# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

*(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)*

Department: **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B. Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Surveying** | **Subject Code: BCIES1-321** | **Semester : 3rd** |
|---|---|---|
| **Credit: 3 (Mandatory Course)** | **L T P - 3-0-0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering plan a survey. | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | - |
| CO2 | Taking accurate measurements, field booking, plotting and adjustment of traverse use various conventional instruments involved in surveying with respect to utility. | - | 2 | - | - | 2 | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | Precisely plan a survey for applications such as road alignment and height of the building undertake measurement and plotting in civil engineering | - | 1 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | - | 1 | 1 |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30%  2. Moderate (Medium) – above 30% and upto70%  3. Substantial (High) – above 70%

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Department: **CIVIL ENGINEERING**
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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: FLUID MECHANICS-I** | **Subject Code: BCIES1-322** | **Semester 3rd** |
|---|---|---|
| **Credit: 3** | **L T P – 3 0 0 3** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Understand the broad principles of fluid statics, kinematics and dynamics. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Understand definitions of the basic terms used in fluid mechanics. | 3 | - | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | Understand classifications of fluid flow. | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Be able to apply the continuity, momentum and energy principles. | 3 | 3 | 2 | - | 1 | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | Understand dimensional analysis. | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 1 | - |
| CO6 | Understand flow past immersed bodies. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 1 | 1 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Engineering & Solid Mechanics | **Subject Code:** BCIES1-323 | **Semester:** 3rd |
| **Credit:** 04 | **L T P:** 3-1-0 | **Duration:** 60 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Describe the concepts and principles, understand the theory of elasticity including strain / displacement and Hooke's law relationships, and perform calculations, relative to the strength and stability of structures and mechanical components. | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures, analyze solid mechanics problems using classical methods and energy methods. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO3 | Analyze various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress, locate the shear centre of thin wall, beams | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO4 | Calculate the deflection at any point on a beam subjected to a combination of loads, solve for stresses and deflections of beams under unsymmetrical loading, apply various failure criteria for general stress states at points and solve torsion problems in bars and thin walled members. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | 1 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Building Materials & Construction | **Subject Code:** BCIES1-324 | **Semester:** 3rd |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Predict the properties of building stones and its classifications. | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Understand the concept of various methods of manufacture of bricks. | 3 | - | 3 | - | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Obtain differentiate the fine aggregates & coarse aggregates under various views. | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO4 | Explain various types of cements and their applications in construction. Various field and laboratory tests on cement. | - | 3 | - | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | - |
| CO5 | Analyze the importance of mineral and chemical admixtures, requirements of the concrete in construction. | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO6 | Explain the suitability of floors in buildings like mosaic flooring, terrazzo flooring, rubber flooring, asphalt flooring. | - | 3 | - | - | - | - | 2 | - | - | - | - | - | 3 | 3 | - |
| CO7 | Explain the foundations and uses of different types of foundations. | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO8 | Explain the classification of various types of woods. Properties, seasoning of timber. | 3 | - | - | - | - | 2 | - | - | - | - | - | - | 3 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Civil Engineering- Societal & Global Impact** | **Subject Code BHSMC0-022** | **Semester 3rd** |
|---|---|---|
| **Credit: 02** | **L T P – 2 0 0** | **Duration: 30 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Awareness of the importance of Civil Engineering and the impact it has on the Society and at global levels | - | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - |
| CO2 | Awareness of the impact of Civil Engineering for the various specific fields of human endeavour | - | - | - | - | - | 2 | - | - | - | - | - | - | 3 | - | - |
| CO3 | Need to think innovatively to ensure Sustainability. | - | - | - | - | - | | 3 | - | - | - | - | - | 2 | - | - |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Engineering & Solid Mechanics Lab | **Subject Code:** BCIES1-325 | **Semester:** 3rd |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Students will be able to operate the laboratory equipment, interpret the laboratory data including conversion of measurements into engineering values. | 3 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | They will be able to find the deviation of material properties (strength and stiffness) from the engineering values. | 2 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | They will be able to observe various modes of failure in compression, tension, and shear. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | They will be able to observe various types of material behavior under similar loading conditions. | 3 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO5 | They will be able to observe material behavior under repeated loading. | 3 | 1 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** FLUID MECHANICS LAB | **Subject Code:** BCIES1-326 | **Semester** 3rd |
| **Credit:** 1 | **L T P –** 0 0 2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Predict the metacentric height of floating vessel and utility in vessel design. | 3 | - | - | 3 | - | - | - | - | -- | - | - | - | 3 | 2 | 1 |
| CO2 | Calibrate various flow measuring devices (venturimeter, orifice meter and notches). | 3 | - | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | - |
| CO3 | Authenticate the Bernoulli's theorem experimentally. | 3 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | Assess the discharge of fluid over broad crested weir. | 3 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 1 | - |
| CO5 | Compute various losses and velocity in pipe flow in field. | 1 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 1 | - |
| CO6 | Predict the coefficient of discharge for Broad Crested Weir. | 2 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO7 | Determine the hydraulic coefficients for flow through an orifice. | 3 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 2 | - |
| CO8 | Determine the friction coefficient for pipes of different diameter. | 2 | - | - | 3 | - | - |  | - | - | - | - | - | 3 | 2 | - |

