Civil Engineering Department

Vision

To establish an outstanding centre of regional and national reputation for providing a quality engineering education to the students from the rural area of Punjab, excellent research and services to the professional and the community; to produce quality civil engineers; and to employ principles of continual quality improvement to enhance its programme and faculty.

Mission

- To serve the people of Punjab and the country by providing a broad and high quality education to its student for a successful professional career.
- To conduct strong basic and applied research for national needs.
- To serve the construction industry; civil engineering profession and rural community through dissemination of knowledge and technical services.

Programme Educational Objectives (PEO)

The program educational objectives (PEO) of the civil engineering program are that its graduates could demonstrate the following essential components of a successful engineer and/or consultant within two to four years after the graduation.

1. To train the students so that they can work and contribute to the infrastructure development projects being undertaken by Govt. and private or any other sector companies.
2. To train students in such as a way that they can pursue higher studies so that they can contribute to the teaching profession/ research and development of civil engineering and other allied fields.
3. To train students in a manner that they should function effectively in the multicultural and multidisciplinary groups for the sustainable development and growth of civil engineering projects and profession.

Program Outcomes (PO) and their mapping with identified PEOs

Program outcome (PO)		PEOs that are attained through concerned PO
a	An ability to apply knowledge of mathematics, science, and engineering to problem solving.	1
b	An ability to design and conduct experiments, as well as to analyze and interpret data.	1, 2
c	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	1, 2, 3
d	An ability to function on multidisciplinary teams.	3
e	An ability to identify, formulates, and solves engineering problems.	2
f	An understanding of professional and ethical responsibility.	3
g	An ability to communicate effectively.	3
h	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	1, 3
i	Recognition of the need for, and an ability to engage in life-long learning.	2, 3
j	Knowledge of contemporary issues.	3
k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	2, 3
l	An ability to work for the infrastructural development, to pursue teaching, research & development activities and to work effectively in a group.	1, 3

Course Outcomes (CO)

Course	CO
Engineering Physics (BTPH-101)	1. Understand EM waves, magnetic materials (superconductors in particular) and their properties. 2. Understand the basics of crystallography and X rays & their applications. 3. Explain the lasing action & the working of optical fibres and their role in communication. 4. Comprehend and apply the concept of relativity in non-relativistic& relativistic realms. 5. Recognize the adequacies of quantum & classical mechanics for different physical problems.
Basics of Electrical and Electronics Engineering (BTEE-101)	1. Identify basic elements of electrical engineering. 2. Understand the basic theorems in electrical engineering. 3. Explain the basic operations of transformers and electrical machines. 4. Assess the operations of basic semiconductor devices.
Communicative English (BTHU-101)	1. Acquire standard English sounds and pronunciation. 2. Develop a knack for structured public talk and group discussion 3. Demonstrate fluency in speech without much hesitation in acceptable accent. 4. Receive and understand spoken material accurately. 5. Develop ready access to topological vocabulary and idiomatic expressions of colloquial speech.
Human Values and Professional Ethics (HVPE-101)	1. Recognize the need, basic guidelines and process for value-education. 2. Explain the meaning, purpose, content and process of self-exploration. 3. Assess happiness and prosperity and its prevailing wrong notions. 4. Understand harmony in individual, family and society. 5. Describe the professional ethics, holistic systems and implications of value based living.
Engineering Chemistry (BTCH-101)	1. Identify the structure of any unknown compound with the help of spectroscopy. 2. Differentiate between hard and soft water. 3. Know the principles of Green chemistry and Nanochemistry. 4. Understand the causes of corrosion of metals. 5. Explain the properties and applications of crude oil and natural gas.
Elements of Mechanical Engineering (BTME-101)	**1.** Acquire the knowledge of fundamental principles of thermodynamics. **2.** Solve mechanical and mathematical problems/equations using laws of thermodynamics. **3.** Understand different power cycles and engines. **4.** Analyze different engineering materials, selection of materials and their properties. **5.** Understand fundamentals of centroid, centre of gravity, moment of inertia
Environment Science (EVSC-101)	1. Conceptualize the processes and various factors involved in the formation of environment. 2. Recognize the importance of environment and the sustainable of natural resources.

