

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Study Scheme 2018

Third Semester										
Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours per week			Marks Distribution			Credits
				L	T	P	Int	Ext	Total	
Professional Core courses	PCCE-101	Surveying & Geomatics	Theory	3	1	0	40	60	100	4
Professional Core courses	PCCE-102	Solid Mechanics	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-103	Fluid Mechanics	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-104	Disaster Preparedness & Planning	Theory	3	0	0	40	60	100	3
Engineering Science Course	ESCE-101	Basic Electronics & applications in Civil Engineering	Theory	3	0	0	40	60	100	3
Humanities and Social Sciences including Management	HSMCE-101	Civil Engineering-Introduction, Societal & Global Impact	Theory	3	0	0	40	60	100	3
Professional Core courses	LPCCE-101	Surveying & Geomatics Laboratory	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-102	Fluid Mechanics Laboratory	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-103	Solid Mechanics Laboratory	Practical	0	0	2	30	20	50	1

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Civil Engineering Department

Project/Training	TR-101	Training - I	Practical	-	-	-	60	40	100	1
Mandatory course		Mentoring and Professional Development	Practical	0	0	1		-	-	0
		26		18	1	7	390	460	850	23
Fourth Semester										
Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours Per Week			Marks Distribution			Credits
				L	T	P	Int	Ext	Total	
Professional Core courses	PCCE-105	Concrete Technology	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-106	Material, Testing & Evaluation	Theory	4	0	0	40	60	100	4
Professional Core courses	PCCE-107	Hydrology & Water Resources Engineering	Theory	3	1	0	40	60	100	4
Professional Core courses	PCCE-108	Transportation Engineering	Theory	3	1	0	40	60	100	4
Basic Science Course	BSCE-101	Mathematics-III	Theory	3	0	0	40	60	100	3
Professional Core courses	LPCCE-104	Concrete Testing Laboratory	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-105	Transportation Laboratory	Practical	0	0	2	30	20	50	1
Project	PRCE-101	Seminar and Technical Report Writing	Practical	0	0	2	50	-	50	1
Mandatory Courses (Non-credit)	MCCE-101	Environment Science	Theory	2	0	0	50	-	50	0

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Mandatory Courses	MPD-102	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
		27		18	2	7	460	340	800	22

*4 weeks Industrial/Institutional training for which viva will be conducted along End semester exam of Fifth semester.

Fifth Semester

Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours Per Week			Marks Distribution			Credits
				L	T	P	Int	Ext	Total	
Professional Core courses	PCCE-109	Engineering Geology	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-110	Engineering Economics, Estimation and Costing	Theory	3	1	0	40	60	100	4
Professional Core courses	PCCE-111	Construction Engineering & Management	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-112	Environmental Engineering	Theory	4	0	0	40	60	100	4
Professional Core courses	PCCE-113	Structural Engineering	Theory	3	1	0	40	60	100	4
Professional Core courses	PCCE-114	Geotechnical Engineering	Theory	3	0	0	40	60	100	3
Professional Core courses	LPCCE-106	Geotechnical Laboratory	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-107	Environmental Engineering Laboratory	Practical	0	0	2	30	20	50	1
Professional Core	LPCCE-	Structural	Practical	0	0	2	30	20	50	1

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courses	108	Laboratory								
Training	TR-102	Training - II*	Practical	-	-	-	60	40	100	1
Mandatory Course		Mentoring and Professional Development	Practical	0	0	1	-	-		0
		28		19	2	7	390	460	850	25
Sixth Semester										
Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours Per Week			Marks Distribution			Credits
				L	T	P	Int	Ext	Total	
Professional Core courses	PCCE-115	Elements of Earthquake Engineering	Theory	3	0	0	40	60	100	3
Professional Core courses	PCCE-116	Building Construction Practice	Theory	3	0	0	40	60	100	3
Professional Elective courses	PECE-XXX	Elective – I	Theory	3	1	0	40	60	100	4
Professional Elective courses	PECE-XXX	Elective – II	Theory	3	1	0	40	60	100	4
Professional Core courses	LPCCE-109	CAD Laboratory	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-110	BIM Laboratory	Practical	0	0	2	30	20	50	1
Open Elective courses	OEZZ-XXX	Open Elective – I	Theory	3	0	0	40	60	100	3
Project	PRCE-102	Minor Project (Estimation & costing)	Practical	0	0	4	60	40	100	2
Mandatory Courses	MCI-102	Constitution of	Theory	2	0	0	50	-	50	0

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(Non-credit)		India								
Mandatory Course	MPD-103	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
		28		17	2	9	470	380	850	22
#6 weeks Industrial/Institutional training for which viva will be conducted along End semester exam of Seventh semester.										
Seventh Semester										
Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours Per Week			Marks Distribution			Credits
				L	T	P	Int	Ext	Total	
Professional Elective courses	PECE-XXX	Elective – III	Theory	3	1	0	40	60	100	4
Professional Elective courses	PECE-XXX	Elective – IV	Theory	3	1	0	40	60	100	4
Open Elective courses	OEZZ-XXX	Open Elective – II	Theory	3	0	0	40	60	100	3
Project	PRCE-103	Project -I (Project work / internship in industry or at appropriate work place)	Practical	0	0	6	120	80	200	3
Training	TR-103	Training - III [#]	Practical	-	-	-	100	50	100	2
Mandatory Courses (Non-credit)	MCI-103	Management- I (Organizational Behavior)	Theory	2	0	0	50	-	50	0
Mandatory Course		Mentoring and Professional Development	Practical	0	0	1		-		0

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		20		11	2	7	390	310	700	16
Eighth Semester										
Category	Subject Code	Course Title	Subject Type (Theory/ Practical)	Hours Per Week			Marks			Credits
				L	T	P	Int	Ext	Total	
Professional Elective courses	PECE-XXX	Elective – V	Theory	3	1	0	40	60	100	4
Professional Elective courses	PECE-XXX	Elective – VI	Theory	3	1	0	40	60	100	4
Open Elective courses	OEZZ-XXX	Open Elective – III	Theory	3	0	0	40	60	100	3
Project	PRCE-104	Project -II (Project work / internship in industry or at appropriate work place)	Practical	0	0	6	120	80	200	3
Mandatory Course	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
		18		9	2	7	340	260	600	15

* Industrial /Institutional Training will be imparted at the end of 2nd semester in the institute or students can go to industry for four weeks.

There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-101

Subject Name: Surveying & Geomatics

Programme: B.Tech. (CE)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 50%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the concept, various methods and techniques of surveying.
2	Compute angles, distances and levels for a given area
3	Apply the concept of tachometry survey in difficult and hilly terrain.
4	Select appropriate instruments for data collection and survey purpose
5	Analyze and retrieve the information from remotely sensed data and interpret the data for survey.
6	Understand the concepts related to GIS and GPS and analyze the geographical data.

Detailed Contents:

Part-A

Introduction to Surveying: Principles, Survey stations, Survey lines- ranging, direct & indirect ranging, Bearing and its measurement with prismatic compass, calculation of angles from bearings, Local Attraction Levelling:, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Setting up the plane table and methods of plane tabling (Radiation and three point problem only).

Triangulation and Trilateration: Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Balancing of Traverse, Omitted Measurements, Tachometry: Definition, determination of tachometer constants and reduced level from tachometric observations. Triangulation - network- Signals. Baseline - choices - extension of base lines - corrections - Trigonometric leveling

Curves: Elements of simple and compound curves – Method of setting out Transition curve – length of curve – Elements of transition curve.

Part-B

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Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, LADAR (drone and vehicle based)

Photogrammetry Surveying: Introduction, Basic concepts, flight planning; Stereoscopy, photographic mapping- mapping using paper prints, mapping using stereoplottting instruments, mosaics, map substitutes.

Remote Sensing: Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors.

Text Books

1. Duggal, S.K., Surveying Vol I & II, Tata McGraw Hill
2. Punmia, B.C., Jain, Ashok Kumar and Jain, Arun Kumar, Surveying Vol. I, II & III, Laxmi Publications
3. Agor, R., Surveying, Khanna Publishers
4. Bhavikatti, S.S. Surveying & Levelling Volume I & II

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-102
Subject Name: Solid Mechanics

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 80%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the concept of static equilibrium, deformations, and material constitutive behavior.
2	Describe the concepts of stress, strain and elastic behaviour of materials including Hooke's law relationships to analyze structural members subjected to tension, compression and torsion.
3	Apply the concept of Mohr's circle in the stress/strain calculations.
4	Develop SFD and BMD for different type of beams subjected to different types of loads
5	Plot elastic curves for beams undergoing displacements under different loadings
6	Understand the behaviour of columns and struts under axial loading.

