

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

<b>Third Semester</b>										
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 Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-102	Fluid Mechanics Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-103	Solid Mechanics Lab	Practical	0	0	2	30	20	50	1
Project/Training	TR-101	Training - I	Practical	-	-	-	60	40	100	1
Mandatory course		Mentoring and Professional Development	Practical	0	0	1		-	50	0
		<b>26</b>		<b>18</b>	<b>1</b>	<b>7</b>	<b>390</b>	<b>460</b>	<b>850</b>	<b>23</b>
<b>Fourth Semester</b>										

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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 (Transform & Discrete Mathematics)	Theory	3	0	0	40	60	100	3
Professional Core courses	LPCCE-104	Concrete Testing Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-105	Transportation Lab	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
Mandatory Courses	MPD-102	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
		<b>27</b>		<b>18</b>	<b>2</b>	<b>7</b>	<b>460</b>	<b>340</b>	<b>800</b>	<b>22</b>

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

**Fifth Semester**

Category	Subject	Course Title	Subject	Hours	Marks	Credits
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	Code		Type (Theory/ Practical)	Per Week			Distribution			
				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	Elements of Earthquake Engineering	Theory	3	0	0	40	60	100	3
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 Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-107	Environmental Engineering Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-108	Structural Lab	Practical	0	0	2	30	20	50	1
Training	TR-102	Training - II	Practical	-	-	-	60	40	100	1
Mandatory Course		Mentoring and Professional Development	Practical	0	0	1	-	-		0
		<b>27</b>		<b>19</b>	<b>1</b>	<b>7</b>	<b>390</b>	<b>460</b>	<b>850</b>	<b>24</b>
<b>Sixth Semester</b>										
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	Estimation & Costing and Professional	Theory	3	1	0	40	60	100	4

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		Practice								
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 Lab	Practical	0	0	2	30	20	50	1
Professional Core courses	LPCCE-110	BIM Lab	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 (Non-credit)	MCI-102	Constitution of India	Theory	2	0	0	50	-	50	0
Mandatory Course	MPD-103	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
		<b>29</b>		<b>17</b>	<b>3</b>	<b>9</b>	<b>470</b>	<b>380</b>	<b>850</b>	<b>23</b>

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	OEZZ-	Open Elective –	Theory	3	0	0	40	60	100	3

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courses	XXX	II								
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
		<b>20</b>		<b>11</b>	<b>2</b>	<b>7</b>	<b>390</b>	<b>310</b>	<b>700</b>	<b>16</b>
<b>Eighth Semester</b>										
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
		<b>18</b>		<b>9</b>	<b>2</b>	<b>7</b>	<b>340</b>	<b>260</b>	<b>600</b>	<b>15</b>

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*\* Industrial /Institutional Training will be imparted at the end of 2<sup>nd</sup> 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**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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



**Guru Nanak Dev Engineering College, Ludhiana**  
**Civil Engineering Department**  
**Subject Code: PCCE-102**

**Subject Name: Solid Mechanics**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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.

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**Subject Code: PCCE-103**  
**Subject Name: Fluid Mechanics**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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  $\pi$ -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..

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

**Subject Name: Basic Electronics & applications in Civil Engineering**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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.

**Online Courses and Video Lectures**

NPTEL / other online resources.

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**Civil Engineering Department**  
**Subject Code: HSMCE-101**

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

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

**On completion of the course, the student will have:**

<b>CO#</b>	<b>Course Outcomes (CO)</b>
1	Introduction to what constitutes Civil Engineering
2	Understanding the vast interfaces this field has 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.



**Guru Nanak Dev Engineering College, Ludhiana**  
**Civil Engineering Department**  
**Subject Code: LPCCE-101**  
**Subject Name: Surveying & Geomatics Lab**

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

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
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.

<b>S. No.</b>	<b>Name of Practical</b>
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 Lab.

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

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

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
1	Select appropriate pressure measuring device under different condition 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.

<b>S. No.</b>	<b>Name of Practical</b>
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**  
**Subject Code: LPCCE-103**  
**Subject Name: Solid Mechanics Lab**

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

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
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.

<b>S. No.</b>	<b>Name of Practical</b>
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

**Guru Nanak Dev Engineering College, Ludhiana**  
**Civil Engineering Department**  
**Subject Code: PCCE-105**

**Subject Name: Concrete Technology**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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**

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**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

**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

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

**Subject Name: Materials, Testing a& Evaluation**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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 drawn 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.