	3. Analyze interaction between social and environmental processes. 4. Use scientific reasoning to identify and understand environment problems and evaluate potential solution. 5. Visualize the impacts of human activities on environment and role of society in these impacts. 6. Recall critically about their role as citizens, consumers and environmental actors in a and inter connected world.
Fundamentals of Computer Programming and IT (BTCS-101)	1. Describe the elemental building blocks of a general purpose digital computer system like CPU, peripheral 2. Understand the program development life cycle using various tools like Flowcharts, Algorithms and Pseudo - code. 3. Classify Operators, expressions, character set, data types and control structures. 4. Understand the concept of modular programming and code reusability using library functions. 5. Write programs using Object Oriented concepts like Classes and Objects, file handling.
Engineering Mathematics-I (BTAM-101)	1. Analyse different equations to draw their curves and find their curvature. 2. Apply the concepts of integral calculus for rectification and areas. 3. Understand the concepts of partial differentiation and apply them in engineering problems. 4. Acquire the knowledge of double and triple integrals in evoluation of areas and volumes. 5. Understand the principles of vector functions and operators.
Engineering Mathematics-II (BTAM-102)	1. Analyse the behaviour of infinite series. 2. Solve problems based on linear algebra. 3. Acquire knowledge of Complex Functions. 4. Understand methods to solve first order and higher order differential equations. 5. Apply the concepts of differential equations to solve practical problems.
Engineering Drawing (BTME102)	1. Visualize science in the form of technical graphics. 2. Read and draft orthographic projections of points, lines, planes and solids as per the BIS codes. 3. Understand and visualize section of solid, intersection and development of surfaces. 4. Draw and read isometric and orthographic projections of geometric objects
BEEE Lab (BTEE-102)	1. Verify the basic laws in electrical and electronics engineering. 2. Make measurements of electrical and electronic quantities using various measuring instruments. 3. Calculate efficiency and losses of transformers. 4. Verify the working of D.C. Motors and other devices.
Engineering Physics Lab (BTPH-102)	1. Measure magnetic field, dielectric constant, frequency of ac mains & hysteresis loss. 2. Study and analyse laser beam characteristics. 3. Study and determine the basic parameters related to optical fibres. 4. Find out the refractive index of a material. 5. Measure the velocity of ultrasonic waves in liquid.

	6. Use optical microscope to determine grain size.
Communicative English Lab (BTHU-102)	1. Present them without much hesitation in an accent that is understood all around. 2. Reproduce their understanding of concepts principles of communication in English language. 3. They can present themselves well in front of large audience on a variety of topics. 4. They will become familiar with the standard English sound and pronunciation of words. 5. They become familiar with topical vocabulary and the idiomatic expressions which are part of colloquial speech.
Engineering Chemistry Laboratory (BTCH-102)	1. Correlate the impurities with hardness, chloride content and alkalinity of water. 2. Select a lubricant for a particular type of a machine and analyze the importance of temperature for viscosity. 3. Handle sophisticated instruments, to interpret the results to calculate other parameters. 4. Investigate the advantages of chromatographic techniques. 5. Explore the maintenance of different reaction conditions to get maximum yield.
Fundamentals of Computer Programming and IT Laboratory	1. Get knowledge of Computer System, Window explorer, Control panel and Command prompt. 2. Work on Microsoft Word, Excel, PowerPoint and Mail Merging. 3. Use concepts of C++ types, basic terminologies, operators, expressions, control structures. 4. Implement programs using functions, arrays and strings. 5. Understand the concept of OOP's, use of classes and objects and basics of file handling.
Engineering Computer Graphics Laboratory (BTME-103)	1. Use the drafting software for modelling 2D and 3D entities. 2. Understand the cocepts of dimensioning,tolerances,sectioning of solids. 3. Visualize the entities in different views and projections.
2nd Year	
Fluid Mechanics- 1 (BTCE-301)	1. Determine pressures and forces on submerged bodies. 2. Analyse flow rates, velocities, energy losses and momentum flux for fluid system 3. Measure and describe fluid flow phenomena. 4. Set up a relation among various parameters based on dimensional analysis and model study.
Rock Mechanics & Engineering Geology (BTCE-302)	1. Learn geology and its types, various features like fault, fissures, weathering etc., minerals, rocks, and rock formations in relation to civil engineering structures. 2. Understand various techniques to determine engineering properties of rocks etc. 3. Understand various techniques to analyse and to made possible solutions for various Geological Engineering problems.
Strength of Material (BTCE-303)	1. Apply the linear laws of elasticity as related to stress and strain. 2. Understand the concept of a complex stress system. 3. Understand of the behaviour of columns and struts under axial loading.