Detailed Contents:

Part-A

Concept of Equilibrium: Loads, supports, reactions, displacements; General equilibrium equations; Equilibrium of a point and a member; Concept of free body diagram; Statical determinacy of a problem.

Shear Force and Bending Moment Diagrams: Introduction to the concept of shear force, bending moment and the sign convention; Shear force and bending moment diagrams for cantilever, simply supported and overhang beams subjected to point loads, uniformly distributed loads, uniformly varying loads, moments or their combination, point of contra flexure.

Displacements: Concept of displacements, types - deflections and rotations; assumptions; sign convention; different methods to compute displacements caused by different loadings.

Bending and Shear Stresses: Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross sectional shapes including rectangular,

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circular, I, channel, angle etc.; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.

Part-B

Stresses and Strains: Concept of stress and strain; Type of stresses and strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stress and factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship between them; Bars of varying section, composite bars, thermal stresses; Stresses and strains in thin cylinders, spherical shells subjected to internal pressures; Normal stress, tangential stress; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress; Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and strains.

Torsion of Circular Shafts: Derivation of torsion equation and its assumptions, application of equation to circular shafts; combined torsion and bending of circular shafts, principal stress and maximum shear stress under combined loading of torsion and bending.

Columns and Struts: Stability of Columns; buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.

Text Books

1. 'Elements of Strength of Materials', Timoshenko, S. and Young, D. H., DVNC, New York, USA.
2. 'Solid Mechanics', Kazmi, S. M. A., TMH, New Delhi.
3. 'Mechanics of Materials', Hibbeler, R. C., Pearson Prentice Hall.
4. 'An Introduction to the Mechanics of Solids', Crandall, S. H., N. C. Dahl, and T. J. Lardner, McGraw Hill.
5. 'Mechanics of Materials', Ferdinand P. Beer, E. Russel Jhonston Jr. and John T. D. Ewolf, TMH.
6. 'Strength of Materials', James M. Gere and Barry J. Goodno, Cengage Learning India Pvt. Ltd., New Delhi.
7. 'Strength of Materials', R. Subramanian, Oxford University Press, New Delhi.

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-103
Subject Name: Fluid Mechanics

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the basic terms used in fluid mechanics and its broad principles
2	Estimate the forces induced on a plane/ submerged bodies
3	Formulate expressions using dimensionless approach and able to determine design parameters by creating replica of prototype at appropriate scale.
4	Apply the continuity, momentum and energy principles and design the pipelines used for water supply or sewage under different situation.
5	Calculate drag force exerted by fluid on the body of varying shapes and able to minimize them.
6	Design and addressing problems in open channel (lined/ unlined) of different shapes and size optimally as per site condition

Detailed Contents:

Part-A

Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics - Fluid Pressure: Pressure at a point, Pascals law, Piezometer, U-Tube Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Fluid Kinematics - Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

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Fluid Dynamics - Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π -Theorem.

Part-B

Laminar Flow & Turbulent Flow - Laminar flow through: circular pipes, parallel plates. Stoke's law, Reynolds experiment, Transition from laminar to turbulent flow. Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram. Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel

Boundary Layer Analysis- Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Open Channel Flow - Introduction, Comparison between open channel flow and pipe flow, geometrical parameters of a channel, Uniform Characteristics of uniform flow, Chezy's formula, Manning's formula. Most economical section of channel. Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses.

Text Books

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
4. Fluid mechanics and hydraulic machine: Bansal, R. K. (2011). SI units. New Delhi, India: Laxmi Publication.
5. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.
6. Fluid mechanics: fundamentals and applications. Cengel, Y. A. (2006). New Delhi, India: Tata McGraw-Hill Publishing.
7. Fluid mechanics and turbo machines. Das, M. M. (2010). New Delhi, India: PHI Learning..

Reference Books**E-Books and online learning material**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Online Courses and Video Lectures

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-104

Subject Name: Disaster Preparedness & Planning

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: N/A

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Identify various types of disasters, their causes, effects & mitigation measures.
2	Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.
3	Understand the use of emergency management system to tackle the problems.
4	Discuss the role of media, various agencies and organizations for effective disaster management.
5	Design early warning system and understand the utilization of advanced technologies in disaster management.
6	Compare different models for disaster management and plan & design of infrastructure for effective disaster management.

Detailed Contents:

Part-A

Introduction to Disaster Management: Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, capacity, impact, prevention, mitigation.

Disasters: Identify and describe the types of natural and man-made disasters, hazard and vulnerability profile of India, mountain and coastal areas, Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects (gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

Disaster Mitigation and Preparedness: Disaster Management Cycle-its phases; prevention, mitigation, preparedness, relief and recovery; structural and non structural measures; Preparedness for natural disasters in urban areas.

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Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems; Use of Remote Sensing Systems (RSS) and GIS in disaster Management, early warning systems.

Part-B

Post disaster response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, communications); reconstruction and rehabilitation; Roles and responsibilities of government, community, local institutions, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines.

Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

Text Books

1. [www.http//ndma.gov.in](http://ndma.gov.in)
2. <http://www.ndmindia.nic.in>
3. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
4. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
5. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
6. Disaster Management, R.B. Singh (Ed), Rawat Publications
7. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction.

Reference Books**E-Books and online learning material**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: ESCE-101

Subject Name: Basic Electronics & applications in Civil Engineering

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 0%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand basics of electronics engineering
2	Understand the importance of electronic and soft computing in civil engineering
3	Providing inspiration to use the electronic products and other instruments to solve civil engineering problems
4	Use the computers / computing tools to solve civil engineering problems
5	Able to develop the program using basic language for solving civil engineering problems.
6	Appraise the use of sensors in civil engineering applications

Detailed Contents:

Part-A

Introduction: Role of Electronics in civil engineering, such as Intelligent Signalling, Intelligent Transportation, Instrumentation of bridges and buildings, and material testing.

Diodes and Applications: PN junction diode, volt ampere characteristics Ideal versus Practical, Diode Equivalent Circuits, Special Diodes: Zener Diode, LED, Photo Diode; Applications of diodes in civil engineering.

Transistor Characteristics: Bipolar Junction Transistor (BJT) –Construction, Operation, Common Base, Common Emitter and Common Collector Configurations, Transistor as an Amplifier in CE configuration, Operating Point, Transistor Biasing meaning, Essentials of a Transistor Biasing circuit, Voltage Divider Bias Circuits; Introduction to Field Effect Transistor (FET).

Part-B

Digital Electronics Basics: Logic Gates: OR, AND, NOT, NOR, NAND, EX-OR; Pin diagram and description of ICs of logic gates, Number Systems: binary, octal and hexadecimal; Binary

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Operations: addition, Subtraction; BCD code and BCD additions. 7 segment LCD Display, Introduction to Data Acquisition Systems. Integrated Circuits (ICs): Meaning, advantages and disadvantages.

Transducers & Sensors: Transducing Principles, Ultrasonic, Optical and Infrared Sensors, Inductive, Capacitive and Resistive Transducers, Applications of Transducers/ Sensors for measurements of Length, Thickness, Displacement, Pressure, Temperature, Flow, Humidity, and Moisture.

Computing tools/languages: Introduction and application of different languages, such as C, C+, python, VBA, spread sheets, etc. And its use in solving civil engineering problems

Text Books

1. V.K Mehta and Rohit Mehta, Principles of Electronics, S Chand Publishers.
2. A.K. Sawhney, A course in Electrical & Electronic Instrumentation, Dhanpat Rai and Sons.

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

NPTEL / other online resources.

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Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: HSMCE-101

Subject Name: Civil Engineering- Introduction, Societal & Global Impact

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 0%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have:

CO#	Course Outcomes (CO)
1	Introduction to what constitutes Civil Engineering
2	Understanding the vast interface of this field with the society at large
3	Inspiration for doing creative and innovative work for the benefit of the society
4	Need to think innovatively to ensure sustainability
5	Depth of engagement possible within civil engineering and exploration of various possibilities of a career in this field
6	Introduction and overview to Futuristic engineering systems

Detailed Contents:

Part-A

Civil Engineering and its historical developments; Understanding the importance of Civil Engineering in shaping and impacting the world; the ancient and modern Marvels and Wonders in the field of Civil Engineering; Scope of work involved in various branches of Civil Engineering and future vision; Recent Civil Engineering breakthroughs and innovations; Avenues for entrepreneurial working.

