	2	2	-

CE15302 MECHANICS OF SOLIDS 3 0 0 3

COURSE OBJECTIVES

- To understand the state of stresses and strains in structural components as a result of different loading conditions.
- To analyze the truss elements under complex state of stress by means of analytical and graphical methods. Also behavior thin cylinder with different conditions.
- To acquire knowledge in shear force and bending moment for all statically determinate beams by recognizing the beam type and loading.
- To find deflection of beam with different load and different method. To provide exposure on the concepts of internal stress in beams of various cross sections.
- To know the behavior of members subjected to pure torsion and also to develop knowledge about springs.

UNIT I STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS 9

Rigid bodies and deformable solids - stability, strength, stiffness, tension, compression and shear stresses; strain, elasticity, Hooke's law, limit of proportionately, modules of elasticity, stress-strain curve, lateral strain - temperature stresses - deformation of simple and compound bars; shear modulus, bulk modulus, relationship between elastic constants; biaxial state of stress - stress at a point - stress on inclined plane - principal stresses and principal planes - Mohr's circle of stresses.

UNIT II ANALYSIS OF PLANE TRUSS, THIN CYLINDERS / SHELLS 9

Stability and equilibrium of plane frames; types of trusses - analysis of forces in truss members- method of joints- method of sections- method of tension coefficients; thin cylinders and shells - under internal pressure - deformation of thin cylinders and shells.

UNIT III TRANSVERSE LOADING ON BEAMS 9

Beams - types of supports - simple and fixed, types of load - concentrated, uniformly distributed, varying distributed load, combination of above loading; relationship between bending moment and shear force - bending moment, shear force diagram for simply supported, cantilever and over hanging beams - Theory of simple bending - analysis of stresses - load carrying capacity of beams - proportioning of sections

UNIT IV DEFLECTION OF BEAMS AND SHEAR STRESSES 9

Deflection of beams - double integration method - Macaulay's method - slope and deflection using moment area method, Conjugate Beam method - variation of shear stress - shear stress distribution in

rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections- shear flow- shear centre.

UNIT V TORSION AND SPRINGS 9

Stresses and deformation in circular (solid and hollow shafts) - stepped shafts - shafts fixed at both ends - leaf springs - stresses in helical springs - deflection of springs.

TOTAL : 45PERIODS

COURSE OUTCOMES

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

- understand the fundamental concepts of stress and strain in mechanics of solids and structures.
- analyse the truss for internal forces and also forces of thin cylinder.
- analyse determinate beams and to determine shear forces, bending moments and axial forces.
- evaluate the elements subjected to complex deflection by means of analytical methods. also internal shear stress of different cross section.
- gain a sufficient knowledge in designing shafts to transmit required power and also springs for its maximum energy storage capacities**.**

TEXT BOOKS

1. Rajput.R.K. “Strength of Materials”, S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
3. Bansal R.K. Strength of materials, Laxmi Publications, New Delhi – 2007

REFERENCES

1. Subramanian R., Strength of materials, Oxford university press, New Delhi - 2005
2. William A.Nash, Theory and Problems of Strength of Materials, Schaum’s Outline Series, Tata McGraw-Hill publishing co., New Delhi - 2007.
3. Ramamrutham, S.,”Strength of Materials”, DhanpatRai& Sons, 2008
4. Srinath L.S,” Advanced Mechanics of Solids”, Tata McGraw-Hill Publishing Co., New Delhi, 2005.
5. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.
6. http://web.mst.edu/~mecmovie/

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	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CO2	2	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	2	2	2	-	-	-	-	-	1	-	2	1
CO4	2	3	2	2	2	2	-	-	-	-	1	-	2	1
CO5	2	2	3	2	-	2	-	-	-	-	1	1	2	1

CE15303 MECHANICS OF FLUIDS 3 0 0 3

COURSE OBJECTIVES

- To apply conservation laws to derive governing equations of fluid flows.
- To obtain knowledge in kinematic flow of fluid
- To compute hydrostatic and hydro dynamic forces.
- To analyze and design simple pipe systems.
- To apply principles of dimensional analysis to design experiments.

UNIT I FLUID STATICS, BUOYANCY AND FLOATATION 10

Fluid Statics; Variation of static pressure; Pascal's law; Atmospheric, Absolute and gauge pressure; Pressure measurement by mechanical gauges and manometers; pressure on plane surfaces and curved surfaces. Buoyancy; Buoyant and Centre of Buoyancy; Stability of submerged bodies and floating bodies; Metacentre and metacentric height; Determination of Metacentric height-Floatation.

UNIT II KINEMATICS OF FLUID FLOW 10

Methods of describing fluid motion; Types of flow- Three, two and one dimensional flows; irrotational and rotational flows; Streamline; pathline; Streakline; Equation for acceleration; Continuity equation; Velocity potential and stream function; flownet; Vortex flow-Free vortex and forced vertex flow.

UNIT III DYNAMICS OF FLUID FLOW 8

Control volume and control surface - Energy and its forms. Energy equation- Euler's and Bernoulli's equation -Applications - venturimeter - orifice meter - pitot tube- Flow over notches and weirs – Other Flow measuring devices.

UNIT IV FLOW THROUGH PIPES 9

Laminar flow through circular pipes and between parallel plates - Hagen Poisullie equation - turbulent flow - Darcy Weisbach formula - Moody diagram - Impulse Momentum principle-Major and Minor losses.

UNIT V BOUNDARY LAYER AND FLOW ON SUBMERGED BODIES 8

Boundary layer- Definition - Boundary layer on a flat plate - Thickness and classification - Displacement, energy and momentum thickness - Boundary layer separation and control- Flow around submerged objects - Drag and lift coefficients - Lift on cylinders - Streamlined and Airfoil.

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- attain a thorough knowledge in various fundamental properties of fluids.
- determine the forces acting on bodies submerged in static fluid.
- apply the continuity, energy and momentum equations to fluid flow.
- distinguish laminar and turbulent flow through pipes and compute the energy losses in pipe flow.
- select appropriate model to provide solution to a real time problem related to hydraulics.