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Programme: B. Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Surveying Lab** | **Subject Code: BCIES1-327** | **Semester : 3rd** |
|---|---|---|
| **Credit: 2 (Mandatory Course)** | **L T P - 0-0-4** | **Duration: 60 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Surveying of an area by chain survey (closed traverse) & plotting. | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO2 | Survey of a given area by prismatic compass and surveyor compass and plotting after adjustment. | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO3 | Radiation method, intersection methods by plane table survey | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4 | Two point and three point problems in plane table survey. | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO5 | Leveling – Longitudinal and cross-section and plotting | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO6 | Trigonometric leveling using Theodolite | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO7 | Height and distances using principles of tachometer surveying | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |
| CO8 | a.Measurement of Horizontal angle & vertical angle.<br><br>b.Distance between inaccessible point by theodolite | 1 | 1 | - | - | 2 | - | - | - | 1 | 1 | - | - | 1 | - | 2 |

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Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| **Subject: Computer-aided Civil Engineering Drawing-I** | **Subject Code BCIES1-328** | **Semester 3rd** |
|---|---|---|
| **Credit: 1** | **L T P - 0 0 2** | **Duration: 30 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Design and draw working structural drawings of various concrete structures and their members. | - | - | 3 | - | 3 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO2 | Understand and interoperate design aids and handbooks. | - | - | - | 3 | - | - | - | - | - | 3 | - | 2 | 3 | - | - |
| CO3 | Use of relevant Indian Standard specifications applicable to Reinforced concrete structures. | 3 | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - |

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Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Environmental Science** | **Subject Code BMNCC0-002** | **Semester 3rd** |
| **Credit: 0 (Mandatory & Non-Credit Course)** | **L T P - 2 0 0** | **Duration: 30 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Technologies based on ecological principles and environmental regulations, which in turn helps in sustainable development. | - | - | 3 | - | - | 2 | 3 | - | - | - | - | - | 3 | - | - |
| CO2 | Conceptualize the processes and various factors involved in the formation of environment. | 1 | - | - | 3 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | Recognize the importance of environment and the sustainable natural resources. | - | - | - | - | - | - | 3 | - | - | - | - | - | - | - | 2 |
| CO4 | Use scientific reasoning to identify and understand environment problems and evaluate potential solution. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | Identify the impacts of human activities on environment and role of society in these impacts. | 3 | - | - | - | - | - | - | - | 3 | - | - | 2 | - | 2 | 2 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Structural Analysis-I | **Subject Code:** BCIES1-421 | **Semester:** 4th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will possess the skills to solve statically determinate problems of structural analysis dealing with diff. loads. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | They will be able to apply their knowledge of structural analysis to address structural design problems. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO3 | They will be able to calculate support reactions of all statically determinate structures | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Design of Concrete Structures-I | **Subject Code** BCIES1-422 | **Semester 4th** |
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Identify the different failure modes and determine their design strengths. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO2 | Select the most suitable section shape and size for beams according to specific design criteria. | - | 3 | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Transportation Engineering - I** | **Subject Code: BCIES1-423** | **Semester: 4th** |
| **Credit: 3 (Departmental Core Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The student will learn about essentials of highway planning and features of highway development in India. | - | - | - | - | - | 2 | - | 1 | - | 3 | - | 1 | 3 | - | - |
| CO2 | The student will learn how to do selection of highway alignment and design the geometric elements of highways. | 2 | - | 3 | 2 | - | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | The student will learn how to carry out traffic studies and implement traffic regulation and control measures and intersection design. | - | - | - | 3 | 2 | - | - | - | - | 1 | 1 | - | - | - | 2 |
| CO4 | The student will know about characteristic properties of road construction materials and design the flexible and rigid pavements as per IRC guidelines. | - | 3 | - | - | - | - | 1 | - | 2 | 2 | - | 1 | 3 | - | - |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Environmental Engineering-I | **Subject Code:** BCIES1-424 | **Semester:** 4th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | An ability to design a system, component, or process to meet desired needs. | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, welfare, and environmental factors. | 3 | - | 3 | - | - | 3 | 3 | - | - | - | - | - | 3 | 3 | - |
| CO3 | An ability to develop and conduct appropriate experimentation, analyze and interpret data for future demand & supply. | - | 3 | - | 3 | - | - | 3 | - | - | - | - | 2 | 3 | 3 | - |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - up to 30%  2. Moderate (Medium) – above 30% and up to70%  3. Substantial (High) – above 70%

# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

*(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)*

Department: **CIVIL ENGINEERING**

Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Engineering Geology** | **Subject Code BCIES1-425** | **Semester 4th** |
| **Credit: 2** | **L T P - 2 0 0** | **Duration: 30 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Site characterization and how to collect, analyse, and report geologic data using standards in engineering practice. | 3 | 3 | - | - | - | - | - | - | - | 3 | - | - | 3 | 3 | - |
| CO2 | The fundamentals of the engineering properties of Earth materials and fluids. | 3 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | Rock mass characterization and the mechanics of planar rock slides and topples. | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | - |
| CO4 | Soil characterization and the Unified Soil Classification System. | 2 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO5 | The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - |

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Programme: B. Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Geomatics Engineering** | **Subject Code: BCIED1-451** | **Semester : 4th** |
|---|---|---|
| **Credit: 3 (Mandatory Course)** | **L T P - 3-0-0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline. | 2 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | 2 | - | - |
| CO2 | An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline. | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - |
| CO3 | An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature. | - | 1 | - | 2 | - | - | 1 | - | - | - | - | - | - | 2 | - |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO4 | An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and An ability to function effectively as a member as well as a leader on technical teams. | - | 2 | - | - | - | - | - | - | 2 | - | - | - | - | - | 2 |