Understanding the past to look into the future; Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution and how these eras helped the civil engineering to grow; Concept of sustainability and the steady erosion of the environment due to haphazard developments; Global warming, its impact and possible causes; Atmospheric pollution; Pollution Mitigation measures; Health & Safety aspects for stakeholders; Environmental Impact Analysis: Concept and procedures; Innovations and methodologies for ensuring Sustainability.

Part-B

Infrastructure development and growth of the Nation; its effects on the GDP, employment, living standards of the people, etc.; Introduction and overview to Futuristic systems: Megacities, Smart

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Cities, Stadia; Roads, Railways, Metros, Hyper Loop, Airports, Seaports, River ways, Sea canals, Tunnels, bridges; Energy generation: Hydro, Solar, Wind, Wave, Tidal, Geothermal, Thermal energy; Telecommunication needs: towers, above-ground and underground cabling; Flood control: Dams, Canals, River interlinking; Energy efficient built-environments and LEED ratings; Awareness of various Codes & Standards governing Infrastructure development.

Text Books

1. Salvadori, M and Heller, M, Structures in Architectures, PHI.
2. Fintel, C, Handbook of Civil Engineering, CBS Publications.

Reference Books

E-Books and online learning material

Online Courses and Video Lectures

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: LPCCE-101

Subject Name: Surveying & Geomatics Laboratory

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design/Programming Problems: 100%
External Marks: 20	Duration of End Semester Exam (ESE): 1.5 hr
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Assess horizontal & vertical angles by Theodolite.
2	Survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically.
3	Compute the reduce levels using various methods of leveling.
4	Predict the location of any point horizontally and vertically using Tachometry.
5	Setting out curves in the field.
6	Use electronic survey instruments.

S. No.	Name of Practical
1.	Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
2.	Different methods of levelling, height of instrument, rise & fall methods.
3.	Measurement of horizontal and vertical angle by theodolite.
4.	Determination of tachometric constants and determination of reduced levels by tachometric observations.
5.	Plane table survey, different methods of plotting, Three point problems.
6.	Determination of height of an inaccessible object.
7.	Setting out of circular curves in the field using different methods.
8.	Plotting of traverse using the Total Station and GPS.

Reference Material

Manuals available in Laboratory

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: LPCCE-102
Subject Name: Fluid Mechanics Laboratory

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design/Programming Problems: 100%
External Marks: 20	Duration of End Semester Exam (ESE): 1.5 hr
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Select appropriate pressure measuring device under different conditions of flow.
2	Determine the stability of a floating body.
3	Understand and apply Bernoulli's theorem practically.
4	Find discharge of fluid through pipe, orifices and in open channel.
5	Estimate the major and minor losses in pipe.
6	Estimate the various elements and energy losses in hydraulic jump.

S. No.	Name of Practical
1.	To study of pressure measuring devices as peizometer, U-tube manometer, and pressure gauges.
2.	To verify Bernoulli's Theorem
3.	To determine the meta centric height of a of Floating Body under different condition.
4.	To determine the coefficient of discharge of a Venturimeter.
5.	To determine the coefficient of discharge of a Orifice Meter
6.	To determine the coefficient of friction of different diameter pipes.
7.	To estimate the minor losses as energy loss in pipe bend, sudden contraction or enlargement in pipe.
8.	To determine the coefficient of discharge on rectangular and V-notches.
9.	To determine the various element of a hydraulic jump.

Reference Material

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
4. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

**Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: LPCCE-103
Subject Name: Solid Mechanics Laboratory

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design/Programming Problems: 100%
External Marks: 20	Duration of End Semester Exam (ESE): 1.5 hr
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Understand the importance of physical properties of steel.
2	Identify and comprehend code provisions for testing different properties of steel.
3	Develop stress-strain curve for axial compression, axial tension and shear.
4	Assess hardness and impact strength of steel.
5	Assess flexural strength of a given material.
6	Evaluate fatigue and impact strength of steel.

S. No.	Name of Practical
1.	Determination of physical properties of steel including strength and ductility.
2.	Study of tensile and compressive stress-strain behaviour of steel.
3.	Development of shear stress-strain curve for steel in torsion.
4.	Determination of hardness of a material by Rockwell and Brinell hardness testing machine.
5.	Determination of impact strength of a material by Izod and Charpy tests.
6.	Determination of bending strength of a wooden beam specimen.
7.	Determination of fatigue strength of a material.

Reference Material

1. Laboratory Manual of Testing Materials, William Kendrick Hall Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House

Subject Code: PCCE-105

Subject Name: Concrete Technology

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 4	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 50%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

**Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department**

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the relevance of different properties of constituent materials on properties of concrete.
2	Understand the behavior and durability aspects of concrete under different loading and exposure conditions.
3	Understand the issues involved in production and use of concrete.
4	Design of concrete mixes as per BIS specifications.
5	Understand various testing methods for concrete and their applicability.
6	Knowledge of special type of non-conventional concretes.

Detailed Contents:

Part-A

Concrete and its ingredients: Properties of cement, aggregate, admixture, water and other additives; Related Indian Standard codes & guidelines.

Concrete behaviour in fresh and hardened states: Workability, Elasticity, Shrinkage, Creep, Fatigue, Strength in compression, tension, shear and bond; Influence of various factors on test results; Concrete cracking and type of cracks; Permeability and durability characteristics of concrete including resistance to sulphate & acid attack, alkali-aggregate reaction, freezing and thawing; Fire resistance

Production of concrete: Mixing, handling, placing, compaction of concrete and related issues; Quality control; Behaviour in extreme environmental conditions like hot weather, cold weather and under water conditions

Part-B

Concrete mix design: Basic considerations, proportioning of material, effect of various parameters, trial mixes, IS code

Inspection and testing of concrete: Defects in concrete; Deterioration of concrete; Strength tests including compressive, split tensile, flexural, pullout etc.; Durability tests including permeability, carbonation, rapid chlorine ion penetration etc.; Destructive and Non-destructive testing of concrete; Acceptance and compliance requirements of concrete as per IS codes

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Civil Engineering Department

Special concretes: Types and specifications; Fibre reinforced and steel reinforced concrete; Polymer concrete; Light weight concrete, High strength concrete, Prestressed concrete, Self Compacting Concrete, Pervious Concrete, Self Healing Concrete

Text Books

1. 'Properties of Concrete', A. M. Neville, Prentice Hall
2. 'Concrete Technology', M. S. Shetty, S.Chand & Co.
3. 'Concrete Technology', M. L. Gambhir, Tata McGraw Hill Publishers, New Delhi
4. 'Concrete Technology', A. R. Santha Kumar, Oxford University Press, New Delhi

Reference Books

E-Books and online learning material

Online Courses and Video Lectures

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-106

Subject Name: Materials, Testing a& Evaluation

Programme: B.Tech. (CE)	L:4 T: 0 P: 0
Semester: 4	Teaching Hours: 40
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 50%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Appraisal about the role of materials in civil engineering
2	Introduce common measurement instruments, equipments and devices to capture the material response under loading
3	Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice
4	Ability to write a technical Laboratory report
5	Draw inferences from observations/reports for selection of suitable material
6	Use and draw relevant information from the standards and guidelines

Detailed Contents:

Part-A

Material - Definition, classifications (engineering/non-engineering and structural/non-structural), types (brittle, ductile, composites and cementitious materials, etc.) and its role in engineering design & construction; desirable properties and specifications; Material microstructure (e.g. of concrete, etc) and its effect on their engineering properties.

Strength-deformation and fracture behavior of materials; Characteristics strength of materials, determination & its reporting; Material behavior under different stress conditions; Parameters affecting the material strength; Different equipments, devices, and instruments to characterize the material response/ behavior; Current testing technology (displacement-controlled and load-controlled) and its selection for capturing the response of the material.

Part-B

Force and strain measurements, Important instrument considerations - Fatigue, impact, toughness, crushing, abrasion, permeability and other time-dependent properties, such as shrinkage, creep; Durability considerations.

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Documenting the experimental program, including the test procedures, collected data, method of interpretation and final results; Use of test data/ testing reports in the material selection for various civil engineering projects /construction

Quality control - Sampling, Acceptance criterion, Code of practice and guidelines in this regards for Cements; Aggregates; Admixtures; Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, permeable Concrete); Soils; Bitumen and asphaltic materials; Timbers; Glass and Plastics; Structural Steel; Aluminum; Geotextiles; Carbon composites.