TEXT BOOKS

1. R.K.Rajput., "A text book of Fluid Mechanics", S.Chand and Company, NewDelhi, 2007.
2. R.K. Bansal, "Fluid mechanics and hydraulic machines," Laxmi Publications (P) Ltd, 2006.
3. Modi P.N and Seth S.M, "Hydraulics and Fluid Mechanics", Including Hydraulic Machines, Standard Book House, Newdelhi, 2002.
4. S.Ramamurtham and R.Narayanan , "Hydraulics and Fluid Mechanics and Fluid Mechines" Dhanpatrai Publishing Co (P) Ltd, NewDelhi, 2000.

REFERENCES

1. Streeter, Victor L., Wylie, E.Benjamin , "Fluid Mechanics", McGraw - Hill., 1998.
2. Kumar.K.L., "Engineering FluidMechanics", Eurasia Publishing Houses (P) Ltd., NewDelhi, 2000. Natarajan M.K, "Principles of Fluid Mechanics", Anuradha Agencies, VidayalKaruppur,Kumbakonam, 1995.
3. P.N. Modi& S.M. Seth, "Hydraulics and fluid mechanics including hydraulic machines," Standard book house, New Delhi, 2005
4. K.L. Kumar , "Engineering fluid mechanics," Eurasia publishing house, 1995
5. bookboon.com › en › engineering-fluid-mechanics-ebook
6. engineeringtoolbox.com › fluid-mechanics-t 21
7. efunda.com › formulae › fluids

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CO1	3	2	-	1	1	-	-	-	-	1	1	2	3	-
CO2	3	2	-	1	1	-	-	-	-	1	1	2	3	-
CO3	3	2	-	2	1	-	-	-	-	1	1	2	3	1
CO4	3	2	-	2	1	-	-	-	-	1	1	2	3	1
CO5	3	2	-	2	1	-	-	-	-	1	1	2	3	2

CE15304 CONSTRUCTION TECHNOLOGY 3 0 0 3

COURSE OBJECTIVES

- To identify the characteristics building materials
- To understand the Manufacturing process of bricks and cement.
- To explain the manufacturing process of concrete.
- To identify the methods for preservation of timber and metals.
- To understand the use of non-conventional Civil Engineering materials.

UNIT I STONES – BRICKS – CONCRETE BLOCKS 9

Stone as building material - Criteria for selection - Tests on stones - Deterioration and Preservation of stone work; Bricks -Classification -Manufacturing of clay bricks- Tests on bricks -Compressive Strength - Water Absorption - Efflorescence -Bricks for special use - Refractory bricks; Cement, Concrete blocks- Lightweight concrete blocks.

UNIT II LIME – CEMENT – AGGREGATES – MORTAR 9

Lime - Preparation of lime mortar; Cement - Ingredients - Manufacturing process - Types and Grades - Properties of cement and Cement mortar -Hydration -Compressive strength - Tensile strength - Fineness- Soundness and consistency -Setting time - Industrial byproducts - Fly ash; Aggregates -Natural stone aggregates - Crushing strength -Impact strength- Flakiness Index- Elongation Index- Abrasion Resistance - Grading -Sand Bulking.

UNIT III CONCRETE 9

Concrete -Ingredients -Manufacturing Process- Batching plants- RMC- Properties of fresh concrete - Slump - Flow and compaction Factor- Properties of hardened concrete -Compressive, Tensile and shear Strength Concrete and HPC - Self compacting Concrete -Other types of Concrete; Durability of Concrete.

UNIT IV TIMBER AND OTHER MATERIALS 9

Timber-Market forms- Industrial timber -Plywood - Veneer -Thermacole - Panels of laminates; Steel - Aluminum and Other Metallic Materials -Composition - Aluminium composite panel -Uses -Market forms -Mechanical treatment; Paints - Varnishes - Distempers -Bitumens.

UNIT V MODERN MATERIALS 9

Glass – Ceramics- Sealants for joints-Fibre glass reinforced plastic; Clay products - Refractories- Composite materials -Types -Applications of laminar composites; Fibre textiles -Geomembranes and Geotextiles for earth reinforcement. **TOTAL: 45 PERIODS**

COURSE OUTCOMES

At the end of the course students will be able to

- identify construction materials
- familiarize on wave characteristics of basic building materials
- understand the behavior and manufacture of cement and concrete.
- identify timber materials.
- understand and conserve the modern materials.

TEXT BOOKS

1. Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2012.
2. Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.
3. Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd.,2008.
4. Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004
5. Duggal.S.K., "Building Materials", 4th Edition, New Age International , 2008.

REFERENCES

1. Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.
2. Gambhir. M.L., &NehaJamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
3. IS456 – 2000: Indian Standard specification for plain and reinforced concrete, 2011
4. IS4926–2003 : Indian Standard specification for ready–mixed concrete, 2012

CO PO MAPPING:

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Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	2	-	3	-	2	-	-	-	-	3	-
CO2	3	-	3	-	1	-	1	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	-	2	1	-	-	3	3
CO4	3	-	-	-	-	-	-	-	-	-	2	-	3	-
CO5	2	-	-	2	-	-	-	2	-	-	-	1	3	2

CE15305 SURVEYING I 3 0 0 3

COURSE OBJECTIVES

- To understand the working principles of survey instruments.
- To calculate angles and distances.
- To identify data collection methods and prepare filed notes.
- To estimate measurement errors and and apply corrections.
- To interpret survey data and compute areas and volumes.

UNIT I INTRODUCTION AND CHAIN SURVEYING 9

Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II COMPASS SURVEYING AND PLANE TABLE SURVEYING 9

Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors ; Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT III LEVELLING AND APPLICATIONS 9

Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes; Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV THEODOLITE SURVEYING 9

Theodolite - Vernier and micro optic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.

UNIT V TACHEOMETRIC SURVEYING 9

Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

TOTAL:45PERIODS

COURSE OUTCOMES

At the end of the course students will be able to

- understand the working principles of survey instruments.
- calculate included angles and bearings by using compass.
- interpret survey data compute areas and volumes.
- estimate measurement errors and apply corrections.
- calculate horizontal angles and vertical angles by using tacheometer.

TEXT BOOKS

1. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain "Surveying (Volume –I)", Lakshmi Publications,2005.
2. S.K.Duggal, "Surveying (Volume-I) "Tata Mcgraw-Hill Publishing company Ltd. Newdelhi,2007.
3. Dr.P.Purushothama Raj, "Surveying-I" Tata Mcgraw-Hill Publishing company Ltd. Newdelhi,2013.