	4. Analyse the bending stress on different types of sections . 5. Determine the effect of combined axial and bending stress . 6. Demonstrate the use of critical thinking and problem solving techniques as applied to mechanical and structural systems.
Surveying (BTCE-304)	1. Understand various methods and techniques of surveying and its applications (levelling, compass survey, contouring and curve settings etc.) 2. Apply the concept of Tacheometry in surveying difficult and hilly terrains to obtain the topographical map of area. 3. Ability to use survey instruments in carrying out survey, collect data, write reports and able to perform required calculations to achieve the objective.
Building Material & Construction (BTCE-305)	1. Extend the knowledge about the characteristics, sources and defects in various materials. 2. Design and test the materials either in the laboratory or in the field before their actual use at the site. 3. Attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures. 4. Know the various services to be provided and the defects in the buildings along with the remedial measures for proper maintenance of the buildings.
Fluid Mechanics Lab – 1 (BTCE-306)	1. Determine metacentre of a floating vessel. 2. Calibrate various flow measuring devices in pipe and open channel flow . 3. Determine various losses and velocity in pipe flow in field.
Strength of Material Lab (BTCE-307)	1. Apply the linear laws of elasticity as related to stress and strain. 2. Understand deflection of different sections at different loading conditions. 3. Differentiate between properties of a material. 4. Analyse the bending stress on different types of sections.
Surveying Lab (BTCE-308)	1. Survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically. 2. Record the reduced levels using various methods of levelling and measurement of horizontal & vertical angles by Theodolite. 3. Determine the location of any point horizontally and vertically using Tachometry. 4. Setting out curves in the field.
Geomatics Engineering (BTCE-401)	1. Develop firm understanding of remote sensing and data analysis from aircraft and satellite sensors. Manipulate and represent geographical data. 2. Demonstrate a firm understanding of GPS for navigation and resolving the location related problems. 3. Apply the electronic technology for surveying work.
Construction Machinery& Works Management (BTCE-402)	1. Device a plan and manage construction project and know the time value of money. 2. Plan project by various methods finding the time estimates and controlling the projects while deterring and flowing the critical path. 3. Determine minimum total cost in minimum time by conducting a crash programme and hence updating and rescheduling a project. 4. Make aware of various construction equipment
Design of Concrete Structure (BTCE-403)	1. Understand the properties and role of various constituent materials used in concrete making. 2. Understand the properties of concrete and various design mix techniques for concrete. 3. Apply the fundamental concepts, techniques in analysis and design of reinforced concrete elements i.e. beam & slab. 4. Apply the design principles by undertaking simple design examples. 5. Apply the various codal requirements related to RC members i.e. slab & beam.

Fluid Mechanics-II (BTCE-404)	1. Identify and analyse the appropriate flow and subsequent effect in field 2. Analyse the effect of wind and water if any civil structure is placed in flowing fluid 3. Calculate the resistance forces of fluid on structure and select appropriate technique to minimise it. 4. Analyse forces and design most economical open channel.
Irrigation Engineering (BTCE-405)	1. Demonstrate the concepts, techniques and modernization of Irrigation. 2. Plan, design and execute by applying various concepts in the irrigation structures. 3. Analyse and manage irrigation and water resource system for sustainable development by applying managerial skills.
Structure Analysis –1 (BTCE-406)	1. Visualize the concepts of loads, supports and displacements. 2. Analyse statically determinate structural systems. 3. Choose a suitable method and technique for determination of structural displacement and force resultants. 4. Visualize the effect of loads, rolling loads and/or reactions, support displacements and temperature on the structural response 5. Utilize the concept of influence lines for deciding the critical forces and sections while designing.
Concrete Technology Lab (BTCE-407)	1. Explain the properties of Constituent material of concrete. 2. Carry out concrete mix design. 3. Carry out test procedures for major laboratory properties of fresh and hardened concrete.
Structure Lab (BTCE-408)	1. Verify theoretical formulas by conducting experiments. 2. Analyze statically determinate beams, trusses. 3. Students will be able to analyze arch structures. 4. Obtain the influence lines for statically determinate and indeterminate structures. 5. Determine deflections of beams and frames using classical methods.
3rd Year	
Design of Steel Structures-I (BTCE-501)	1. Understand and appreciate various aspects of steel construction like different types of steel sections, their specifications, advantages of steel construction etc. 2. Analyse and design various types of steel connections using rivets, bolts and weld. 3. Design basic elements of a steel building like beam, column, and column bases etc. for given conditions and loading. 4. Estimate ‘design loads’ for a roof truss and then be able to design its various components like top chord members, bottom chord members, web members, purlins etc
Geotechnical Engineering (BTCE-502)	1. To understand the origin of soil and to identify different types of soil. 2. To understand the various physical and engineering characteristics of different types of soil. 3. To understand the concept of slope stability. 4. To appreciate the use of modern technology in the field of geotechnical engineering.
Structural Analysis-II (BTCE-503)	1. Distinguish statically determinate and redundant structural systems. 2. Choose a suitable method for the analysis of structural system (pin-jointed as well as rigid jointed) while designing. 3. Visualize the effect of loads and/or reactions, support displacements and temperature on the structural response. 4. Utilize the concept of influence lines for deciding the critical forces and sections while designing.