Text Books

1. Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth-Heinemann
2. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand & Bros,
3. Various related updated & recent standards of BIS, IRC, ASTM, RILEM, ACI, AASHTO, etc. corresponding to materials used for Civil Engineering applications
4. Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials, Cognella
5. E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
6. Mehta, P K and Monteiro P J M (1997), Concrete: Microstructure, Properties and Materials, Tata McGraw Hill.

Reference Books**E-Books and online learning material**

1. Related papers published in international journals

Online Courses and Video Lectures

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-107

Subject Name: Hydrology & Water Resources Engineering

Programme: B.Tech. (CE)	L: 3 T: 1 P: 0
Semester: 4	Teaching Hours: 40
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Express the interaction among various processes in the hydrologic cycle
2	Calculate the average annual rainfall of any area using the rain gauge data and compile interrelations of various parameters as infiltration, evapotranspiration etc
3	Define the various components of hydrographs and calculate the estimated run off.
4	Find the water requirement for different crops and plan appropriate method of applying water.
5	Develop the distribution system of canal and various components of irrigation system.
6	Classify dams and plan dams according to suitability of sites available, their problems and able to determine forces exerted by fluid on dams.

Detailed Contents:

Part-A

Introduction- Hydrologic Cycle, Water-Budget Equation, History of Hydrology, World Water Balance, Applications in Engineering, Sources of Data.

Precipitation- Forms of Precipitation, Characteristics of Precipitation in India, Measurement of Precipitation, Rain Gauge Network, Mean Precipitation over an Area, Depth Area-Duration Relationships, Maximum Intensity/Depth-Duration-Frequency Relationship, Probable Maximum Precipitation (PMP), Rainfall Data in India.

Abstractions from precipitation- Evaporation Process, Evaporimeters, Analytical Methods of Evaporation Estimation, Reservoir Evaporation and Methods for its Reduction, Evapotranspiration, Interception, Depression Storage, Infiltration, Infiltration Capacity, Measurement of Infiltration, Modelling Infiltration Capacity, Classification of Infiltration Capacities, Infiltration Indices.

Guru Nanak Dev Engineering College, Ludhiana**Civil Engineering Department**

Runoff- Hydrograph, Factors Affecting Runoff and Runoff Hydrograph, Components of Hydrograph, Base Flow Separation, Effective Rainfall, Unit Hydrograph, S-curve hydrograph, Snyder's synthetic unit hydrograph. Surface Water Resources of India

Part-B

Water withdrawals and uses– Water for Energy Production, Water for Agriculture, Water for Hydroelectric Generation; Flood Control, Analysis of Surface Water Supply, Water Requirement of Crops-Crops and Crop Seasons in India, Cropping Pattern, Duty And Delta; Quality of Irrigation Water; Soil-Water Relationships, Root Zone Soil Water, Infiltration, Consumptive use, Irrigation Requirement, Frequency of Irrigation; Methods of Applying Water to The Fields: Surface, Sub-Surface, Sprinkler and Trickle / Drip Irrigation.

Distribution systems- Canal Systems, Alignment of Canals, Canal Losses, Estimation of Design Discharge, Design of Channels- Rigid Boundary Channels, Alluvial Channels, Kennedy's and Lacey's Theory of Regime Channels, Canal Outlets: Non-Modular, Semi-Modular And Modular Outlets.

Water Logging- Causes, Effects And Remedial Measures. Lining of Canals, Types of Lining. Drainage of Irrigated Lands: Necessity, Methods.

Dams and spillways- embankment dams: Classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site.

Text Books

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J. D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PCCE-108

Subject Name: Transportation Engineering

Programme: B.Tech. (CE)	L: 3 T: 1 P: 0
Semester: 4	Teaching Hours: 40
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 40%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Appreciate the importance of different modes of transportation and characterize the road transportation.
2	Alignment and geometry of pavement as per Indian Standards according to topography.
3	Assess the properties of highway materials in Laboratory
4	Understand the importance of railway infrastructure planning and design.
5	Identify the functions of different component of railway track.
6	Outline the importance of Airport Infrastructure

Detailed Contents:

Part-A

Introduction: Importance of Transportation, Different Modes of Transportation, Characteristics of Road Transport.

Transportation Systems: Multi modal transportation system, Characteristics of Mass Transit systems including technical, demand operational and economic problems, fixed Track Facility, Mass Rapid Transit System-Elevated, Surface and Underground construction, Express Bus System, integrated Operating Characteristics of Terminal and Transfer facilities.

Highway Development & Planning: Principles of Highway Planning, Road Development in India, Classification of Roads, Road Patterns, Planning Surveys; Highway Construction: Right of way; Earthen/Gravel Road, Water Bound Macadam, Wet Mix Macadam, Bituminous Pavements, Cement Concrete Pavements

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Railway Engineering: History of Railways, Development of Indian Railway, Organisation of Indian Railway, Important Statistics of Indian Railways. Railway Gauges: Definition, Gauges on World Railways, Choice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge.

Part-B

Railway Track: Requirements of a Good Track, Track Specifications, Detailed Cross-Section of Single/Double Track used in Indian Railways. Components of permanent way - Rails, Sleepers, Ballast, Sub-grade and Formation, Track Fixtures & Fastenings, Coning of Wheels, Tilting of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails.

Airport Engineering: Introduction, Air Transport Scenario in India and Stages of Development, National and International Organizations; Airport planning - Site selection, runway orientation, etc. Concept of Head Wind, Cross Wind, Wind Rose Diagram, Runway Configuration

Aircraft Parking System & Visual Aids: Main Taxiway, Exit Taxiway, Separation Clearance, Holding Aprons.: Marking and Lighting of Runway and Taxiway, Landing Direction Indicator, and Wind Direction Indicator, IFR/VFR.

Text Books

1. Khanna S.K., and Justo, C.E.G. "Highway Engineering", Nem Chand and Brothers, Roorkee, 1998.
2. Kadiyali, L.R. "Principles and Practice of Highway Engineering", Khanna Publishers, New Delhi, 1997.
3. Flaherty, C.A.O. "Highway Engineering", Volume 2, Edward Arnold, London, 1986.
4. Sharma, S.K. "Principles, Practice & Design of Highway Engineering", S. Chand & Company Ltd., New Delhi, 1985.
5. Mannering, "Principles of Highway Engineering & Traffic Analysis", Wiley Publishers, New Delhi.

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

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Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: BSCE-101

Subject Name: Mathematics-III

Programme: B.Tech. (CE)	L: 3 T: 0 P: 0
Semester: 4	Teaching Hours: 40
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 100%
External Marks: 60	Duration of End Semester Exam (ESE): 3hr
Total Marks: 100	Elective Status: Compulsory

Prerequisites: N/A

Additional Material Allowed in ESE: [Scientific Calculator]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Study the use / application of mathematic theory in the solution of engineering problems.
2	Identify appropriate method / functions for obtaining solution
3	Use power series method to solve differential equation and its application to Bessel's and Legendre's equations.
4	Analyze Ordinary and Partial differential equations and learn simplest means to solve them.
5	Learn and apply binary operations, Laplace, Fourier transform methods to civil engineering applications
6	Use the concepts of limit, continuity and derivative of complex variables and use analytic functions which are widely applicable to two dimensional problems in engineering.

Detailed Contents:

Part-A

Transform Calculus -1: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem, Solving ODEs by Laplace Transform method

Transform Calculus-2: The Fourier integral, The Fourier transform, Fourier sine and cosine transform, properties of Fourier transform, Convolution theorem, Parseval's Identities, application of Fourier transforms to solve PDE.

Part-B

Logic and Partially ordered sets: Introduction to first order logic and first order theory. Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices.

Guru Nanak Dev Engineering College, Ludhiana**Civil Engineering Department**

Algebraic Structures: Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange’s theorem, normal subgroup, homomorphic subgroup, Congruence relation and quotient structures

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
4. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
6. K. H. Rosen, “Discrete Mathematics”, MGH Publication.
7. John A. Dossey, “Discrete Mathematics”, Addison Wesley Publishing Company.
8. T. Sengadir, “Discrete Mathematics”, Pearson Education.
9. G. Shanker Rao, “Discrete Mathematics”, New Age International Pvt. Ltd Publishers.

Reference Books**E-Books and online learning material****Online Courses and Video Lectures**

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: LPCCE-104
Subject Name: Concrete Testing Laboratory

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design/Programming Problems:
External Marks: 20	Duration of End Semester Exam (ESE):
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Evaluate properties of building materials, such as cement and aggregates.
2	Conduct experiments to check the acceptance criteria (if any).
3	Design concrete mixes as per BIS provisions.
4	Analyze the properties of concrete in fresh and hardened state.
5	Create a well organized document and present the results appropriately.
6	Understand and apply non destructive testing (NDT) for evaluating concrete quality.