REFERENCES

1. AlakDe , "Plane surveying", S.Chand& Company, New Delhi,2002.
2. A.M Chandra, "Plane Surveying", New age International, New Delhi, 2004.
3. S. S. Bhavikatti, "Surveying and Levelling (Volume-1)"I. K. International Pvt Ltd, 2009.
4. Basak, "Surveying &Levelling", Tata McGraw-Hill Education, 2000.
5. http://nptel.ac.in

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	1	1	-	-	-	-	-	-	-	1	3	1
CO2	3	2	2	1	-	-	-	-	-	-	-	1	3	1
CO3	2	2	1	1	-	-	-	-	-	-	-	2	3	1
CO4	2	2	2	2	-	-	-	-	-	-	-	2	3	1
CO5	1	2	2	2	-	-	-	-	-	-	-	2	3	1

CE15306 SURVEY PRACTICAL I 0 0 4 2

COURSE OBJECTIVES

- To conduct survey and field data.
- To prepare field notes from survey data.
- To interpret survey data and compute areas and volumes.
- To understand the working procedure of total station

LIST OF EXPERIMENTS

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection –Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level **TOTAL:60PERIODS**
12. Fly levelling using tilting level
13. Check levelling
14. LS and CS
15. Contouring

COURSE OUTCOMES

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

- conduct survey by using surveying instruments such as chain/tape, compass, plane table, and theodolite.
- prepare field notes from survey data.
- interpret survey data and compute areas and volumes.
- measure the horizontal and vertical distance by total station

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	-	-	2	1	-	-	2	1	-	1	3	-
CO2	2	1	-	-	3	2	-	-	3	1	-	1	3	-
CO3	3	2	-	-	2	-	-	-	2	1	-	2	3	1
CO4	2	2	-	-	3	2	-	-	3	1	-	2	3	2

CE15307 CONSTRUCTION LAB AND PRACTICE 0 0 4 2

COURSE OBJECTIVES

- To construct the different types of bonds in brickwork and making different joints.
- To find every day room temperature by setting standard Temperature measuring Devices.
- To demonstrate and practice in plastering, painting, varnishing and polishing.
- To practice Cutting, Hooking, Cranking and arrangement of reinforcement.

LIST OF EXPERIMENTS

1. Arrangement of bricks using English bond in one brick thick wall and one and half brick thick for right angled corner junction.
2. Arrangement of bricks using English bond in one brick thick wall and one and half brick thick wall for Tee-junction
3. Arrangement bricks using English bond in one brick thick, one and half and two brick thick square pillars.
4. Arrangement of bricks using Flemish bond in one brick thick wall and one and half brick thick for right angled corner junction.
5. Arrangement of bricks using Flemish bond in one brick thick wall and one and half brick thick wall for Tee-junction
6. Arrangement bricks using Flemish bond in one brick thick, one and half and two brick thick square pillars.
7. Practice on measuring every day temperature in the Laboratory by setting standard Temperature measuring Devices in the Laboratory and separate register to be maintained in the Laboratory for temperature records for future reference. (For Demonstration purpose but it is Compulsory).
8. Demonstration and practice in plastering, painting, varnishing and polishing.
9. Cutting, Hooking, cranking and arrangement of reinforcement.
    a. Beam
    b. Lintel and Sunshade
    c. Column and footing.
10. Pre – measurement for steel work. The following models should be prepared in the laboratory, students should take out measurement from the model, they should enter the measurement in the measurement book and the total quantity of steel required in kg for each item may be arrived. One way slab-size – 2.0 m x 2.0 m Main rod - 8 mm dia. - 15 nos. Distributor - 6 mm dia - 12 nos.

11. Pre – measurement for steel work. The following models should be prepared in the laboratory, students should take out measurement from the model, they should enter the measurement in the measurement book and the total quantity of steel required in kg for each item may be arrived. Column and footing Footing – size – 1.0 m x 1.0 m – 10 mm dia 5 nos. each direction Column – size – 150 mm x 150 mm – 4 nos. 10 mm dia
12. Pre – measurement for steel work. The following models should be prepared in the laboratory, students should take out measurement from the model, they should enter the measurement in the measurement book and the total quantity of steel required in kg for each item may be arrived.
    a. Beam – size – 230 mm x 300 mm – Length – 2.0 m Bottom rod – 12 mm – 3 nos.
    b. Top rod – 10 mm – 2 nos. Stirrups – 6 mm – 14 nos.

TOTAL : 60PERIODS

COURSE OUTCOMES

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

- construct the different types of bonds in brickwork and making different joints.
- calculate the everyday room temperature by setting standard temperature measuring devices.
- practice plastering, painting, varnishing and polishing works.
- practice cutting, hooking, cranking and arrangement of reinforcement.

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	-	3	-	1	-	2	-	-	-	3	2
CO2	3	3	-	-	3	-	1	-	2	-	-	-	3	2
CO3	3	3	-	-	3	-	1	-	2	-	-	-	3	2
CO4	3	3	-	-	3	-	1	-	2	-	-	-	3	2

CE15308 COMPUTER AIDED BUILDING DRAWING 0 0 2 1

COURSE OBJECTIVES

- To draw the Plan, Section and elevation of a building.
- To create, analyse and reproduce 2D drawings of buildings in Auto CAD.
- To create, modify and annotate commands using software.
- To draw the basic 3-D view of a simple building.

LIST OF EXPERIMENTS

PART A

1. Introduction to Building drawing
2. Symbols and sign conventions related to buildings and architecture – Structure types – components of a typical residential building – developing plan, section and elevation of buildings.

PART B (Using standard drafting software)

1. Drafting and annotation commands.
2. Simple Drawings I
3. Simple drawings II.
4. Drawings using advanced commands.

PART C (Building Drawings)

Plan, elevation and cross section of

1. Single storied residential building
2. Multi-storied residential building
3. Framed office building
4. Institution building
5. Industrial building with north light roof truss
6. 3D view of a single floor residential building:

TOTAL : 30PERIODS

COURSE OUTCOMES

At the end of this lab course the students will be able to

- Create 2d and 3d views of buildings.
- Understand the different views of the components of a building.
- Familiarize with the standard symbols and sign conventions suitably.
- Create, modify and annotate commands.