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**Department:** **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda

**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Numerical Methods in Civil Engineering | **Subject Code:** BCIED1-452 | **Semester:** 4th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Identify the application potential of numerical methods. | 3 | 3 | - | 1 | - | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO2 | Solve Civil engineering problems using numerical methods. | 3 | 1 | - | 1 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Demonstrate application of numerical methods to civil engineering problems. | 3 | 2 | - | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO4 | Apply differential equations and integration to solve civil engineering problems. | 3 | - | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO5 | Outline and Propose the finite difference techniques. | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO6 | Apply the concept of partial differential equations and Solve practical problems. | 3 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 1 |

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Department: **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Concrete Construction Technology** | **Subject Code BCIED1-453** | **Semester 4th** |
| **Credit: 3 (Departmental Elective-I)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | To understand the behaviour of fresh and hardened concrete. | 3 | - | - | - | - | - | - | - | - | 2 | - | 2 | 3 | - | - |
| CO2 | To make aware the recent developments in concrete technology. | 3 | - | 2 | - | - | 3 | - | - | - | 2 | - | 2 | 3 | 2 | 1 |
| CO3 | To understand factors affecting the strength, workability and durability of concrete. | - | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO4 | To impart the methods of proportioning of concrete mixtures. | 3 | - | 2 | - | - | - | - | - | - | 3 | - | - | 3 | - | 3 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Concrete Technology Lab-I | **Subject Code:** BCIES1-426 | **Semester:** 4th |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Determine the consistency, setting time and fineness of cement. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Determine the specific gravity, soundness and compressive strength of cement | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Determine the fineness modulus, grading, density & specific gravity of aggregates. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO4 | Determine the shape & size, compressive strength and water absorption of bricks. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO5 | Determine the compressive strength and water absorption of interlocking Pavers. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO6 | Determine the yield Stress, ultimate Stress, elongation of Steel bars. | 3 | - | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | - |

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Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda

**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Structural Analysis Lab | **Subject Code:** BCIES1-427 | **Semester:** 4th |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Students will be able to effectively link the theory / analytical concepts. | 2 | 2 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO2 | They will be able to demonstrate the background of the theoretical aspects, with practice and application. | 2 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | They will be able to generate and analyze data using experiments and develop observational skill by the exposure to equipment and machines. | - | 3 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO4 | They will be able to use computing tools in analyzing and presentation of the experimental data. | - | 2 | - | 3 | 2 | - | - | - | - | 2 | - | - | 3 | 3 | 1 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Transportation Engineering Lab** | **Subject Code: BCIES1-428** | **Semester: 4th** |
|---|---|---|
| **Credit: 1 (Departmental Core Course)** | **L T P - 0 0 2** | **Duration: 30 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The student will learn the laboratory testing of different kinds of highway construction materials such as Soil, Aggregate and Bitumen. | 3 | 1 | - | 2 | 1 | - | 2 | - | - | 1 | 1 | - | 3 | - | 1 |
| CO2 | The student will learn to check the suitability of highway construction material so as to exercise better quality control in a road construction project. | - | - | 3 | - | | 1 | - | 1 | 2 | - | 2 | 1 | - | 3 | - |

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Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda

**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Structural Analysis-II | **Subject Code:** BCIES1-521 | **Semester:** 5th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will possess the skills to solve statically indeterminate problems of structural analysis dealing with different loads. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | They will be able to apply their knowledge of structural analysis to address structural design problems. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | 1 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Geotechnical Engineering** | **Subject Code BCIES1-522** | **Semester 5th** |
| **Credit: 03** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will be able to apply their knowledge of various phase diagrams and derive various phase relationships of the soil. | 3 | 1 | 1 | - | - | _ | 2 | - | - | - | - | - | 3 | 3 | 1 |
| CO2 | The students will be able to apply their knowledge of index properties, | 3 | 1 | 2 | 3 | - | - | 2 | - | - | - | - | - | 3 | 3 | 1 |
| CO3 | The students will be able to apply their knowledge of the engineering properties of soil. | 3 | 1 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 1 |
| CO4 | The students will be able to apply their knowledge of stability of slopes. | 3 | 1 | 3 | - | - | - | 2 | - | - | - | - | - | 3 | 3 | 1 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Environmental Engineering-II | **Subject Code:** BCIES1-523 | **Semester:** 5th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Estimate sewage generation and design sewer system including Sewage pumping stations. | 3 | - | 3 | - | - | 2 | - | - | - | - | - | - | 3 | 3 | 1 |
| CO2 | Required understanding on the characteristics and composition of sewage, self Purification of streams. | 3 | - | - | - | - | 2 | 2 | - | - | - | - | - | 3 | 3 | - |
| CO3 | Perform basic design of the unit operations and processes for sewage treatment. | - | - | 3 | - | - | - | 3 | - | - | - | - | - | 3 | 3 | 1 |
| CO4 | An ability to develop and conduct appropriate experimentation, analyze and interpret data for future sewage generation & handling. | - | 3 | - | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 3 | 1 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Design of Steel Structures-I** | **Subject Code BCIES1-524** | **Semester 5th** |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Identify the different failure modes of bolted and welded connections, and determine their design strengths. | - | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO2 | Identify the different failure modes of steel tension and compression members and beams, and compute their design strengths. | - | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria. | - | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 2 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: FLUID MECHANICS-II** | **Subject Code: BCIED1-551** | **Semester 5th** |
|---|---|---|
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Understand laminar and turbulent flows. | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Learn about concepts of boundary layer theory. | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | Design open channels for most economical sections. | 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | Will be able to understand surges, momentum principles, specific energy and GVF profiles. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |

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Department: **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Maintenance of Building Structures** | **Subject Code BCIED1-552** | **Semester 5th** |
| **Credit: 3 (Departmental Elective-II)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Assess the health condition of structures. | 3 | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Inspect and evaluate damage structures. | 3 | 3 | - | - | - | - | - | - | - | 2 | - | - | 3 | 3 | - |
| CO3 | Implement the techniques for repairing of concrete structures. | 3 | - | 3 | - | 3 | - | - | - | - | - | 2 | 3 | 3 | - | 1 |
| CO4 | Test the assess the condition of properties of existing concrete structures. | 2 | 3 | - | 3 | - | - | - | - | - | 2 | - | - | 3 | 3 | - |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Rural Water Supply and Onsite Sanitation Systems | **Subject Code:** BCIED1-553 | **Semester:** 5th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Knowledge about water supply scheme in rural areas. | 3 | - | - | - | - | 2 | 2 | - | - | - | - | - | 3 | 3 | - |
| CO2 | Knowledge about environmental sanitation methods and design in rural areas. | 3 | - | 3 | - | - | 2 | 2 | - | - | - | - | - | 3 | 3 | - |

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Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda

**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Construction Engineering & Management | **Subject Code:** BCIED1-561 | **Semester:** 5th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Students will be able to develop basic ability to plan, control and monitor construction projects with respect to time and cost. | 3 | - | - | - | 2 | - | - | - | - | - | 3 | - | 3 | 3 | 2 |
| CO2 | Students will be able to develop an idea of how to optimize construction projects based on costs. | 2 | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 | 3 | - |
| CO3 | Students will be able to develop an idea how construction projects are administered with respect to various contract systems and issues. | 2 | - | 3 | - | - | - | - | - | - | - | 2 | - | 3 | 3 | 1 |
| CO4 | They will be able to develop an ability to put forward ideas and understandings to others with effective communication processes. | 3 | - | 3 | - | - | - | - | - | - | 2 | - | - | 3 | 3 | 1 |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - up to 30%  2. Moderate (Medium) – above 30% and up to70%  3. Substantial (High) – above 70%

# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

*(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)*

Department: **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B. Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Repair & Rehabilitation of Structures** | **Subject Code: BCIED1-562** | **Semester : 5th** |
|---|---|---|
| **Credit: 3** | **L T P - 3-0-0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Know the strategies of maintenance and repair. | 2 | 1 | - | - | - | 2 | - | - | - | - | - | - | 1 | 1 | - |
| CO2 | Understand the properties of repair materials. | 2 | 1 | - | - | - | 2 | - | - | - | - | - | - | 1 | 1 | - |
| CO3 | Understand the various properties of concrete. | 2 | 1 | - | - | - | 2 | - | - | - | - | - | - | 1 | 1 | - |
| CO4 | Get an idea of repair techniques. | 2 | 1 | - | - | - | 2 | - | - | - | - | - | - | 1 | 1 | - |
| CO5 | Understand the retrofitting strategies and techniques. | 2 | 1 | - | - | - | 2 | - | - | - | - | - | - | 1 | 1 | - |

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Department: **CIVIL ENGINEERING**
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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: RIVER ENGINEERING** | **Subject Code: BCIED1-563** | **Semester 5th** |
|---|---|---|
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Mechanics of river flow, aggradations and degradation, measurements in rivers. | 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Physical river models. | 2 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | 3 | 2 | - |
| CO3 | River training works. | 2 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Design of river training and flood protection structures. | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |

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GianiZail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Geotechnical Engineering lab** | **Subject Code BCIES1-525** | **Semester 5th** |
| **Credit: 01** | **L T P - 0 0 2** | **Duration: 30 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Have thorough knowledge about the procedures of laboratory tests used for determination of physical, index and engineering properties of soils | 3 | 1 | 3 | - | - | _ | 2 | - | - | - | - | - | 3 | 3 | 3 |
| CO2 | Have the capability to classify soils based on test results and interpret engineering behavior based on test results | 3 | 1 | 1 | - | - | - | 2 | - | - | - | - | - | 3 | 3 | 3 |
| CO3 | Be able to evaluate the permeability and shear strength of soils | 3 | 1 | 1 | - | - | - | 2 | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | Be able to evaluate settlement characteristics of soils | 3 | 1 | 3 | - | - | - | 2 | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | Be able to evaluate compaction characteristics required for field application | 3 | 1 | 3 | - | - | - | 2 | - | - | - | - | - | 3 | 3 | 3 |

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Department: **CIVIL ENGINEERING**

Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Engineering Geology Lab** | **Subject Code BCIES1-526** | **Semester 5th** |
| **Credit: 1** | **L T P – 0 0 2** | **Duration: 30 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Ability to categorize rocks and minerals by their origin and engineering properties. | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | - | 1 |
| CO2 | Ability to apply geological principles to rock masses and discontinuities for use in engineering design e.g. rock slopes, foundation. | - | 3 | 3 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 1 |
| CO3 | Gain an understanding of the societal relevance of Geological system. | 3 | - | 2 | 2 | - | 3 | - | - | 2 | - | - | 2 | 3 | - | 3 |
| CO4 | Life-long learning of students about the identification of minerals and rocks. | 3 | - | - | 2 | - | - | - | - | - | - | - | 3 | 3 | 2 | 2 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Environmental Engineering Lab | **Subject Code:** BCIES1-527 | **Semester:** 5th |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Discuss about importance of water and its quality analysis. | 2 | 3 | - | 3 | - | 2 | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Analyse various physico-chemical and biological parameters of water in case of quality requirements. | 3 | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Assess complete water quality assessment for EIA and domestic supplies. | - | - | 3 | 3 | - | - | 2 | - | - | - | - | - | 3 | 3 | - |
| CO4 | Suggest various types of treatment methods required to purify raw water with different contaminants. | 3 | - | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO5 | Assess complete waste water quality assessment for their disposal. | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| Subject: DESIGN OF CONCRETE STRUCTURE-II | **Subject Code BCIESI-621** | **Semester** 6th |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Identify and compute the design loads on RCC components. | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Able to analyze and design with detailing RCC members. | - | 3 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | Ability to design and check for serviceability (crack and deflection) and ultimate limit state conditions. | - | 3 | 3 | 2 | - | 2 | - | - | 2 | - | - | - | - | 3 | 2 |
| CO4 | Apply relevant Indian Standard provisions to ensure safety and serviceability of RCC structural elements. | 3 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | - | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Foundation Engineering** | **Subject Code BCIES1-622** | **Semester 6th** |
|---|---|---|
| **Credit: 03** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Learn about types and purposes of different foundation systems and structures. | 3 | 2 | 3 | 2 | - | _ | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO2 | Have an exposure to the systematic methods for designing foundations. | 3 | 2 | 3 | 3 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO4 | Have necessary theoretical background for design and construction of foundation systems. | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |

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Programme: B. Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Professional Practice & Law** | **Subject Code: BCIES1-623** | **Semester : 6th** |
|---|---|---|
| **Credit: 4 (Mandatory Course)** | **L T P - 3 1 0** | **Duration: 60Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Understand the preparation of an abstract estimate for a residential building, roads, irrigation projects, bridges, etc. | 2 | 2 | - | - | - | - | - | - | - | - | 2 | - | 2 | - | 2 |
| CO2 | Analyse the units for various quantities of items of work & also evaluate the rates for various items of work | 2 | 2 | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | - |
| CO3 | Design and prepare bar bending schedule for reinforcement works. | - | 2 | 2 | - | - | 2 | - | - | - | - | - | - | 2 | 2 | - |
| CO4 | Evaluate the valuation of buildings & preparation of standard specifications for different items. | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: IRRIGATION ENGINEERING** | **Subject Code: BCIES1-624** | **Semester 6th** |
|---|---|---|
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Recognize the concepts, techniques and modernization of irrigation. | 3 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Plan and design lined and un-lined canals for irrigations. | 2 | 1 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO3 | Apply different theories/ methods to design lined and un-lined canals. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | Learn losses in canals and its control measures. | 1 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | Design and construction of well and tube well. | 1 | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 3 | 1 | - |
| CO6 | Learn about river training works. | 3 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | 3 | - | 1 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Matrix Methods of Analysis | **Subject Code:** BCIED1-651 | **Semester:** 6th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Students will be able to analyze skeletal i.e. framed structures. | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | They will be able to differentiate between the flexibility and stiffness methods of structural analysis. | 3 | 3 | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO3 | They will be able to access computers that permits the use of the stiffness method for analyzing traditional civil engineering structures, air frame, space structures etc. | 2 | 3 | - | - | 3 | - | - | - | - | - | - | - | 3 | 3 | - |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Solid & Hazardous Waste Management | **Subject Code:** BCIED1-652 | **Semester:** 6th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Do sampling and characterization of solid waste. | 3 | - | - | - | - | 3 | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Analysis of hazardous waste constituents including QA/QC issues | - | 3 | - | - | - | 3 | 2 | - | - | - | - | - | 3 | 3 | - |
| CO3 | Apply steps in solid waste management like waste reduction at source, collection techniques, recycling, transport, optimization of solid waste. | - | 3 | 3 | - | - | 3 | - | - | - | - | - | - | 3 | 3 | 2 |
| CO4 | Analyse treatment & disposal techniques and economics of the onsite vs. offsite waste management. | - | 3 | 3 | - | - | 3 | - | - | - | - | 1 | - | 3 | 3 | 2 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Pavement Design** | **Subject Code: BCIED1-653** | **Semester: 6th** |
| **Credit: 3 (Departmental Elective Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will learn about how to design the crust thickness of highway and airfield pavements. | 3 | - | - | 2 | - | 1 | - | - | - | - | - | 2 | 3 | - | - |
| CO2 | They will learn the design principles and methods of flexible and rigid pavements being used worldwide. | - | 3 | - | 1 | 2 | - | 2 | - | - | - | - | - | - | 2 | - |
| CO3 | They will learn in detail the design methods prescribed by the Indian Roads Congress for flexible and rigid pavements in India | - | - | 3 | - | 2 | - | - | 2 | 1 | 1 | - | - | 3 | - | 2 |
| CO4 | The students will get exposure to methodology of strengthening of existing pavement structures and some modern pavement design concepts. | - | - | - | 3 | 1 | - | - | 1 | - | 2 | 2 | - | - | 1 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Ground Improvement Techniques** | **Subject Code BCIED1-654** | **Semester 6th** |
| **Credit: 03** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Ability to understand the necessity of ground improvement and potential of a ground for improvement | 3 | 2 | 3 | 2 | - | _ | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | To gain comprehensive understanding about the improvement of in-situ cohesive soils as well as Cohesion less soils | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | Competence to analyze an in-situ ground, identification of ground improvement techniques feasible, selection of the ideal method, its planning , design, implementation and evaluation of improvement level | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 2 | 2 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Soil Mechanics and Foundation Engineering lab** | **Subject Code BCIES1-625** | **Semester 6th** |
|---|---|---|
| **Credit: 01** | **L T P - 0 0 2** | **Duration: 30 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Be able to perform and evaluate un-soaked and soaked California bearing ratio (CBR) tests used to estimate subgrade behaviour. | 3 | 2 | 2 | 2 | - | _ | 3 | - | - | - | - | - | 3 | 3 | 2 |
| CO2 | Be able to perform and evaluate load carrying capacities of piles. | 3 | 2 | 3 | 3 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | Be able to perform and evaluate load carrying capacities of shallow foundation | 3 | 2 | 3 | 2 | - | - | 1 | - | - | - | - | - | 3 | 3 | 2 |
| CO4 | Be able to perform and evaluate permeability of soil. | 3 | 2 | 2 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30%  2. Moderate (Medium) – above 30% and upto70%  3. Substantial (High) – above 70%

# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB) INDIA

*(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)*

**Department:** **CIVIL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda

**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Concrete Technology Lab-II | **Subject Code:** BCIES1-626 | **Semester:** 6th |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Analyze & describe the properties of hardened concrete. | 3 | 3 | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Knowledge of concrete mix design philosophy & analysis of these philosophies. | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Design concrete mixes which fulfils the required properties for fresh and hardened concrete for sustainable development. | - | - | 3 | 3 | - | - | 2 | - | - | - | - | - | 3 | 3 | 1 |
| CO4 | Test of different concrete property to specify quality of concrete. | 3 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO5 | Give practical exposure for laboratory testings and make their effective reports & presentations. | 3 | - | - | 3 | - | - | - | - | - | 3 | - | - | 3 | 3 | 1 |

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Department: **CIVIL ENGINEERING**

Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering (2019 Scheme)

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Computer-aided Civil Engineering Drawing-II** | **Subject Code BCIES1-627** | **Semester 6th** |
| **Credit: 1** | **L T P - 0 0 2** | **Duration: 30 Hrs.** |

| COs | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Ability to use the software packers for drafting and modelling. | 3 | - | 2 | - | 3 | - | - | - | 3 | - | - | 3 | 3 | - | 2 |
| CO2 | Design and draw working structural drawings of various concrete, steel, hydraulic, etc. structures and their components & members. | - | - | 3 | - | 3 | - | - | 2 | - | - | - | - | 3 | 2 | - |
| CO3 | Understand and interoperate design aids and handbooks. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 3 | 2 |
| CO4 | Use of relevant Indian Standard specifications applicable to reinforced concrete, steel, hydraulic and other structures. | 3 | 2 | 3 | 2 | - | 2 | - | - | - | - | 2 | - | 3 | 3 | 2 |

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Giani Zail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Constitution of India** | **Subject Code: BMNCCO-001** | **Semester: 6th** |
| **Credit: 0 (Mandatory Course)** | **L T P - 2 0 0** | **Duration: 30 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local administrations. | - | - | 2 | - | - | - | - | 3 | - | - | - | - | 2 | - | - |
| CO2 | Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. | - | - | | - | - | - | 2 | - | - | - | - | - | - | 2 | |
| CO3 | Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government. | - | - | | - | - | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO4 | Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions like SC/ST/OBC and women. | - | - | | - | - | - | - | - | 2 | - | - | - | - | 1 | - |

Enter Correlation levels 1, 2 or 3 as defined below:

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Transportation Engineering - II** | **Subject Code: BCIES1-721** | **Semester: 7th** |
| **Credit: 3 (Departmental Core Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will learn about importance of railways and Air transportation systems in the social and economic development of the country. | - | 3 | - | - | - | 2 | - | 1 | - | 3 | - | 1 | - | 3 | - |
| CO2 | The students will come to know about engineering aspects of components of railway track and its geometric design, layouts of stations and yards, and railway signaling and interlocking systems. | 2 | - | 3 | 2 | - | - | 2 | - | 1 | - | - | - | 3 | 1 | - |
| CO3 | The students will learn about planning and design of runway and taxiway, airport configurations and visual aids required for safe and efficient air transportation system. | - | - | - | 3 | 2 | - | - | - | - | 1 | 1 | - | - | - | 3 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: EARTHQUAKE ENGINEERING** | **Subject Code BCIES1-722** | **Semester 7th** |
| **Credit: 02** | **L T P – 2 0 0** | **Duration: 30 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering. | - | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO2 | The students will get a diverse knowledge of earthquake engineering practices applied to real life problems. | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects. | - | 3 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** WATER RESOURCES ENGINEERING | **Subject Code: BCIED1-751** | **Semester 7th** |
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | To study types of diversion headworks, seepage theories. | 1 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | To design weirs. | 2 | - | 3 | - | - | - | - | - | 1 | - | - | - | 3 | 1 | - |
| CO3 | To learn about spillways. | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Design of canal regulators, canal falls, cross drainage works. | 1 | 2 | 3 | - | - | - | - | - | 1 | - | - | - | 3 | 1 | - |
| CO5 | Classify canal outlets, design outlets. | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | 1 |