S. No.	Name of Practical
1.	Tests on cement <ul style="list-style-type: none"> • Fineness • Consistency • Setting time • Soundness • Specific gravity • Strength
2.	Tests on aggregates (fine and coarse) <ul style="list-style-type: none"> • Specific gravity • Bulk Density • Fineness Modulus • Moisture content • Water Absorption • Bulking of sand
3.	Design mix of concrete as per BIS method.
4.	Workability tests on concrete <ul style="list-style-type: none"> • Slump test • Compaction Factor test • Vee-Bee test
5.	Strength tests on concrete <ul style="list-style-type: none"> • Compressive strength (Cube and Cylinder) • Split Tensile strength

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department

	<ul style="list-style-type: none">• Flexural strength• Abrasion resistance
6.	Non-Destructive Techniques <ul style="list-style-type: none">• Rebound hammer test• Ultra sonic pulse velocity test

Reference Material

1. 'Concrete Laboratory Manual', M. L. Gambhir, Dhanpat Rai & Sons, New Delhi.
2. 'Concrete Laboratory Manual', TTTI Chandigarh.

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: LPCCE-105
Subject Name: Transportation Laboratory

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design/Programming Problems:
External Marks: 20	Duration of End Semester Exam (ESE):
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Characterize the pavement materials as per the Indian Standard guidelines.
2	Evaluate the strength of subgrade soil by CBR test.
3	Conduct experiments to evaluate aggregate properties.
4	Determine properties of bitumen material and mixes
5	Evaluate the pavement condition by rough meter and Benkelman beam test.
6	Create a well organized report and present the results appropriately

S. No.	Name of Practical
1.	<i>Tests on Sub-grade Soil</i> <ul style="list-style-type: none"> • California Bearing Ratio Test
2.	<i>Tests on Road Aggregates</i> <ul style="list-style-type: none"> • Crushing Value Test • Los Angles Abrasion Value Test • Impact Value Test • Shape Test (Flakiness and Elongation Index)
3.	<i>Tests on Bituminous Materials and Mixes</i> <ul style="list-style-type: none"> • Penetration Test • Ductility Test • Softening Point Test • Flash & Fire Point Test • Bitumen Extraction Test
4.	<i>Field Tests</i> <ul style="list-style-type: none"> • Study of Roughometer/Bump Indicator • Study of Benkelman Beam Method

Reference Material

1. Khanna S.K., and Justo, C.E.G. "Highway Material & Pavement Testing", NemChand and Brothers, Roorkee., International Student Edition, Mc Graw Hill.

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: PRCE-101

Subject Name: Seminar and Technical Report Writing

Programme: B.Tech. (CE)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Internal Marks: 50	Percentage of Numerical/Design/Programming Problems:
External Marks: nil	Duration of End Semester Exam (ESE):
Total Marks: 50	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Find relevant sources of information, research and gather information.
2	Create a well organized document using appropriate format and grammatical structure.
3	Acknowledge the work of others in a consistent manner.
4	Understanding of ethical and professional issues.
5	Demonstrate effective written and oral communication.
6	Awareness of implications to society at large.

S. No.	Content
1.	<p>This is an structured open-ended course in which the students under the overall supervision of a faculty member of his discipline, must submit report as a culmination of his endeavor and investigation. The focus area of the seminar can be any topic from the civil engineering discipline.</p> <p>The course will aim to evaluate student's Understanding, Broadness, Diversity, Self-Learning and Service in the area of civil engineering.</p> <p>Students will prepare the individual seminar report as per the prescribed format and present it before the group of students.</p>

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: MCI-101

Subject Name: Environmental Science

Programme: B.Tech. (CE)	L: 2 T: 0 P: 0
Semester: 4	Teaching Hours: 26
Theory/Practical: Theory	Credits: 0
Internal Marks: 40+10	Percentage of Numerical/Design/Programming Problems: 0%
External Marks: --	Duration of End Semester Exam (ESE):
Total Marks: 50	Elective Status: Mandatory

Prerequisites: N/A

Additional Material Allowed in ESE: [NIL]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Measure environmental variables and interpret results.
2	Evaluate local, regional and global environmental topics related to resource use and management.
3	Propose solutions to environmental problems related to resource use and management.
4	Interpret the results of scientific studies of environmental problems.
5	Describe threats to global biodiversity, their implications and potential solutions.

Detailed Contents:

Part-A

Natural Resources - Renewable and non renewable resources: Natural resources and associated problems: Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people,

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems, Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, case studies, Energy Resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies, Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.

Eco Systems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Part-B

Guru Nanak Dev Engineering College, Ludhiana**Civil Engineering Department**

Biodiversity and its Conservation: Introduction-Definition: genetics, species and ecosystem diversity, Biogeographically classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local level, India as a mega diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts, Endangered and endemic spaces of India, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Environmental Pollution: Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies.

Social issues and the Environment: Form unsustainable to sustainable development, Water conservation, rain water harvesting, water shed management, Resettlement and rehabilitation of people; its problems and concerns, case studies, Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies, Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection act, Forest conservation act

Human population and the environment: Population growth and variation among nations, Population explosion- family welfare program, Environment and human health, Human rights, Value education, HIV / AIDS, Women and child welfare

Text Books

1. Textbook of Environmental studies, Erach Bharucha, UGC
2. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd
3. Environment Biology by Agarwal, K. C., Nidi Publ. Ltd. Bikaner.
4. Principle of Environment Science by Cunningham, W.P.
5. Essentials of Environment Science by Joseph.
6. Perspectives in Environmental Studies by Kaushik, A.
7. Elements of Environment Science & Engineering by Meenakshi.
8. Elements of Environment Engineering by Duggal.

Reference Books**E-Books and online learning material**

: <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>

Online Courses and Video Lectures

Guru Nanak Dev Engineering College, Ludhiana
Civil Engineering Department
Subject Code: TR-101
Subject Name: Training - I

Programme: B.Tech. (CE)	L: 0 T: 0 P: 0
Semester:	Teaching Hours: 4 Weeks
Theory/Practical: Practical	Credits: 1
Internal Marks: 60	Percentage of Numerical/Design/Programming Problems:
External Marks: 40	Duration of End Semester Exam (ESE):
Total Marks: 100	Elective Status: Compulsory

Prerequisites:

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes(CO)
1	Visualize things/ concepts and express the thoughts in the form of sketches, models, etc
2	Create a model through programming language using computer.
3	Know about the different materials used at construction sites.
4	Understanding of ethical and professional issues.
5	Demonstrate effective oral and written communication.
6	Work in team.

S. No.	Content
1.	<p>Solid modeling through Python</p> <p>Collection and compilation of different materials used in civil engineering projects in the form of Scrapbook, etc.</p> <p>Sketching / Drafting practice for different buildings, its components, views, sections, etc. and compilation in the form of a drawing notebook and models.</p> <p>Visits to some construction sites/ concrete batching plants, etc.</p>

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE-109

Subject Name: Engineering Geology

Programme: B.Tech (Civil Engineering)	L: 3 T: 0 P: 0
Semester: 5	Teaching Hours: 45 Hours
Theory/Practical: Theory	Credits: 03
Internal Marks: 40	Percentage of Numerical/Design Problems: 0%
External Marks: 60	Duration of End Semester Exam(ESE): 3 hours
Total Marks: 100	Elective Status: Compulsory

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO	Course Outcomes
1.	Understand the geological considerations in civil engineering projects.
2.	Predict the different properties of rocks.
3.	Identify the geological problems associated with civil engineering structures and suggest remedies.
4.	Analyze geological data for civil engineering projects.
5.	Predict the engineering properties of rocks in laboratory and field
6.	Plan appropriate techniques for improvement of engineering properties of rocks.

Detailed Contents:

Part-A

Introduction:

6 hours

Branches of geology useful to civil engineering, scope of geological studies in various civil engineering projects. Department dealing with this subject in India and their scope of work Mineralogy-Mineral, Origin and composition. Physical properties of minerals. Rock forming minerals, megascopic identification of common primary & secondary minerals.