TEXT BOOKS

1. Sikka V.B., "A Course in Civil Engineering Drawing", 4th edition, S.K.Kataria& Sons, New Delhi, 1998.
2. Shah M.G. Kale C.M. &Patki S.Y., "Building Drawing with an Integrated Approach to Built Environment", 4th edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2002.

REFERENCES

1. Building drawing - Shah.M.G., Tata McGraw-Hill,1992
2. Building planning & Drawing -Kumaraswamy N., KameswaraRao A., Charotar Publishing
3. www.iitk.ac.in/cad/
4. www.cadl.iiscx.ernet.in/

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	1	-	2	-	-	-	-	-	-	-	-	2
CO2	1	1	1	-	2	-	-	-	-	-	1	1	1	3
CO3	2	1	2	-	3	-	-	-	-	-	1	1	1	3
CO4	2	1	2	-	3	-	-	-	-	-	1	1	1	3

SEMESTER IV

MA15404 NUMERICAL METHODS 3 2 0 4

COURSE OBJECTIVES

- To analyze the solution for a large system of linear equations.
- To find the intermediate values when a series of data is given.
- To develop efficient algorithms for solving problems in science, engineering and technology.
- To solve the non-linear differential equations that cannot be solved by regular conventional method.
- To develop the accuracy of second order differential equation by finite difference method.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 15

Solution of equation –Iteration method : Newton Raphson method – Solution of linear system by Gaussian elimination and Gauss - Jordon method – Iterative method – Gauss-Seidel method – Inverse of a matrix by Gauss Jordon method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 15

Lagrangian Polynomials – Divided differences –Newton's Divided Difference, Hermite Interpolation Polynomial and Interpolating with a cubic spline – Newton‟s forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 15

Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3– Romberg's method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpsons' rule.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 15

Single step methods: Taylor series method – Modified Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 15

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL: 75 PERIODS

COURSE OUTCOMES

On the completion of the course, students will be able to

- understand the basics of problem solving in linear equations.
- learn the methods on interpolation which will be useful in constructing approximate polynomial to represent the data is understood.
- acquire basic knowledge in developing computer programs.
- apply the concepts of initial value problem with more accuracy in the field of science and engineering field.
- acquire the computational procedure of the amount of heat emitted or transferred from an object.

TEXTBOOKS

1. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th edition, Wiley Publications, 2010.
2. T. Veerarajan. and T .Ramachandran, "Numerical Methods with programming in C", 2nded., Tata McGraw-Hill, 2006.
3. SankarRaoK" Numerical Methods ForScientisits And Engineers –3rd Edition Princtice Hall of India Private, New Delhi, 2007.

REFERENCES

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Gerald C.F. and Wheatley, P.O., "Applied Numerical Analysis" 6thEdition, Pearson Education Asia, New Delhi, 2002.
3. M.K.Jain , S.R.K. Iyangar , R.K.Jain , "Numerical Methods For Scientific & Engineering Computation" , New Age International (P) Ltd , New Delhi , 2005.
4. M.B.K. Moorthy and P.Geetha, "Numerical Methods" , Tata McGraw Hill Publications company, New Delhi, 2011.

WEB LINKS

1. https://www.youtube.com/watch?v=QTQ8bO1F-Dg
2. https://www.youtube.com/watch?v=AT7Olelic8U
3. https://www.youtube.com/watch?v=TH06N7Q7FJw
4. https://www.youtube.com/watch?v=DnBJLpdVHCY.
5. https://www.youtube.com/watch?v=5TccPEz2nB8

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
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CO1	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO2	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO3	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO4	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO5	3	3	3	2	-	-	-	-	-	-	-	1	3	2

CE15401 BASIC STRUCTURAL DESIGN I (MASONRY AND STEEL) 3 0 0 3

COURSE OBJECTIVES

- To introduce the basic concept and steps in the design of beams and slabs mainly in accordance with limit state method
- To impart knowledge in rivetted and bolted joints.
- To create knowledge in design of welding joints.
- To introduce the concept of design principles and structural design of masonry structures.
- To design timber structures.

UNIT I STRUCTURE AND DESIGN CONCEPTS 9

Classification of structures - function, material and shape- different structural systems- requirements of structures -basic structural requirements- stability, strength and stiffness; Design process- codes of practice; Working Stress Method -Limit State Method of Design -Probabilistic approach to design - load and resistance -factor design - design for strength, stiffness and stability considerations- choice between different structural materials - concrete, timber, masonry and steel. Structural Loads; Dead load-live load-wind load - calculation of wind load for a structure- seismic load.

UNIT II RIVETTED AND BOLTED CONNECTIONS 9

Types of connections - type of riveted joints -modes of failure of riveted joint -strength of riveted joint - design of riveted joint subjected to axial load - joint subjected to moment - joint in framed structures; Types of bolts- black bolts -turned and fitted bolts- high strength friction grip bolts -proof loads - types of bolted connections - design of bolted shear connections- subjected to shear and tension -pinned connections.

UNIT III WELDED CONNECTION 9

Types- advantages- defects- butt weld -fillet weld - stresses in welds - design of fillet weld for axial load-design of butt weld -plug and slot weld - eccentrically loaded fillet weld joints-eccentrically loaded butt welded joints.

UNIT IV DESIGN OF MASONRY WALLS AND COLUMNS 9

Brick masonry - brick walls - allowable stresses - design of load bearing wall -walls with opening - bed stones - axially loaded square and rectangular column with uniaxial eccentricity; Laterally Loaded masonry Structures; Structures and loads- stability of masonry - middle third rule - masonry dams - trapezoidal dam- retaining wall

.

UNIT V TIMBER STRUCTURES 9

Knots, Wanes, Checks and Shakes -slope of grain - classification and grading - factors of safety- permissible stresses -flexural members - flitched beam - timber columns and strut - members subjected to bending and axial stresses.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the basics principles of different design methods and different loading and end conditions.
- gain knowledge in limit state design concept, rivetted and bolted connections.
- gain knowledge in limit state design concept, welded connections.
- study the deformation behavior of axial loaded columns having different end conditions and further, evaluate the strength of such columns.
- design a axial and eccentricitical loaded timber structures based on the knowledge gained for varies loading condition.