Transport Engineering-I (BTCE-504)	1. Understand the importance & characteristics of road transport for geometric design of various roads with proper alignment based on planning principles, survey data, economics & finance data. 2. Recognize the knowledge of highway materials & construction of various types of roads and identify the problems associated with roads & remedies for same. 3. The traffic characteristics, interpretation of traffic data & its uses, traffic safety & various control measures and traffic environment interaction for safe & healthy environment.
Environmental Engineering – I (BTCE-505)	1. Identify various water demands and select suitable source of water. 2. Demonstrate a firm understanding of various water quality parameters. 3. Generalize relevant design criteria, procedures and methods for various water treatment processes. 4. Describe structure of drinking water supply system, water transport and its distribution.
Transport Engineering Lab (BTCE-506)	1. Evaluate the strength of subgrade soil by CBR test. 2. Recognise the knowledge about different physical properties of aggregates by performing different test on road aggregates. 3. Outline the various properties of bitumen material and mixes by performing various tests on it. 4. Evaluate the pavement condition by roughometer and Benkleman beam test.
Geotechnical Engineering Lab (BTCE-507)	1. Understand the procedure to classify the coarse grained and fine grained soil. 2. Evaluate the index properties of soil. 3. Evaluate the engineering properties of soil. 4. Apply the concept of MDD and OMC to control compaction in the field.
Computer Aided Structural Drawing I (BTCE-508)	1. Produce structural drawing of Reinforced Concrete Elements such as Beams, Slabs 2. Develop Structural Drawings of steel elements such as Connections, Tension Members, Compression Members, Beams, Column Base, and Roof Trusses. 3. Understand various connection details.
Survey Camp (BTCE-509)	1. An ability to function in multidisciplinary teams 2. To develop a skill to communicate (both oral and written) effectively. 3. Ability to concepts of surveying and plotting topographical maps of various terrains as well as to analyze and interpret data from these maps. 4. Recognition of the need for, and ability to engage in life-long learning.
Design of Concrete Structures-II (BTCE-601)	1. Design various sub-structure components like isolated footing, combined footing, retaining walls, along with relevant IS code requirements. 2. Design various super-structure components like stairs, columns, continuous beams, along with relevant IS code requirements. 3. Apply the concepts of structure design to special structural elements like curved beams, domes, water retaining structures, along with relevant IS code requirements.
Elements of Earthquake Engineering (BTCE–602)	1. Appreciate the role of earthquake forces in structural design of building and various parameters related to the seismic design of buildings. 2. Apply various codal provisions related to the seismic design of buildings (both RC and masonry). 3. Develop a skill to retrieve information from past structural failures and use it in future planning. 4. Acquire new basic knowledge in earthquake engineering thus allowing them to communicate in a better way with scientists and engineers of other disciplines in earthquake engineering.
Foundation Engineering (BTCE-603)	1. Understand the importance of soil investigation and determine various soil properties.