Petrology:

8

hours

Rock forming processes. Specific gravity of rocks. Ternary diagram. Igneous petrology- Volcanic Phenomenon and different materials ejected by volcanoes. Types of volcanic eruption. Concept of Hot spring and Geysers. Characteristics of different types of magma. Division of rock on the basis of depth of formation, and their characteristics. Chemical and Mineralogical Composition. Texture and its types. Various forms of rocks. Classification of Igneous rocks on the basis of Chemical composition. Detailed study of Acidic Igneous rocks like Granite. Engineering aspect to granite. Basic Igneous rocks Like Gabbro, Dolerite, Basalt. Engineering aspect to Basalt. Sedimentary petrology- mode of formation, Mineralogical Composition. Texture and its types, Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics. Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone Metamorphic petrology- Agents and types of metamorphism, metamorphic grades, Mineralogical composition, structures & textures in metamorphic rocks. Important Distinguishing features of rocks as Rock cleavage, Schistosity, Foliation. Classification. Detailed study of Gneiss, Schist, Slate with engineering consideration.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Physical Geology:

5 hours

Weathering. Erosion and Denudation. Factors affecting weathering and product of weathering. Engineering consideration. Superficial deposits and its geotechnical importance: Water fall and Gorges, River meandering, Alluvium, Glacial deposits, Laterite (engineering aspects), Desert Landform, Loess, Solifluction deposits, mudflows, Coastal deposits.

Strength Behavior of Rocks:

6 hours

Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop. Inliers and Outliers. Main types of discontinuities according to size. Fold- Types and nomenclature, Criteria for their recognition in field. Faults: Classification, recognition in field, effects on outcrops. Joints & Unconformity; Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land sliding, Earthquake and Subsidence. Strength of Igneous rock structures.

Part-B

Geological Hazards:

5 hours

Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock anchoring, retaining wall, Lowering of water table and Subsidence. Earthquake: Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth.-Seismic Zone in India.

Rock masses as construction material:

5 hours

Definition of Rock masses. Main features constituting rock mass. Main features that affects the quality of rock engineering and design. Basic element and structures of rock those are relevant in civil engineering areas. Main types of works connected to rocks and rock masses. Important variables influencing rock properties and behavior such as Fresh rock Influence from some minerals. Effect of alteration and weathering. Measurement of velocity of sound in rock. Classification of Rock material strength. Rock Quality Designation.

Geology of dam and reservoir site:

5 hours

Required geological consideration for selecting dam and reservoir site. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, significance of discontinuities on the dam site and treatment giving to such structures.

Rock Mechanics:

5 hours

Sub surface investigations in rocks and engineering characteristics or rocks masses; Structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks, Stress deformation of rocks, Failure theories and shear strength of rocks, Bearing capacity of rocks.

Text Books:

1. Rock Mechanics for Engineers - B.P. Verma - Khanna Publishers New Delhi.
2. Engineering Geology - D.S.Arora – Mohindra Capital Publishers 2000.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

3. Engineering Geology - Parbin Singh - 8th Edition S.K. Kataria & Sons.

Reference Books:

1. Introduction to Rock Mechanics - Richard E. Goodman – wiley.
2. Engg. Behaviour of rocks - Farmar, I.W - Kluwer Academic Publishers.
3. Rock Mechanics and Engg. - C Jaeger – Cambridge University Press.
4. Text Book of Engineering Geology – Kesavvalu - MacMillan India.
5. Geology for Geotechnical Engineers - J.C.Harvey - Cambridge University Press.

E-Books and online learning material:

The Elements of Geology by William Harmon Norton

<https://www.freebookcentre.net/earth-science-books-download/The-Elements-of-Geology.html>

Structural Geology by Stephen J. Martel

<https://www.freebookcentre.net/earth-science-books-download/Structural-Geology-by-Stephen-J.-Martel.html>

Geology Lecture Notes and Supplementary Material by Scott T. Marshall

<https://www.freebookcentre.net/earth-science-books-download/Geology-Lecture-Notes-and-Supplementary-Materials.html>

Physical Geology by Stephen A. Nelson

<https://www.freebookcentre.net/earth-science-books-download/Physical-Geology.html>

Online Courses and Video Lectures:

1. <https://www.youtube.com/watch?v=aTVDiRtRook&list=PLDF5162B475DD915F>
2. <https://www.youtube.com/watch?v=fvoYHzAhvVM>
3. <https://www.youtube.com/watch?v=9K2Zu-phR4Q>
4. <https://www.youtube.com/watch?v=UzZFMWH-ISQ>
5. <https://freevidelectures.com/course/87/engineering-geology>

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE-110

Subject Name: Engineering Economics, Estimation and Costing

Programme: B.Tech. (Civil Engineering)	L: 3 T: 1 P: 0
Semester: 5	Teaching Hours: 48 Hours
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3 Hours
Total Marks: 100	Elective Status: Compulsory

Prerequisites: Math-1

Additional Material Allowed in ESE: Non programmable calculator

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Applying different concepts of economics in engineering projects
2.	Perform and evaluate present worth, future worth and annual worth analyses on one of many economic alternatives.
3.	Evaluate benefit/cost, life cycle and breakeven analyses on one or many economic alternatives
4.	Formulate technical specifications for various works to be performed for a project and their impact on the cost of a structure
5.	Quantify the cost of a structure by evaluating quantities of its constituent materials
6.	Write and prepare tender documents

Detailed Syllabus

Part-A

Basic Principles and Methodology of Economics: Demand/Supply – elasticity – Government Policies and Application; Theory of the Firm and Market Structure; Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies; Aggregate demand and Supply (IS/LM); Price Indices (WPI/CPI), Interest rates, Direct and Indirect; Components of Monetary and Financial System Taxes; Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve. (6 Hours)

Elements of Business/Managerial Economics: Cost & Cost Control –Techniques, Types of Costs, Life-cycle costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money (present and future worth of cash flows). Business Forecasting – Elementary techniques. Statements – Cash flow, Financial. Case Study Method (6 Hours)

Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights (2 Hours)

Part-B

Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; Material survey - Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, market survey of basic materials. (12 Hours)

Specifications & Analysis of rates - Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures; Rate analysis - Purpose & importance, factors affecting, task work, daily output from different equipment/ productivity, labour costs. (14 Hours)

Tender - Preparation of tender documents; importance of inviting tenders; contract types, relative merits, prequalification; general and special conditions; termination of contracts, extra work and Changes, penalty and liquidated charges; Settlement of disputes; R.A. Bill & Final Bill; Payment of advance, insurance, claims, price variation, etc; Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads; Profits; Bid conditions; alternative specifications; Alternative Bids. Bid process management. (8 Hours)

Text/Reference Books:

1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
2. V. Mote, S. Paul, G. Gupta (2004), Managerial Economics, Tata McGraw Hill
3. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
4. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers
5. M Chakravarty, Estimating, Costing Specifications & Valuation
6. Joy P K, Handbook of Construction Management, Macmillan
7. B.S. Patil, Building & Engineering Contracts
8. Relevant Indian Standard Specifications.
9. World Bank Approved Contract Documents.
10. FIDIC Contract Conditions.
11. Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
12. Typical PWD Rate Analysis documents.
13. UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016
14. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE-111

Subject Name: Construction Engineering and Management

Programme: B.Tech. (Civil Engineering)	L: 3 T: 0 P: 0
Semester: 5	Teaching Hours: 36 Hours
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design Problems: 20%
External Marks: 60	Duration of End Semester Exam (ESE): 3 Hours
Total Marks: 100	Elective Status: Compulsory

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Identify various construction methods with their respective features.
2.	Decide various resources required for a particular construction project.
3.	Use CPM and PERT techniques to identify the best course of action for the given parameters.
4.	Explain different techniques and elements of monitoring for a construction project.
5.	Draw a comprehensive checklist required for quality control at a construction project.
6.	Differentiate and explain various types of civil engineering contracts including their important features.

Detailed Contents:

Part-A

Basics of Construction

2 hr

Unique features of construction, construction projects- types and features, phases of a project, agencies involved and their methods of execution;

Construction Methods and Equipment

8 hr

Formwork and Staging, conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures. Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

Planning and Organizing Construction Site and Resources

8 hr

Site- site layout including enabling structures, developing site organization, documentation at site; Manpower- planning, organizing, staffing; Materials- planning, procurement, inventory control; Equipment- productivity, planning, organizing; Funds- cash flow, sources of funds; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource

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2018 Admission Batch Onwards

aggregation, allocation, smoothening and leveling. Make-up of construction costs; Classification of costs, time- cost trade-off in construction projects, compression and decompression.

Part-B

Construction Project Planning

10 hr

Stages of project planning- pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor. Process of development of plans and schedules- work break-down structure, assessment of work content and durations, activity lists, sequence of activities. Techniques of planning- Bar charts, Gantt Charts. CPM Network- basic terminology, types of precedence relationships, activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three-time estimates, analysis, slack computations, calculation of probability of completion.