TEXT BOOKS

1. BhavikattiS.S. ,Design of Steel Structures by Limit State Method ,I.K.InternationalPvtLtd,New Delhi,2009.
2. Chandra R, Limit State Design of Steel Structure,ScientificPublishers,New Delhi,2009.
3. DayaratnamP,Brick and Reinforced Brick Structures, OXFORD& IBH Publishing Co.Pvt Ltd, New Delhi 2004.

REFERENCES

1. Subramanian N, Design of Steel Structures, First Edition OXFORD University Press 2008.
2. Ramachandra S,&VirendraGehlot.,Limit State Design of Steel Structures,Std Publications, New Delhi 2009.
3. Teaching Resources for Structural Steel Design-Vol.I&II,INSDAG,Kolkatta.
4. Gaylord,E.H., Gaylord,N.C&Stallmeyer, J.E.,Design of Steel Structure, 3rdEdition,McGraw-Hill Publications,1992.
5. IS 800-2007 code of Practice for General Construction Steel.
6. IS 1905-1987 code of Practice for Structural Use of and Unreinforced Masonry.
7. http://ceae.colorado.edu/~saouma/Lecture-Notes/s4a.pdf
8. http://pareto.uab.es/xmg/Docencia/IO-en/IO-Introduction.pdf

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	2	-	-	-	-	-	-	-	-	1	2
CO2	2	3	3	2	-	-	-	-	-	-	-	-	1	2
CO3	2	3	3	2	-	-	-	-	-	-	-	-	1	2
CO4	2	3	3	2	-	-	-	-	-	-	-	-	1	2
CO5	2	3	3	2	-	-	-	-	-	-	-	-	1	2

CE15402 STRENGTH OF MATERIALS 3 0 0 3

COURSE OBJECTIVES

- To understand the concept of energy principles.
- To anlyze the determinate and indeterminate beams.
- To analyze columns and struts.
- To understand the concept of theories of failure and state of stress in three dimensions.
- To understand advanced concepts like unsymmetrical bending, stresses in curved bars and locating shear centre.

UNIT I ENERGY PRINCIPLES 9

Strain energy and strain energy density - strain energy in traction, shear in flexure and torsion - castigliano's theorems - principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorems

UNIT II INDETERMINATE BEAMS 9

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) - theorem of three moments - analysis of continuous beams - shear force and bending moment diagrams for continuous beams - slope & deflections in continuous beams (qualitative study only)

UNIT III COLUMNS AND CYLINDER 9

Eccentrically loaded short columns - middle third rule - core section - columns of unsymmetrical sections - (angle channel sections) - Euler's theory of long columns - critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns - thick cylinders - compound cylinders.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS 9

Spherical and deviatory components of stress tensor - determination of principal stresses and principal planes - volumetric strain - dilatation and distortion - theories of failure - principal stress dilatation - principal strain - shear stress - strain energy and distortion energy theories - application in analysis of stress, load carrying capacity and design of members - residual stresses

UNIT V ADVANCED TOPICS IN BENDING OF BEAMS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach formula - stress concentration - fatigue and fracture.

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- understand energy method for estimating the slope and deflections of beams and trusses.
- analyze the indeterminate beams such as propped cantilever, fixed beams and continuous beams
- formulate the safe load and crippling load on the coumn for different end conditions and also analyze the stress distribution in thick cylinders subjected to fluid pressure.
- analyze the various types of failures of materials by theories of failures and also know stresses in three dimensions.
- apply the concepts in beams subjected to unsymmetrical bending.

TEXT BOOKS

1. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi 2003
2. Rajput R.K. Strength of Materials, S.Chand& company Ltd., New Delhi – 2006.
3. Bansal R.K, Strength of Materials (Mechanics of Solids), Laxmi publishing PvtLtd,New Delhi, 2012.

REFERENCES

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing company Ltd, 2007.
3. Khurmi R.S, Strength of Materials (Mechanics of Solids), S.Chand& Company Ltd.,2010.
4. Srinath, L.S. Advanced mechanics and solids, Tata-McGraw Hill publishing company ltd, 2005.
5. Punmia B.C, Ashok K. Jain and Arun K. Jain, Mechanics of Structures (SMTS I), Laxmi publishing PvtLtd,New Delhi,2011.
6. Punmia B.C, Ashok K. Jain and Arun K. Jain, Theory of Structures (SMTS II), Laxmi publishing PvtLtd,New Delhi,2004.

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
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	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	1
CO2	2	3	-	2	-	-	-	-	-	-	-	-	3	1
CO3	2	3	3	2	-	-	-	-	-	-	-	-	3	1
CO4	2	3	2	2	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	2	-	-	-	-	-	-	-	-	3	1

CE15403 APPLIED HYDRAULICS & FLUID MACHINES 3 0 0 3

COURSE OBJECTIVES

- To compute drag and lift coefficients.
- To design channels
- To compute flow profiles in channel transitions and analyse hydraulic transients
- To design the working proportions of hydraulic machines.
- To analyse compressible flow of liquids.

UNIT I UNIFORM OPEN CHANNEL FLOW 9

Types and regimes of open channel flow - Velocity distribution in open channel -Wide open channels; Chezy's& Manning's uniform flow equations -Determination of normal depth - Most economical section.

UNIT II CRITICAL FLOW 9

Specific energy -Specific energy diagram - Alternate depths; Critical flow condition in rectangular, triangular, trapezoidal, and circular channels; Flow through transitions (local bed rise and width contraction).

UNIT III NON-UNIFORM FLOW 9

Dynamic equation of gradually varied flow -Determination of GVF profiles- Direct and standard step methods; Hydraulic jump -Sequent depths -Surge.

UNIT IV TURBINES 9

Impact of jet on flat and curved plates; Classification of turbines - Pelton wheel turbine -Francis turbine-Kaplan turbine; Draft tubes – Cavitation; Case study.

UNIT V PUMPS 9

Centrifugal pump -Single and Multi stage pumps - Reciprocating pump - Indicator diagram- Separation & Cavitation -Air vessel; Other pumps- Case study.