	2. Understand the significance and determine the load bearing capacity for shallow and deep foundations 3. Understand the settlement behaviour of different type of soil under different foundation. 4. Understand the concept of earth pressure behind earth retaining structures for different conditions.
Numerical Methods in Civil Engineering (BTCE-604)	1. Calculate the roots of linear and non-linear equations by applying various numerical methods/formula. 2. Apply, finite difference technique for ordinary and partial differential equation 3. Analyze, apply and appreciate the finite difference technique for various types of plate and civil engineering problems. 4. Develop skills in numerical computation by working on numerical examples through different numerical method. 5. Identify the origin of errors and their effect on the accuracy, while applying the various numerical methods and numerical computation.
Professional practice (BTCE-605)	1. Demonstrate an ability to prepare rough and detailed building estimate. 2. Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc. 3. Develop an understanding of various laws applicable to buildings and construction industry.
Environmental Engineering – II (BTCE-606)	1. Demonstrate a firm understanding of various sewerage systems and their suitability. 2. Design sewer and drainage systems layout for communities. 3. Visualize waste water quality parameters and their characteristics. 4. Understand relevant wastewater treatment processes, their design criteria and applicability. 5. Make decisions regarding the treatment plant site selection, operation and maintenance and the need of advanced treatment**.**
Environmental Engineering Laboratory – II (BTCE-607)	1. Make students proficient in the analysis of water and the wastewater by following the standard methods of sampling and testing. 2. Independently perform the characterisation studies of wastewater and determine the suitability of a water sample as drinking water source. 3. Explain the importance of the laboratory analysis as a controlling factor in the treatment of water and wastewater.
Computer Aided Structural Drawing – II (BTCE-608)	1. Design and draw working structural drawings of staircase,foundation,domes and water retaining structures. **2.** Understand and interperate design aids and handbooks. 3. Use of relevant Indian Standard specifications applicable to Reinforced concrete structures.
4th Year	
Industrial Training (BTCE-701)	1. An understanding of professional and ethical responsibilities. 2. An ability to the techniques skill, and modern engineering tools necessary for practice such as procurement, billing, quality assurance in construction industry, interaction with clients, professionals etc. 3. Recognition of the need for, and ability to engage in life-long learning. 4. Knowledge of contemporary issues.
Design of Steel Structures-II (BTCE-801)	1. Consider various primary loads, load combinations for obtaining a worst design load. 2. Plan the structural framing of industrial buildings and bridges from the given data/design constraints. 3. Apply the concepts of structural design to obtain suitable member sizes/sections. 4. Prepare and deliver rough sketches to the draftsman.

Disaster Management (BTCE-802)	1. Identify various types of disasters, its causes, effect & mitigation of each and describe the various important phases of disaster management cycle having concern of vulnerability & risk for mankind and need of emergency management system to tackle the problems. 2. Understand the role of media, various agencies, and technology for the capacity building for effective disaster management & preparedness for future through various case studies. 3. Understand the importance of integration of public policy and how planning & design of infrastructure, community based approach and various ecological & sustainable models can be used for effective disaster management.
Irrigation Engineering-II (BTCE-803)	1. Analyse the structures for seepage and uplift pressure. 2. Understand the functioning of Diversion Headwork and use of energy dissipation devices. 3. Envisage the selection of type of fall and outlet and choice of different cross drainage works according to situation. 4. Utilize the concept of hydraulic design in the devising the water distribution system, regulators, falls, outlets and weirs of irrigation network.
Transportation Engineering – II (BTCE-804)	1. Functions of components of railway track 2. Apply existing technology to the design, construction, and maintenance of railway physical facilities. 3. Aware of the current international technology relative to Railway Engineering. 4. Develop an awareness of major issues and problems of current interest to the Airport Engineering.
Major Project (BTCE-805)	1. An understanding of professional and ethical responsibilities. 2. An ability to use of various techniques, engineering knowledge and skill, and modern engineering tools necessary for planning, analysis and designing of engineering projects like building, roads, geotechnical works/problems. 3. Recognition of the need for, and ability to engage in life-long learning. 4. Knowledge of contemporary issues.
Prestressed Concrete (BTCE-809)	1. Understand concept and principles of prestressing; tools/methods of prestressing; and role of materials *viz:* concrete and steel in the process. 2. Evaluate different loses in the prestress and analyse the sections for resultant stresses and/or capacity. 3. Identify different modes of section failure; choose and apply different methods of analysis; provisions of IS 1343. 4. Design prestressed concrete members for flexure, shear and torsion. 5. Prepare and deliver rough sketches to the draftsman etc.
Ground Improvement Techniques (BTCE-810)	1. Understand the concepts behind various ground improvement techniques. 2. Identify appropriate techniques for various ground conditions. 3. Predict the behaviour of ground after improvement.
Hydrology and Dams (BTCE-817)	1. Design rain gauge network and calculate depth of precipitation, runoff, infiltration, peak flow over the basin using different methods. 2. Estimate peak flows and fix design flood by different methods. 3. Select a suitable type of dam to be constructed according to the site requirements. 4. Design different types of dams i.e. gravity dam, earthen dam, arch and buttress dam.
Pavement Design (BTCE-818)	1. Identify different pavement and functions of different components in pavement. 2. Design pavement and overlays as per need and field condition 3. Design bituminous mix as per Indian standard.