Project Monitoring, Control & Safety

5 hr

Supervision, record keeping, periodic progress reports. Updating of plans: purpose, frequency and methods of updating. Common causes of time and cost overruns and corrective measures, Use of Building Information Modelling (BIM) in project management; Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control. Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures.

Contracts Management Basics

3 hr

Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given), Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods.

Text Books:

1. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
2. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

Reference Books/Codes:

1. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
2. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. National Building Code, Bureau of Indian Standards, New Delhi, 2017.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE-112
Subject Name: Environmental Engineering

Programme: B.Tech (Civil Engineering)	L: 4 T: 0 P: 0
Semester: 5	Teaching Hours: 52 Hours
Theory/Practical: Theory	Credits: 4
Internal Marks: 40	Percentage of Numerical/Design Problems: 30%
External Marks: 60	Duration of End Semester Exam (ESE): 3 hours
Total Marks: 100	Elective Status: Compulsory

Prerequisites: Nil

Additional Material Allowed in ESE: Graph papers

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Identify different types of water demands and select suitable source of water.
2.	Analyze water and wastewater quality for a given end use and its disposal
3.	Design an appropriate sewerage system.
4.	Examine physical and chemical composition of solid wastes and to investigate the activities associated with the management of solid waste.
5.	Define various sources of air pollution and their effects on environment.
6.	Select the most appropriate technique for the treatment of water, wastewater, solid waste and contaminated air.

Detailed Contents:

Part-A

Unit 1: Water:- General requirement for water supply, population forecasting and water demand, sources, intake, pumping and transportation of water; Physical, chemical and bacteriological characteristics of water and their significance, Water quality criteria, Water borne diseases, Natural purification of water sources. Engineered systems for water treatment: aeration, sedimentation, softening, coagulation, filtration, adsorption, ion exchange, membrane processes and disinfection. **(14 hours)**

Unit 2: Wastewater:- Generation of domestic wastewater, sullage, storm water, Wastewater flow variations; Conveyance of wastewater- Sewers, shapes design parameters, Design of sewerage systems, wastewater pumping, sewer appurtenances. Wastewater collection from buildings; Physical, chemical and bacteriological characteristics of wastewater, Wastewater treatment, Primary, secondary and tertiary treatment of wastewater, wastewater disposal standards, aerobic and anaerobic treatment systems, suspended and attached growth systems, sludge digestion and handling, recycling of sewage – quality requirements for various purposes. **(20 hours)**

Part-B

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Unit 3: Solid Waste:- Engineering principles; Sources, Composition and Properties of Municipal Solid Waste, Onsite handling, storage and processing, Collection, transfer and transport, Recovery of resources, Conversion products and energy, Disposal of solid waste including sanitary landfill. Introduction to biomedical and hazardous waste management. **(12 hours)**

Unit 4: Air and Noise Pollution:- Air Pollutants, their sources, harmful effects on environment, metrology and atmospheric diffusion of pollutants, air sampling and pollutant measurement methods, ambient air quality and emission standards, control, removal of gaseous pollutants, particulate emission control, control of automobile pollution. Noise: Basic concept, measurement and various control methods. **(06 hours)**

Text/Reference Books:

1. Peavy H.S., Rowe D.R. and Tchobanoglous G. “*Environmental Engineering*”, 1st Edition, McGraw-Hill Education (Indian Edition), 2017.
2. Davis M.L and Cornwell D.A. “*Introduction to Environmental Engineering*”, 5th Edition, McGraw-Hill Education, 2012
3. Nathanson J.A. and Schneider R.A. “*Basic Environmental Technology*”, 6th Edition, Pearson Education India, 2016
4. Masters G.M. and Ela W.P. “*Introduction to Environmental Engineering and Science*” 3rd Edition, Pearson International, 2014
5. Garg S.K. “*Water Supply Engineering*”, 33rd Edition, Khanna Publishers, 2010.
6. Garg S.K., “*Sewage Disposal and Air Pollution*”, 39th Edition, Khanna Publishers, 2019.
7. MetCalf and Eddy, “*Wastewater Engineering- Treatment and Reuse*”, 4th Edition, McGraw-Hill Education (Indian Edition), 2017.
8. “*Manual on Operation and Maintenance of Water Supply System*”, Central Public Health & Environmental Engineering Organisation, Ministry of Housing and Urban Affairs, Govt. of India, 2005.
9. “*Manual on Sewerage and Sewage Treatment Systems*”, Central Public Health & Environmental Engineering Organisation, Ministry of Housing and Urban Affairs, Govt. of India, 2013.
10. “*Manual on Municipal Solid Waste Management*”, Central Public Health & Environmental Engineering Organisation, Ministry of Housing and Urban Affairs, Govt. of India., 2016.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE-113
Subject Name: Structural Engineering

Programme: B.Tech. (Civil Engineering)	L: 3 T: 0 P: 0
Semester: 5	Teaching Hours: 40 Hours
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3 Hours
Total Marks: 100	Elective Status: Compulsory

Prerequisites: Math-1

Additional Material Allowed in ESE: Non programmable calculator, IS 456, IS 800, IS 875

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Calculation of loads and its effects in structural members.
2.	Selection of appropriate structural type and load under given set of constraints
3.	Analyse structural system and determination of forces and displacements
4.	Select suitable material for construction of structural system
5.	Design of different structural elements
6.	Detail different structural element as per different applicable BIS guidelines

Detailed Syllabus

Part-A

The concept of structure, what makes a structure, its need and types; First principles of planning and design process: Load, types of load and its assessment; Concept of equilibrium - Principles of structural stability & robustness; Concept and importance of load path, its selection. [5 hours]

Structural analysis: Concept of redundancy and its importance - determinate and redundant structural systems; Effect of load on the structural member - displacements, simple stresses and strains, their importance and calculation for determinate problems only; Classical methods of analysis - beam, pin- and rigid-jointed frames (only portal types frames and beams having DoR up to 2, just to illustrate the concept). [14 hours]

Part-B

Materials - Concrete and steel, their mechanical properties; Safety and structural design criteria; Role of standards (BIS) in the design process. [4 hours]

Design of structural elements using structural steel and reinforced concrete - Slabs (one-way cases only), Beams, Axially loaded columns, Isolated footings; Checks to ensure completeness of a selected load path; Fire protection and durability aspects; Detailing, its importance. [17 hours]

Syllabus, B. Tech (Civil Engineering)
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Text/Reference Books

Devdas Menon, Reinforced Concrete Design. McGraw Hill, 2017

Devdas Menon, Structural Analysis. Narosa, 2010

Gambhir M L, Design of Reinforced Concrete Structures. PHI, 2008

Gambhir M L, Fundamental of Structural Steel Design, McGraw Hill, 2017

Gambhir M L, Fundamental of Structural Mechanics and Analysis, PHI, 2011

Nilson, A. H. Design of Concrete Structures. 13th edition. McGraw Hill, 2004

McCormac, J.C., Nelson, J.K. Jr., Structural Steel Design. 3rd edition. Prentice Hall, N.J., 2003.

Galambos, T.V., Lin, F.J., Johnston, B.G., Basic Steel Design with LRFD, Prentice Hall, 1996

Salmon, C.G. and Johnson, J.E., Steel Structures: Design and Behavior, 3rd Edition, Harper & Row, Publishers, New York, 1990.

NBC, National Building Code, BIS (2017).

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: PCCE – 114
Subject Name: Geotechnical Engineering

Programme: B.Tech.	L: 3 T: 0 P: 0
Semester: 5	Teaching Hours: 42
Theory/Practical: Theory	Credits: 3
Internal Marks: 40	Percentage of Numerical/Design Problems: 70%
External Marks: 60	Duration of End Semester Exam (ESE): 3hours
Total Marks: 100	Elective Status: Compulsory

Prerequisites: NIL

Additional Material Allowed in ESE: Scientific Calculator, graph (natural scale and semi-log)

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Classify different types of soils based on their origin & formation, and derive various phase relationships of the soil
2.	Determination of index properties of soil
3.	Determination of engineering characteristics of soil
4.	Evaluate shear strength and permeability parameters of different soils
5.	Compute elastic and consolidation settlements
6.	Apply the principles of compaction to field problems

Detailed Contents:

Part-A

Introduction and basic concepts

6hours

Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity, etc. Relationship between volume weight, voids ratio- moisture content, unit weight- percent air voids, saturation- moisture content, moisture content- specific gravity etc. Determination of various parameters such as: Moisture content by oven dry method, pycnometer, sand bath method, torsional balance method, nuclear method, alcohol method and sensors. Specific gravity by density bottle method, pycnometer method, measuring flask method. Unit weight by water displacement method, submerged weight method, core-cutter method, sand-replacement method.