TOTAL : 45PERIODS

COURSE OUTCOMES

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

- understand theories those explain behaviour and performance of fluid when it is flowing in an open channel.
- demonstrate critical flow condition in channels
- determine gvf profiles under non-uniform flow

- compare the components, functions and use of different types of turbine
- understand the components, functions and use of different types of pump.

TEXT BOOKS

1. K. Subramanya, "Flow in open channels," Tata McGraw-Hill publishing company limited, 2007
2. R.K. Bansal, "Fluid mechanics and hydraulic machines," Laxmi Publications (P) Ltd, 2006

REFERENCES

1. Rajput R.K.' A text book of Fluid Mechanics and Hydraulic Machines", S.Chand and Co. Pvt. Ltd, New Delhi, 2003.
2. V.T. Chow, "Open channel hydraulics," Blackburn Press, 2009
3. P.N. Modi& S.M. Seth, "Hydraulics and fluid mechanics including hydraulic machines," Standard book house, 2005.
4. K.G. RangaRaju, "Flow through open channel," Tata McGraw-Hill publishing company limited, 1999

WEB LINKS

1. ebookbrowsee.net › ap › applied-hydraulic-engineering
2. tnupdater.blogspot.com›2013/04› applied-hydraulic-engineering-
3. eng.nus.edu.sg › civil › JoiNUS › roles hydraulic

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	1	2	-	-	-	-	-	-	-	-	3	2
CO2	2	3	1	2	-	-	-	-	-	-	-	-	3	2
CO3	2	3	1	2	-	-	-	-	-	-	-	-	3	2
CO4	2	3	1	2	-	-	-	-	-	-	-	-	3	2
CO5	2	3	1	2	-	-	-	-	-	-	-	-	3	2

CE15404 SURVEYING II 3 0 0 3

COURSE OBJECTIVES

- To study the trignometrical levelling.
- To adjust the error encountered during surveying
- To work with total station
- To understand the concept of GPS
- To know the various types of surveys

UNIT I CONTROL SURVEYING 9

Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre ; Trignometrical leveling-Single and reciprocal observations - Modern trends – Bench marking

UNIT II SURVEY ADJUSTMENTS 9

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT III TOTAL STATION SURVEYING 9

Basic Principle-classifications-Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser total station instruments. Microwave system, measuring principle, working principle, sources of Error, Microwave Total station instruments, Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments; Modern positioning systems-Traversing and Trilateration.

UNIT IV GPS SURVEYING 9

Basic concepts-Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation- anti spoofing and selective availability-Task of control segment- Hand held and Geodetic receivers-data processing-Traversing and triangulation.

UNIT V ADVANCED TOPICS IN SURVEYING 9

Route Surveying-Reconnaissance- Route surveys for highways, railways and waterways; Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements; Hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem- Strength of fix-Sextants and station pointer; Astronomical Surveying-field observations and determination of Azimuth by altitude and hour angle methods- fundamentals of Photogrammetry and Remote sensing.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- study the advantages of electronic surveying over conventional surveying meyhods**.**
- understand the working principles of GPS, its components, signal structure and error sources.
- Understand various GPS surveying methods and processing techniques used in GPS.
- Take observations.
- demonstrate methods of survey in water bodies by hydrographic surveying, basic concepts adopted in photogrammetry.

TEXT BOOKS

1. Punmia B.C., Surveying, Vols. I, II and III, Laxmi Publications, 1989.
2. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
3. Dr.P.Purushothama Raj, "Surveying-II" Tata Mcgraw-Hill Publishing company Ltd. Newdelhi,2013.

REFERENCES

1. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971.
2. James M.Anderson and Edward M.Mikhail, Introduction to Surveying, McGraw-Hill Book Company, 1985.
3. Wolf P.R., Elements of Photogrammetry, McGraw-Hill Book Company, Second Edition, 1986.

WEB LINK

1. http://nptel.ac.in

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
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CO1	2	2	1	1	-	-	-	-	-	-	-	-	3	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	3	1
CO3	3	2	1	1	-	-	-	-	-	-	-	-	3	1
CO4	3	2	2	2	-	-	-	-	-	-	-	-	3	1
CO5	1	3	2	2	-	-	-	-	-	-	-	-	3	1

CE15405 WATER SUPPLY ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To analyze characteristics of water and waste water.
- To estimate the quantity of drinking water and domestic waste water generated.
- To design components of water supply systems.
- To understand the secondary water treatment techniques.
- To realize the principles of water distribution in a city and to a building, also about modern equipment to treat water.

UNIT I PUBLIC WATER SUPPLY PROJECT PLANNING AND FORECASTING 9

Necessary and objectives of public water supply schemes - planning and financing - housing treatment of water; Quantity of water - water requirements - continuous and intermittent supply - rate of demand - variations in rate of demand -its effect on design –-design periods and capacities of different components- population growth and forecast – estimating the quantity of water

UNIT II WATER INTAKE AND CONVEYANCE 9

Intakes- types, location, requirements and features; Transportation of water - Types of conduits - relative merits, selection of pipe and joints - hydraulic design and cross connected parallel pipe to increase capacity - laying and testing - Corrosion - theory and prevention; pumps.

UNIT III PRIMARY TREATMENT OF WATER 9

Water characteristics- quality standards Treatment flow charts - Principles of coagulation, flocculation and sedimentation - Design principles of - Flash mixer –Design and drawing (Line sketch) of flocculator and Sedimentation tank; Disinfection - methods and disinfectants - Disinfection devices - Chlorination - advantages - action of chlorine - application - dosage - different methods.

UNIT IV SECONDARY TREATMETN OF WATER 9

Principles of Filtration - Classification, Constructional and operational features of slow sand filters and rapid sand filters - Design criteria; Design and drawing (Line sketch) of slow sand filters and rapid sand filters, Miscellaneous treatment methods - aeration, taste and odour control, iron and manganese removal, water softening, fluoridation and defluoridation and demineralization; Residue Management-treatment plant layouts design - study of treatment plant projects.

