PEOPLE'S UNIVERSITY, BHOPAL
(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Bachelor of Technology**   **Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
BT-1301	Engineering Mathematics-II	3	1	-			Min: 40 (D Grade)			Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab work & Session – Max Marks: Nil	Assignment / Quiz/Attendance - Max. Marks: Nil

Pre-Requisite	Fundamental knowledge of mathematics such as algebra and trigonometry.
Course Outcome	1. Experience mathematics outside of your regular course work.
	2. Use knowledge and skills necessary for immediate employment or acceptance into a graduate program.
	3. Maintain a core of mathematical and technical knowledge that is adaptable to changing technologies and provides a solid foundation for future learning.

Unit	Contents (Theory)	Marks Weightage
I	**Fourier Series:** Introduction of Fourier series, Fourier series for discontinues functions, Fourier series for even and odd function, Half range sine and cosine series and Fourier transform.	14
II	**Laplace Transformations :** Introduction of Laplace Transform of elementary functions, Properties of Laplace transform ,Change of scale property, Shifting property, Laplace transform of the derivative, Inverse Laplace transform and its properties, Convolution theorem and applications of Laplace transformation to solve the ordinary differential equations.	14
III	**Second Order Linear Differential Equations with Variable Coefficients:** Methods one integral is known, Removal of first derivative, Changing of independent variable and variation of parameter, Solution by series method.	14
IV	**Linear & Non Linear Partial Differential Equations of First Order :** Formulation of partial differential equations, Solution of equation by direct integration, Lagrange's linear equation, Non linear partial differential equation and Charpit's method, Linear homogeneous and non-homogeneous partial differential equation of second and higher order with constant coefficients.	14
V	**Vector Calculus :** Differentiation of vectors, Scalar and vector point function, Geometrical meaning of gradient, Unit normal vector and directional derivative, Physical interpretation of divergence and curl, Line integral, Surface integral and volume integral, Green's Stroke's and Gauss divergence theorem.	14

Text Book/References Books/ Websites

1. D.C. Aggarwal ;Engg. Mathematics – II; S Chand Publication.
2. BS Grewal ;Higher Engineering Mathematics; Khanna Publication.
3. S.Arumungam ;Mathematics for Engineers; SCITECH Publications.
4. Erwin Kreyszig ;Advanced Engineering Mathematics; Wiley India.
5. D.G.Guffy ;Advance Engineering Mathematics; Jones & Bartlett.
6. S Sastri; Engineering Mathematics; P.H.I. Publication.
7. Peter V.O'Neil, Thomson Learning ;Advanced Engineering Mathematics; CENGAGE Learning Custom Publishing.

Suggested List of Laboratory Practical (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**External (70)**	**Internal (30)**	**Total 100**	**External (Nil)**	**Internal (Nil)**	**Total**
CET-1302	**Transportation Engg.-I**	**3**	**1**	**-**			**Min: 40 (D Grade)**			Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil

Pre-Requisite	**Nil**
Course Outcome	1. To study about tractive resistances & permanent way, principles of transportation, modes of transportation, their importance and limitations.
	2. Geometric design of station & yards, points & crossings, super elevation, equilibrium, cant and cant deficiency, various curves, layout details.
	3. To study about bridge site investigation and planning, collection of bridge design data type of road & railway bridges.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction, Tractive Resistances & Permanent Way:** Principles of transportation, Modes of transportation, Their importance and limitations, Route surveys and alignment, Railway track, Development and gauges, Hauling capacity and tractive effort, MONO and rapid transit rail (Metro). **Rails:** Types, Welding of rails, Wear and tear of rails, Rail creep. **Sleepers**: Types and comparison, Requirement of a good sleeper, Sleeper density. **Rail Fastenings**: Types, Fish plates, Fish bolts, Spikes, Bearing plates, Chain keys, Check and guard rails. **Ballast:** Requirement of good ballast, various materials used as ballast, quantity of ballast.	**14**
II	**Station & Yards; Points & Crossings & Signaling & Interlocking:** Formation, cross sections, super elevation, equilibrium, cant and cant deficiency, various Curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, types of signals in stations and yards, Principles of signaling and inter-locking.	**14**
III	**Bridge Site Investigation and Planning;** Loading standards &component parts, Selection of site, Alignment, Collection of bridge design data, Essential surveys, Scour, Depth of bridge foundation, Economical span, Clearance, Afflux. **Type of Road & Railway Bridges:** Design loads and forces, Impact factor, Indian loading standards for railways bridges and highway bridges, Bridge super structure and sub-structures, Abutments, Piers, Wing walls, Return walls, Approaches, Choice of super structure.	**14**
IV	**Bridge Foundations, Construction, Testing and Strengthening of Bridges** : Different types of foundation, Piles and wells, Sinking of wells, Coffer-dams, Details of construction underwater and above water, Sheet piles coffer dams, Girders, Equipments and plants, Inspection and data collection, Strengthening of bridges, Bridge failure.	**14**
V	**Tunnels:** Selection of route, Engineering surveys, Alignment, shape and size of tunnel, Tunnel approaches, Construction of tunnels in soft soil, Hard soil and rock, Different types of lining, Methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.	**14**

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Text Book/References Books/ Websites

1. S.P. Bindra ; Principles and Practice of Bridge Engineering; Dhanpat Rai & Sons.
2. Ponnuswamy; Bridge Engineering; TMH Publication.
3. Arora & Saxena; Railway Engineering ; Dhanpat Rai & Sons.
4. Dr.S.C. Saxena, Railway; Bridges & Tunnels; Dhanpat Rai & Sons.
5. R. Srinivasan; Harbour, Docks & Tunnel Engineering; Charotar Publication.