**E-Books and online learning material**

1. Related papers published in international journals

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

**Subject Name: Hydrology & Water Resources Engineering**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
1	Understand the interaction among various processes in the hydrologic cycle.
2	Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapotranspiration etc
3	Understand the various component of hydro graphs and able to estimate the run off.
4	Find the water requirement for different crops and able to proposed appropriate method of applying water.
5	Understand the distribution system of canal and various components of irrigation system.
6	Classify dams and spillways, 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.



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**Runoff** - Runoff Volume, SCS-CN Method of estimating runoff volume, Flow Duration Curve, Flow-Mass Curve, Hydrograph, Factors Affecting Runoff Hydrograph, Components of Hydrograph, Base Flow Separation, Effective Rainfall, Unit Hydrograph Surface Water Resources of India, Environmental Flows.

**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.

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

**Subject Name: Transportation Engineering**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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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## Civil Engineering Department

**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.

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

**Subject Name: Mathematics-III (Transform & Discrete Mathematics)**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [Scientific Calculator]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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.

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**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.

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

<b>Programme:</b> B.Tech. (CE)	<b>L: 0 T: 0 P: 2</b>
<b>Semester:</b> 4	<b>Teaching Hours:</b> 24
<b>Theory/Practical:</b> Practical	<b>Credits:</b> 1
<b>Internal Marks:</b> 30	<b>Percentage of Numerical/Design/Programming Problems:</b> 100%
<b>External Marks:</b> 20	<b>Duration of End Semester Exam (ESE):</b> 1.5 hr
<b>Total Marks:</b> 50	<b>Elective Status:</b> Compulsory

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
1	Evaluate properties of building materials, such as cement and aggregates.
2	Conduct experiments and 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.

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

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

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

**Reference Material**

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

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

<b>Programme:</b> B.Tech. (CE)	<b>L: 0 T: 0 P: 2</b>
<b>Semester:</b> 4	<b>Teaching Hours:</b> 24
<b>Theory/Practical:</b> Practical	<b>Credits:</b> 1
<b>Internal Marks:</b> 30	<b>Percentage of Numerical/Design/Programming Problems:</b> 100%
<b>External Marks:</b> 20	<b>Duration of End Semester Exam (ESE):</b> 1.5 hr
<b>Total Marks:</b> 50	<b>Elective Status:</b> Compulsory

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
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

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

**Reference Material**

1. Khanna S.K., and Justo, C.E.G. "Highway Material & Pavement Testing", NemChand andBrothers, 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**

<b>Programme:</b> B.Tech. (CE)	<b>L: 0 T: 0 P: 2</b>
<b>Semester:</b> 4	<b>Teaching Hours:</b> 24
<b>Theory/Practical:</b> Practical	<b>Credits:</b> 1
<b>Internal Marks:</b> 50	<b>Percentage of Numerical/Design/Programming Problems:</b> 100%
<b>External Marks:</b> nil	<b>Duration of End Semester Exam (ESE):</b> 1.5 hr
<b>Total Marks:</b> 50	<b>Elective Status:</b> Compulsory

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
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 other 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.

<b>S. No.</b>	<b>Content</b>
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>

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**Subject Code: MCCE-101**

**Subject Name: Environmental Science**

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

**Prerequisites:** N/A

**Additional Material Allowed in ESE:** [NIL]

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

<b>CO#</b>	<b>Course Outcomes (CO)</b>
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.
6	

**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

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function of the following ecosystems: Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Part-B**

***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>

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**Subject Code: TR-101**

**Subject Name: Seminar and Technical Report Writing**

<b>Programme:</b> B.Tech. (CE)	<b>L: 0 T: 0 P: 0</b>
<b>Semester:</b> 4	<b>Teaching Hours:</b> 4 Weeks
<b>Theory/Practical:</b> Practical	<b>Credits:</b> 1
<b>Internal Marks:</b> 60	<b>Percentage of Numerical/Design/Programming Problems:</b> 100%
<b>External Marks:</b> 40	<b>Duration of End Semester Exam (ESE):</b> 1.5 hr
<b>Total Marks:</b> 100	<b>Elective Status:</b> Compulsory

**Prerequisites:**

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

<b>CO#</b>	<b>Course Outcomes(CO)</b>
1	Visualize things/ concepts and express the thoughts in the form of sketches, models, etc
2	Create a well organized document using computers
3	Work in teams
4	Acknowledge the work of other in a consistent manner
5	Understanding of ethical and professional issues
6	Demonstrate effective oral communication and presentation skills

<b>S. No.</b>	<b>Content</b>
1.	<p>Hands-on-training on Office suite (Word processor, Spreadsheet, Math tools, presentation/ ppt, etc.) and preparation of the report of the site visits to be undertaken in the training, and other activities performed therein.</p> <p>Visits to some construction sites/ concrete batching plants, etc.</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>Presentation of the work done in the training.</p>