UNIT – V DISTRIBUTION OF WATER, PLUMBING AND MODERN EQUIPMENTS FOR TREATING WATER 9

Distribution network - Requirements of distribution system - Analysis by Hardy Cross method- Equivalent Pipe method- Computer application; Service reservoirs - functions, classification - Service reservoir design; Waste detection and prevention - Metered and unmetered water supplies - plumbing in

multistory building - one pipe system and two pipe system - modern equipment to treat water in individual homes.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- plan and select the water sources for the water supply system.
- design the intake structures, transmission mains and pumps.
- select and design the treatment units for various sources of water and sludge.
- prefer the suitable advanced treatment technique for different sources of water.
- choose the appropriate water distribution network for a city and plumbing systems for a building.

TEXT BOOKS

1. Garg. S. K., "Water Supply Engineering", Khannah Publishers, Delhi, September 2001.
2. Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prentice hall of India 2008.
3. B.C .Bunmia, " water supply engineering", Lakshmi publications. Delhi, Augest, 2005
4. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003

REFERENCEBOOKS

1. Birdie.G.S., "Water Supply and Sanitary Engineering", DhanpatRai and sons, 1985.
2. Fair. G. M.., Geyer. J. C., "Water Supply and Waste Water disposal", John Wiley & Sons, 1954.
3. Babbit. H. E., and Donald. J. J., "Water Supply Engineering", McGraw Hill book Co, 1984
4. Steel E. W. et.al, "Water Supply Engineering", McGraw Hill International Book Co,1984
5. Duggal. K.N., " Elememts of public Health Engineering", S.Chand and Co,1985.
6. http://engineeringtoolbox.com/water-supply-systems-d_477.html
7. http://melbournewater.com.au/whatwedo/supply-water/pages/water-supply-syatem.aspx
8. http;//water.epa.gov/lawregs/rulesregs/sdwa/tcr/distibutionsystems.cfm

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	2	-	3	-	3	-	-	-	-	-	-	2	1
CO2	1	1	2	-	2	-	3	-	-	-	-	-	2	1
CO3	1	1	2	-	-	-	3	-	-	-	-	-	2	1
CO4	-	1	-	-	3	-	3	-	-	-	-	-	2	1
CO5	3	1	3	2	-	3	-	-	-	-	-	-	2	1

CH 15403 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To know the constituents of the environment and the precious resources in the environment.
- To learn all biological resources.
- To understand the role of human being in maintaining a clean environment and useful nvironment for the future generations
- To maintain the ecological balance and preserve bio-diversity.
- Learn the role of government and non-government organizations in environment management.

UNITI INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Environment- Definition, scope , importance, need for public awareness; Forest resources- Use -over exploitation- deforestation - case studies- mining - effects on forests and tribal people; Water resources- Use- over utilization of surface and ground water- floods - drought - conflicts over water; Mineral resources- Use - exploitation - environmental effects of extracting and using mineral resources - case studies; Food resources- World food problems - changes caused by agriculture and overgrazing - effects of modern agriculture- fertilizer-pesticide problems - water logging - salinity -case studies; Energy resources- Growing energy needs - renewable and non renewable energy sources; Land resources- Land as resource - land degradation - soil erosion. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concept of an ecosystem: Structure and function of an ecosystem – producers - consumers -decomposers - energy flow in the ecosystem ; ecological succession - food chains - food webs and ecological pyramids; Types of ecosystem- Introduction - characteristic features - forest ecosystem - grassland ecosystem - desert ecosystem - aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries); Biodiversity- Introduction- definition (genetic - species –ecosystem) diversity; Value of biodiversity- Consumptive use - productive use -social values - ethical values - aesthetic values; Biodiversity level- Global - national - local levels- India as a mega diversity nation- hotspots of biodiversity; Threats to biodiversity- Habitat loss - poaching of wildlife- man wildlife conflicts - endangered and endemic species of India; Conservation of biodiversity- In-situ and ex-situ conservation of biodiversity - field study.

UNITIII POLLUTION 9

Pollution- Definition -air pollution - water pollution - soil pollution - marine pollution - noise pollution - thermal pollution – nuclear hazards; Solid waste management- Causes - effects - control measures of urban and industrial wastes; Role of an individual in prevention of pollution - pollution case studies.

Disaster management- Floods - earthquake - cyclone – landslides; Electronic waste-Sources-Causes and its effects.

UNITIV SOCIAL ISSUES AND ENVIRONMENT 9

Sustainable development- Unsustainable to sustainable development - urban problems related to energy; Water conservation - rain water harvesting - watershed management; Resettlement and rehabilitation of people; Environmental ethics- Issues - possible solutions - climate change - global warming and its effects on flora and fauna - acid rain - ozone layer depletion - nuclear accidents - nuclear holocaust - wasteland reclamation - consumerism and waste products; Environment protection act- Air (Prevention and Control of Pollution) act - water (Prevention and control of Pollution) act - wildlife protection act - forest conservation act -issues involved in enforcement of environmental legislation.

UNITVHUMAN POPULATION AND ENVIRONMENT 9

Human population- Population growth - variation among nations - population explosion - family welfare programme and family planning- environment and human health - Human rights; value education; HIV / AIDS, Swine flu - women and child welfare; Role of information technology in environment and human health.

TOTAL: 45 PERIODS

COURSEOUTCOMES

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

- know the relationship between the human population and environment.
- understand the basic concepts of environment studies and natural resources.
- gain the knowledge in ecosystem and biodiversity.
- acquire knowledge about causes, effects and control measures of various types of pollution.
- understand the social issues and various environmental acts.

TEXT BOOKS

1. T.G.Jr. Miller, Environmental Science, 10thEdn, Wadsworth Publishing Co., (2004).
2. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2ndEdn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
3. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, (2010).

REFERENCES

1. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India,2010 .
2. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
3. K.D. Wager, Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. W.P. Cunningham, Environmental Encyclopedia, JaicoPublising House, Mumbai, 2004.

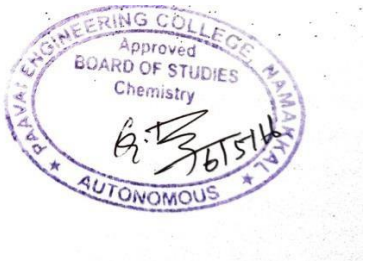
5. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental
6. Engineering and Science", McGraw Hill Science, 2010.