Suggeted List of Laboratory Experiments :- (Expandable): Nil

Subject Code	Subject Title	Credit	Theory	Practical

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CET-1303	Strength of Materials	L	T	P	External (70)	Internal (30)	Total 100 Min: 40 D Grade)	External (35)	Internal (15)	Total (50) Min: 20 (D Grade)
		3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab work & Sessional - Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05

Pre-Requisite	**Nil**
Course Outcome	1. Study about the simple stress and strains: various types of stress and strains.
	2. To know about the principal stresses and strains, Mohr's circle of stresses, support reactions, shear force and bending moment.
	3. To give knowledge about the torsion of shafts & its applications.

Unit	Contents (Theory)	Marks Weightage
I	**Simple Stress and Strains**: Concept of elastic body, Stress and strain, Hook's law, Various types of stress and strains, elastic constants, Stresses in compound bars, Composite and tapering bars, Temperature stresses.	**14**
II	Principal stresses and strains, Mohr's circle of stresses, Combined bending and torsion, Theories of failure, Support reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and couple.	**14**
III	**Bending & Deflection:** Theory of simple bending, Concept of pure bending , Equation of bending, Neutral axis, Section-modulus, Determination of bending stresses in simply supported, Cantilever and overhanging beams subjected to point load and uniformly distributed loading, Bending & shear stress distribution across a section in beams, Deflection of beams, Double integration method, Conjugate beam method, Macaulay's method, area moment method.	**14**
IV	**Torsion of Shafts:** Concept of pure torsion, torsion equation, Determination of shear Stress and angle of twist of shafts of circular section, Hollow shafts, leaf spring, Spiral spring, pressure vessels, Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.	**14**
V	**Columns and Struts:** Euler's buckling load for uniform section, Various end conditions, Slenderness ratio, stress in columns, Rankine formulae, Eccentric loading on columns.	**14**

Text Book/References Books/ Websites
1. Negi; Strength of Materials; TMH
2. Sadhu Singh; Strength of Materials, Khanna Publication
3. Rattan SS; Strength of Materials; TMH
4. Subramaniam; Strength of Materials; R; Oxford
5. National Building Code of India, Part-IV Code

Suggested List of Laboratory Experiments :- (Expandable):

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I	The experimental work to tension, compression, bending, impact test on the RCC, steel ,mild steel ,cat iron ,timber etc.
2	To study the Universal Testing Machine (U.T.M.)
3	To Determine hardness of mild steel.
4	To perform torsion test on mild steel.
5	To determine impact strength test by Izod test).
6	To determine impact strength test by Charpy Test.
7	To determine Young's Modulus of elasticity of different material of beam simply supported at ends.
8	To perform shear test on matels.
9	To determine the stiffness of the spring and modulus of rigidity of the spring wire.
10	To study various types of strain gauges.

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal (30)	Total 100	External (35)	Internal (15)	Total (50)
CET-1304	Building Design and Drawing									

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		3	1	1	**(70)**		Min 40 (D Grade)			Min 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab work & Sessional - Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05

Pre-Requisite	Nil	
Course Outcome	1	Drawing of various elements of buildings like footing, door and windows, staircase, lintel and arches.
	2	Use of national building code for building planning, principles of planning and orientation.
	3	To demonstrate building services like water supply, electrification, ventilation, fire safety.

Unit	Contents (Theory)	Marks Weightage
I	**Drawing of Building Elements** : Drawing of various elements of buildings like various, Types of footing, Open foundation, Raft, Grillage, Pile and well foundation, Drawing of frames of Doors, Window, Various types of door, Window and ventilator, Lintels and arches, Stairs and staircase, Trusses, Flooring, Roofs etc.	14
II	**Building Planning** : Provisions of national building code, Building bye-laws, Open area, Set backs, FAR terminology, Principle of architectural composition (i.e. Unity, contrast, etc.), Principles of planning, Orientation.	14
III	**Building Services** : Introduction of building services like water supply and drainage, Electrification, Ventilation and lightening and staircases, Fire safety, Thermal insulation, Acoustics of buildings.	14
IV	**Design and Drawing of Building :** Design and preparation of detailed drawings of various Types of buildings like residential building, Institutional buildings and commercial buildings, Detailing of doors, Windows, Ventilators and staircases etc.	14
V	**Perspective Drawing :** Elements of perspective drawing involving simple problems, One point and two point perspectives, Energy efficient buildings.	14

Text Book/References Books/ Websites

1. Malik & Meo; Building Design and Drawing , Asian Publishers/Computech Publications Pvt Ltd.
2. Shah, Kale & Patki; Building Design and Drawing; TMH.
3. Gurucharan Singh & Jagdish Singh Building Planning, Design and Scheduling, Standard Publishers Distributors.