Plasticity Characteristics of Soil

6hours

Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: Indian standard soil

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

classification system. Identification: field identification of soils, general characteristics of soil in different groups.

Permeability and seepage of Soil

8hours

Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets. Effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quicksand condition.

Part-B

Compaction of Soil

4hours

Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density, concept of O.M.C. and zero Air Void Line. Compaction in field, compaction specifications and field control.

Consolidation of Soil

10hours

Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, One – dimensional Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation

Shear Strength

8hours

Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, test behaviour of UU, CU and CD tests, pore-pressure measurement, computation of effective shear strength parameters: unconfined compression test, vane shear test

Text Books:

1. Arora K.R., "Soil Mech. & Foundation Engineering", Standard Publishers Distributors, 2011
2. Ranjan G. and Rao A.S., "Basic and applied Soil Mechanics", New Age International Publishers
3. Murthy V.N.S., "Soil Mech. & Foundation Engineering", CBS Publishers & Distributors

Reference Books:

1. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
2. Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

3. Soil Mechanics by Craig R.F., Chapman & Hall
4. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
5. Geotechnical Engineering by Gulati and Datta, Tata McGraw Hill
6. Geotechnical Engineering by Principles & Practices by Donald. P. Coduto, Pearson Education.

E-Books and online learning material:

1. Soil Mechanics and Foundation by BC Punmia, Ashok K Jain, Arun K Jain
<https://easyengineering.net/soil-mechanics-and-foundations-by-punmia>
2. Geotechnical Engineering by C. Venkatramaiah
<http://93.174.95.29/main/1DC69D69B5C9EEE6A7B8747692402614>

Online Courses and Video Lectures:

1. <https://nptel.ac.in/courses/105/101/105101201> Accessed on Nov. 13, 2019
2. <https://nptel.ac.in/courses/105/105/105105185> Accessed on Nov. 26, 2018
3. <https://nptel.ac.in/courses/105/105/105105168> Accessed on Dec. 21, 2017

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: LPCCE106
Subject Name: Geotechnical Lab

Programme: B.Tech.	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24 Hours
Theory/Practical: Theory	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design Problems: 100%
External Marks: 20	Duration of End Semester Exam (ESE): 1.5hours
Total Marks: 50	Elective Status: Compulsory

Prerequisites: Basics of Soil Mechanics

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Comprehend the procedure for classifying coarse grained and fine-grained soils
2.	Evaluate the index properties of soil
3.	Determine the engineering properties of soil
4.	Interpret the results of compaction test for relative compaction in the field
5.	Apply modern engineering tools effectively and efficiently for geotechnical engineering analysis.
6.	Conduct experiments for analyze and interpretation of results for geotechnical engineering design

Detailed Contents:

1. Determination of in-situ density by core cutter method and Sand replacement method.
2. Determination of moisture content in soil sample using oven drying method.
3. Determination of Liquid Limit & Plastic Limit.
4. Determination of specific gravity of soil solids by pycnometer method.
5. Grain size analysis of sand and determination of uniformity coefficient (C_u) and coefficient of curvature (C_c).
6. Compaction test of soil.
7. Unconfined Compression Test for fine grained soil.
8. Direct Shear Test
9. Determination of Relative Density of soil.
10. Determination of permeability by Constant Head Method.
11. Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle
12. Preparing a consolidated report of index properties and strength properties of soil

Text Books:

1. Soil Testing Engineering, Manual by Shamsher Prakash and P.K. Jain, Nem Chand & Brothers
2. A Laboratory Manual on Soil Mechanics: Testing and Interpretation by Ravi Kumar Sharma, I.K. International Publishing House Pvt. Ltd.

Reference Books:

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

1. Soil Mechanics and Foundation Engg.- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. BIS Codes of Practice: IS 2720 (Part 2, 3, 4, 5, 7, 10, 13, 14, 17) – Methods of test for soils
3. Soil Testing for Engineers- Lambe T.W., Wiley Eastern Ltd., New Delhi
4. Manual of Soil Laboratory Testing- Head K.H., (1986)- Vol. I, II, III, Princeton Press, London.

E-Books and online learning material:

1. <http://home.iitk.ac.in/~madhav/geolab.html>

Online Courses and Video Lectures:

1. <https://nptel.ac.in/courses/105/101/105101160/>
2. www.nitttrchd.ac.in/sitenew1/nctel/civil.php
- 3.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: LPCCE-107
Subject Name: Environmental Engineering Laboratory

Programme: B.Tech.	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 26 Hours
Theory/Practical: Practical	Credits: 1
Internal Marks: 30	Percentage of Numerical/Design Problems: --
External Marks: 20	Duration of End Semester Exam (ESE): Viva-voce
Total Marks: 50	Elective Status: Compulsory

Prerequisites: Nil

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Conduct experiments as per standard methods of sampling and analysis.
2.	Demonstrate the characterization of water and wastewater samples.
3.	Understand the importance of laboratory analysis as a controlling factor in the treatment of water and wastewater.
4.	Record the experimental observations and interpret the analysis results.
5.	Use the analysis results for making informed decision about the potability of water and disposal of wastewater.
6.	Recognize the working of air pollution monitoring equipment and noise meter.

S. No.	Name of Practical
1.	Determination of pH value of a water/wastewater sample.
2.	Determination of Turbidity of a water sample.
3.	Determination of Hardness- total, calcium and magnesium hardness of a water sample.
4.	Determination of solids- total, dissolved, suspended, settleable solids of a water/wastewater sample.
5.	Determination of acidity and alkalinity of a water sample
6.	Determination of chlorides and sulphates in a water sample.
7.	Determination of Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD) of a wastewater sample.
8.	Determination of Chemical Oxygen Demand (COD) of a wastewater sample.
9.	Determination of bacteriological quality of a water/wastewater sample.
10.	Determination of nutrients in wastewater (TKN, TN and TP).
11.	Demonstration of air pollution monitoring equipment.
12.	Demonstration of noise level meter.

Text/Reference Books:

- Standard Methods for the Examination of Water and Waste Water, American Public Health Association, American Water Works Association, 2017.
- Sawyer C.N., McCarty P.L. and Parkin G.F., Chemistry for Environmental Engineering and Science, 5th Edition, McGraw Hill, 2003.
- Manuals of analytical equipments.

Syllabus, B. Tech (Civil Engineering)
2018 Admission Batch Onwards

Subject Code: LPCCE108
Subject Name: Structural Lab

Programme: B.Tech.	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24 Hours
Theory/Practical: Practical	Credits: 01
Internal Marks: 30	Percentage of Numerical/Design Problems: -
External Marks: 20	Duration of End Semester Exam(ESE): 1.5 Hours
Total Marks: 50	Elective Status: Compulsory

Prerequisites: NIL

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Verify theoretical formulas by conducting experiments.
2.	Predict the behavior of statically determinate beams and trusses.
3.	Depict the behavior of two hinged arch and three hinged arch structures.
4.	Demonstrate the influence lines for statically determinate and indeterminate beams.
5.	Observe and compute deflections of simply supported beams, curved beams and frames using classical methods.
6.	Outline the deflected shapes of columns and struts with different end conditions.

Detailed Contents:

1. Deflection of a simply supported beam and verification of Clark-Maxwell's theorem.
2. To determine the Flexural Rigidity of a given beam.
3. To verify the Moment- area theorem for slope and deflection of a given beam.
4. Deflection of a fixed beam and influence line for reactions.
5. Deflection studies for a continuous beam and influence line for reactions.
6. Study of behaviour of columns and struts with different end conditions.
7. Experiment on three-hinged arch.
8. Experiment on two-hinged arch.
9. Deflection of a statically determinate pin jointed truss.
10. Forces in members of redundant frames.
11. Experiment on curved beams.
12. Unsymmetrical bending of a cantilever beam.

Text Books:

Laboratory Manual on Structural Mechanics by Dr. Harvinder Singh; New Academic Publishing Comp. Ltd

E-Books and online learning material:

1. Structural Analysis Lab by Lakshman Singh
<http://www.dbit.ac.in/ce/syllabus/structural-analysis-lab.pdf>

Online Courses and Video Lectures:

<https://lecturenotes.in/practicals/36000-lab-manual-for-structural-analysis2-sa2-by-prashant-kumar?reading=true>