WEB LINKS

- www.chegg.com
- www.vidhyarathiplus.com

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	1	3	3	2	-	-	3	1	-
CO2	-	-	2	-	-	1	-	3	-	2	-	3	1	-
CO3	2	-	2	-	2	1	-	3	-	2	-	3	1	-
CO4	2	2	2	-	2	1	3	3	-	2	-	3	1	-
CO5	-	2	-	-	-	1	3	3	2	2	-	3	1	-



CE 15406 HYDRAULIC ENGINEERING LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To compute drag coefficients.
- To calculate Manning's and Chezy's coefficients for rough and smooth channels.
- To determine energy loss Hydraulic jump and calibrate standing wave flume.
- To test the performace of pumps and turbines.

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of friction losses in pipes
6. Study of minor losses in pipes
7. Study on performance characteristics of Pelton turbine
8. Study on performance characteristics of Francis turbine
9. Study on performance characteristics of Kaplan turbine
10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
11. Study on performance characteristics of reciprocating pump.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- determine the flow in pipes and open channels.
- analyze the major and minor losses in pipes.
- understand the impact of jet on vanes and to compute their efficiency.
- select an appropriate pump for a specific application.

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	1	2	-	-	-	-	-	-	-	-	2	1
CO2	2	2	1	2	-	-	-	-	-	-	-	-	3	1
CO3	2	2	2	2	-	-	-	-	-	-	-	-	3	2
CO4	2	2	2	2	-	-	-	-	-	-	-	-	3	2

CE15407 SURVEY PRACTICAL II 0 0 4 2

COURSE OBJECTIVES

- To apply geometric and trigonometric principles of surveying.
- To get practical exposure to different systems of Tacheometry.
- To set out a curve by different methods.
- To gain exposure in modern surveying instruments like GPS and Total station.

LIST OF EXPERIMENTS

1. Study of theodolite
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Theodolite survey traverse
4. Heights and distances - Triangulation - Single plane method.
5. Tacheometry - Tangential system - Stadia system - Subtense system.
6. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.
7. Field observation for and Calculation of azimuth
8. Field work using Total Station.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- determine the heights, distances, and gradient using trigonometric methods
- calculate the height of an inaccessible point by system of tacheometry.
- apply field procedures in setting out of a curve
- use modern surveying instruments like total station, gps

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	-	-	2	-	-	-	-	-	-	1	3	-
CO2	2	1	-	-	3	-	-	-	-	-	-	1	3	-
CO3	3	2	-	-	2	-	-	-	-	-	-	2	3	1
CO4	2	2	-	-	3	-	-	-	-	-	-	2	3	2

CE15408 STRENGTH OF MATERIALS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To conduct tesion test on different metals.
- To conduct compression test on Spring and Concrete.
- To conduct flexural and torsion test to determine elastic constants.
- To determine hardness of metals.

LIST OF EXPERIMENTS

1. Test involving axial compression to obtain the stress - strain curve
2. Test involving axial tension to obtain the stress - strain curve and the strength
3. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness
4. Test involving flexure to obtain the load deflection curve and hence the stiffness
5. Tests on springs
6. Hardness tests
7. Shear test
8. Test for impact resistance
9. Tests on Cement
10. The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- apply the concepts of mechanics for determining stresses and strains from the member forces.
- Solve the problems by knowing the effects of axial loads, bending, shear and torsion on structural components.
- determine the behavior of structural elements such as bars, beams and columns subjected to tension, compression, shear, bending and torsion by means of experiments.
- feel physically the behavior of materials and structural elements including distribution of stresses, strains, deformations and failure modes.

CO PO MAPPING:

Mapping of course objectives with Programme Outcomes: (1/2/3 indicates strength of correlation) 3- strong,2-Medium, 1-Weak														
Cos	**Programme Outcomes (POs)**													
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CO3	3	2	-	3	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	3	-	-	-	-	-	-	-	-	3	2

EN 15401 BUSINESS ENGLISH COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

- To develop the reading skills of the students and make them familiarize in skimming and scanning.
- To instill the communication concepts to enhance the students'conversational skills through various practice sessions and to familiarize them with a variety of business correspondence.
- To inculcate the receptive skills i.e. Listening and Reading and to make the students wellversed in the Productive skills and to assist them in improving their vocabulary and comprehension of grammar.
- speak well without inhibition and to assist the students in improving their vocabulary, pronunciation and comprehension of grammar.

UNIT I READING & VOCABULARY

Understanding short, real notices, messages - detailed comprehension of factual material- skimming & scanning skills - interpreting visual information - reading for detailed factual information - reading for gist and specific information - reading for grammatical accuracy and understanding of text structure - reading and information transfer.

UNIT II WRITING

Re-arranging appointments - asking for permission - giving instructions - apologizing and offering compensation - making or altering reservations - dealing with requests - giving information about a product.

UNIT III LISTENING

Listening to short telephonic conversation - Listening to short conversation or monologue - Listening to specific information - Listening to conversation- interview, discussion.

UNIT IV SPEAKING

Conversation between the interlocutor and the candidate - general interaction and social language - A mini presentation by each candidate on a business theme - organising a larger unit of discourse - giving information and expressing opinions - two way conversation between candidates followed by further prompting from the interlocutor- Expressing opinions- agreeing and disagreeing

TOTAL: 30 PERIODS

COURSE OUTCOMES

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

- enrich the vocabulary through reading and todevelop their pronunciation skills.
- speak effectively in english in all occasions.
- communicate fluently and effectively on any given topics.
- prepare flawless reports and proposals.

TEXT BOOKS

1. Cambridge BEC Preliminary, Self Study Edition, Cambridge University Press, New York, 2012.
2. Whitby, Norman. Business Benchmark, Pre-intermediate to intermediate, Business Preliminary, Shree MaitreyPrintech Pvt. Ltd., Noida, 2014.

REFERENCES

1. Raman, Meenakshi&Sangeetha Sharma. Technical Communication: Principles and Practice.
2. Oxford University Press, New Delhi. 2011.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
4. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.

WEB SOURCE

1. http://www.cambridge.org/us/cambridgeenglish/catalog/cambridge-english-exams-ielts/business-benchmark

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CO2	-	-	-	-	-	-	1	1	3	2	-	2	-	2
CO3	-	-	-	-	-	3	1	2	3	2	2	3	2	-
CO4	-	-	-	-	-	2	2	3	3	2	2	-	2	-