Enter Correction levels 1, 2 or 3 as defined below:

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Air & Noise Pollution and Control | **Subject Code:** BCIED1-752 | **Semester:** 7th |
| **Credit:** 03 | **L T P:** 3-0-0 | **Duration:** 45 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Explain basic principles on various aspects of atmospheric chemistry. | 3 | - | - | - | - | 3 | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Identify the major sources, effects and monitoring of air and noise pollutants. | 3 | 3 | - | - | - | 3 | - | - | - | - | - | - | 3 | 3 | - |
| CO3 | Understand the key transformations and meteorological influence on air and noise. | 3 | - | - | - | - | 3 | 2 | - | - | - | - | - | 3 | 3 | - |
| CO4 | Relate and analyse the pollution regulation on its scientific basis. | 3 | 3 | - | - | - | 3 | - | - | - | - | - | - | 3 | 3 | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** PIPELINE ENGINEERING | **Subject Code: BCIED1-753** | **Semester 7th** |
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Design and operation of pipeline. | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | 1 |
| CO2 | Rehabilitation of pipeline systems. | 1 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | 1 | - |
| CO3 | Software for WDN analysis. | - | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Pipe burst and leak control detection. | - | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | Appurtenances and pipe materials. | - | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: PRESTRESSED CONCRETE** | **Subject Code BCIED1-761** | **Semester 7th** |
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Students will understand the general mechanical behavior of prestressed concrete. | 3 | | | | | | | | | | | | 2 | 2 | |
| CO2 | Students will be able to analyze and design prestressed concrete flexural members. | | 3 | 3 | 3 | | | | | | | | | 3 | 3 | |
| CO3 | Students will be able to analyze and design for vertical and horizontal shear in prestressed concrete. | | 3 | 3 | 3 | | | | | | | | | 3 | 3 | |

Enter Correction levels 1, 2 or 3 as defined below:

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Pavement Construction & Management** | **Subject Code: BCIED1-762** | **Semester: 7th** |
| **Credit: 3 (Departmental Elective Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will learn about various engineering methods used for construction and maintenance of different types of pavement structures. | 3 | - | - | 2 | - | - | 1 | - | - | - | 2 | - | 3 | - | - |
| CO2 | The student shall get familiar with the methods of evaluation of pavement structures to undertake various types of maintenance management strategies. | - | 1 | 3 | - | - | - | - | 2 | 1 | 2 | - | - | - | 3 | 1 |
| CO3 | They will learn the concept of pavement management system and pavement performance prediction, which will not only help them in field applications but also in research at the postgraduate level after completion of their graduation | - | 3 | - | - | 2 | 2 | - | - | - | - | - | 2 | - | - | 3 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Soil Reinforcing Techniques** | **Subject Code BCIED1-763** | **Semester 7th** |
|---|---|---|
| **Credit: 03** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Competence in identification of ideal geo-synthetic function and ability to select the ideal product to serve the function. | 3 | 2 | 2 | 2 | - | _ | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | Ability to analyse and design the application of geo-synthetics. | 3 | 2 | 1 | 2 | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO3 | Competence construction practices and evaluation of post construction improvement. | 3 | 2 | 2 | 2 | - | - | 2 | - | - | - | - | - | 3 | 2 | 2 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: SOFTWARE LAB** | **Subject Code BCIESI-723** | **Semester 7th** |
|---|---|---|
| **Credit: 01** | **L T P – 0 0 2** | **Duration: 30 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | To design the whole project like roads, building etc. with the help of softwares | - | 3 | 3 | 2 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - |
| CO2 | To deal with project management in real time | - | - | - | - | - | - | - | - | 3 | - | 3 | 3 | - | - | 3 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: DESIGN OF STEEL STRUCTURE-II** | **Subject Code BCIESI-821** | **Semester** 8th |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Identify and compute the design loads on a typical steel building. | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Able to analyze and design with detailing of steel flexural members. | - | 3 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | Ability to design and check for serviceability (crack and deflection) and ultimate limit state conditions. | - | 3 | 3 | 2 | - | 2 | - | - | 2 | - | - | - | - | 3 | 2 |
| CO4 | Apply relevant Indian Standard provisions to ensure safety and serviceability of structural steel elements. | 3 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | - | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Bridge Engineering** | **Subject Code: BCIED1-851** | **Semester: 8th** |
| **Credit: 3 (Departmental Elective Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students will learn about the planning and construction of bridges, which is one of the most important components of the transportation infrastructure. | - | 3 | - | 1 | - | 2 | - | - | - | 1 | - | 2 | - | - | 3 |
| CO2 | They will learn about different types of bridges, their choice, site selection, loads, with special emphasis on RCC and steel bridges. | - | - | 3 | - | 2 | - | 2 | - | 1 | - | 2 | - | 3 | 2 | - |
| CO3 | They will also learn about components of sub-structure and super-structure of the bridges along with construction and maintenance aspects of bridges. | 3 | - | 2 | - | - | - | - | 2 | - | 1 | - | - | - | 3 | 1 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Design of Industrial Structures** | **Subject Code** BCIED1-852 | **Semester 8th** |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Various distress and damages to concrete and masonry structures, the importance of maintenance of structures, types and properties of repair materials etc. | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Assessing damage to structures and various repair techniques. | - | - | - | - | 3 | 2 | - | - | - | - | 2 | - | - | 3 | 3 |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30%  2. Moderate (Medium) – above 30% and upto70%  3. Substantial (High) – above 70%

# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

*(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)*

Department: **CIVIL ENGINEERING**

GianiZail Singh Campus College of Engineering & Technology, MRSPTU Bathinda.

Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: DISASTER MANAGEMENT** | **Subject Code BCIED1-853** | **Semester 8th** |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 hrs** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Understanding foundations of hazards, disasters and associated natural/social phenomena. | 2 | | 2 | | | | 2 | | | | | | | | 2 |
| CO2 | Familiarity with disaster management theory (cycle, phases). | | | | | 3 | | 2 | 2 | | | | | 2 | 2 | |
| CO3 | Knowledge about existing global frameworks and existing agreements. | 2 | | | | 2 | | 3 | | | | | | 2 | | 3 |
| CO4 | Humanitarian Assistance before and after disaster. | | 2 | | 3 | | | | | | | 2 | 1 | 3 | 2 | |
| CO5 | Technological innovations in Disaster Risk Reduction: Advantages and problems. | | | 3 | | | | | | | | | | 2 | | |
| CO6 | Experience on conducting independent DM study including data search, analysis and presentation of disaster case study. | | | 3 | 3 | | | | | | | | | 3 | 3 | 2 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** ENGINEERING HYDROLOGY | **Subject Code: BCIEDI-861** | **Semester 8th** |
| **Credit: 3** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Understand the interaction among various processes in the hydrological cycle. | 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapo-transpiration etc. | - | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | Understand the various components of hydrographs and to estimate the run-off. | 1 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Estimation of peak flows by rational method, unit hydrograph theory, Gumbels's method. | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | 1 |
| CO5 | Understand flood routing. | - | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject: Port & Harbour Engineering** | **Subject Code: BCIED1-862** | **Semester: 8th** |
| **Credit: 3 (Departmental Elective Course)** | **L T P - 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | The students shall learn about the importance and application of fourth major mode of transportation, i.e., waterways, after covering highways, railways, and airports in the previous semesters. | 3 | - | - | 1 | - | 2 | - | - | - | 1 | - | 2 | - | 3 | - |
| CO2 | They will understand the need for providing various civil engineering structures at the ports and harbours, and their construction, maintenance, and navigational aspects. | - | 3 | - | 1 | 2 | - | 2 | - | - | - | 2 | - | - | 2 | - |
| CO3 | They will come to know about the functions of different components of harbours and ports for the purpose of safe and efficient water transportation. | - | - | 3 | - | - | - | - | 2 | - | 1 | - | - | 3 | - | 1 |

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Programme: B Tech Civil Engineering

## COs, POs, PSOs Mapping

| **Subject: Geotechnical Design** | **Subject Code BCIED1-863** | **Semester 8th** |
|---|---|---|
| **Credit: 03** | **L T P – 3 0 0** | **Duration: 45 Hrs.** |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Learn about types and purposes of different underground structures. | 3 | 2 | 3 | 2 | - | _ | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | Have an exposure to the systematic methods for designing foundations. | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior. | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | Have necessary theoretical background for design and construction of foundation systems | 3 | 2 | 3 | 2 | - | - | 2 | - | - | - | - | - | 3 | 2 | 2 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Advanced Testing Lab | **Subject Code:** BCIES1-823 | **Semester:** 8th |
| **Credit:** 01 | **L T P:** 0-0-2 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Knowledge of different NDTs for concrete & highway works. | 3 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO2 | Improve quality of work during construction by identify & analyze the problems. | - | 3 | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO3 | Improve product reliability, strength, etc. by conducting investigations. | 3 | - | - | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| CO4 | Predict accident prevention analysis for safety and to reduce costs. | 3 | 3 | - | - | - | - | - | - | - | - | 2 | - | 3 | 3 | 1 |
| CO5 | Solutions on repair criteria using modern techniques & tools for long term sustainability. | - | - | 3 | 3 | 3 | - | 2 | - | - | - | - | 2 | 3 | 3 | 1 |

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**Programme:** B.Tech. Civil Engineering

## COs, POs, PSOs Mapping

| | | |
|---|---|---|
| **Subject:** Essence of Indian Knowledge Tradition | **Subject Code:** BMNCC0-006 | **Semester:** 8th |
| **Credit:** 00 (Mandatory Non-Credit Course) | **L T P:** 2-0-0 | **Duration:** 30 Hrs. |

| CO | Statement | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | Know about Vedas, Upavedas, Vedangas, etc. | - | - | - | - | - | 2 | - | 2 | - | - | - | - | 2 | - | 1 |
| CO2 | Provide important insight into the **processes of observation, mitigation, and adaptation** of changes in climate. | - | - | 2 | - | - | 2 | - | - | - | - | - | - | 3 | - | 1 |
| CO3 | Understand Indian knowledge system with knowledge, innovations and practices of indigenous and local communities around the world. | - | - | - | - | - | 3 | - | 2 | - | - | - | - | 3 | - | 1 |
| CO4 | Know the importance of Yoga, including conscious breathing, meditation, lifestyle and diet changes, visualization, etc. in human life. | - | - | - | - | - | 3 | - | - | - | - | - | - | 2 | - | - |
| CO5 | Know about ancient Indian knowledge systems with case studies. | - | - | - | - | - | 3 | - | - | - | - | - | - | 2 | - | - |

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