Suggested List of Laboratory Experiments :-

1   Sketches of various building components.
2   One drawing sheet of various types of foundation.
3   One drawing sheet of various building components containing doors, windows & ventilators.

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4   One drawing sheet of Stairs case.
5   One drawing sheets each for services and interiors of buildings.
6   One drawing sheet containing detailed planning of one/two bed room residential building (common to all students).
7   One drawing sheet each of residential and institutional building (each student perform Different drawing).
8   Use of AutoCAD for preparation of drawings.

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**External (70)**	**Internal (30)**	**Total 100**	**External (35)**	**Internal (15)**	**Total (50)**
CET-1305	**Rock Mechanics and Engineering**	**3**	**1**	**1**			Min 40 (D Grade)			Min 20 (D Grade)

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Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab work & Sessional - Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05

Pre-Requisite	**Nil**	
Course Outcome	1	To study about crust and interior of earth, deposition of soil and classification of soils.
	2	To demonstrate fundamentals of mineralogy and elements of crystallography.
	3	To understand composition of earth's crust, geology of India.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction and Physical Geology**: Objects and scope of geology, The crust and the interior of the earth, Origin and age of the earth, Sub-aerial and sub-terrain weathering, Denudation and deposition, Wind, river, Glacial and marine erosion, Volcanoes , Soil formation, Soil profile, Geological classification of soil and concept of earthquake plate-tectonics.	14
II	**Mineralogy and Crystallography**: Fundamentals of mineralogy, Study of common rock forming minerals, Ores and minerals of economic importance to civil engineering., Elements of crystallography and introduction to crystal systems.	14
III	**Petrology:** Composition of earth's crust, Study of igneous, Sedimentary and metamorphic rocks and their formation, Characteristics classification, Rocks of civil engineering Importance. **Geology of India:** Physical features of India, Brief geological history of India, Occurrence of important ores and minerals in India.	14
IV	**Structural Geology**: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. Folds, Faults, Joints, Unconformity and their importance in civil engineering.	14
V	**Applied Geology:** Introduction to applied geology and its use in civil engg., Properties of rocks, Selection of sites for roads, Bridges, Dams, Reservoirs and tunnels, Prevention of engineering structures from seismic shocks, Stability of hill sides, Water bearing strata, Artesian wells, Use of remote-sensing techniques in selection of above sites.	14

Text Book/References Books/ Websites

1. Prabin Singh; Engineering and General Geology; Katson Books.
2. Gulati ; Geotechnical Engineering; TMH.
3. P.K. Mukerjee ;A Text Book of Geology; World Publisher.
4. S.K. Garg ;A text book of physical and engineering geology; Khanna Publisher.

Suggested List of Laboratory Experiments :-

1. Identification of simple rock forming minerals and important ores.
2. Identification of rock.
3. Simple map exercises.
4. Field visit / geological excursion.

5. To study the earth and interior of the earth.

6. To study about the sun and planets according to size, distance, description of satellite with the help of chart.

7. To study the land forms of the earth by land form models.

8. To study about ground water, glacier, sea water, rivers, denudation, wind eolian system with the help of chart.

9. To study the charts showing topography of the ocean floor, psunami, map of ocean current.

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**External** (Nil)	**Internal** (Nil)	**Total** (Nil)	**External** (35)	**Internal** (15)	**Total** (50)
BT-1306	C++ Programming	-	-	1	(Nil)	(Nil)	Nil	(35)	(15)	Min: 20 (D Grade)

Duration of Theory (Externals): Nil

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Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 15	Lab work & Sessional - Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05

Pre-Requisite	Students have basic knowledge of programming
Course Outcome	1.An understanding of the concepts of inheritance and polymorphism
	2. An understanding basic concepts of C++ programming
	3.An ability to incorporate exception handling in object-oriented programs

Unit	*Contents (Theory)*	Marks Weightage
I	**C++ Basics:** Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Strings, Structures, conditional statement, control structure, switch-case, break, go to statements. **OOPS :** Introduction to OOPS, differences Between OOP and Procedure Oriented Programming, Overview of OOP principles. **Function & Classes:** Scope of variables, Parameter passing, Default arguments, inline function, Recursive function, Dynamic memory allocation and reallocation, operators-new and delete, Preprocessor directives, **Classes:** Class Definition, Class Structure, Class Scope, object, Friends to a class, Static class members, Constructors and Destructors, Dynamic creation and destruction of objects, Data Abstraction. **Inheritance:** Inheritance, Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class member. **Polymorphism:** Function overloading, Operator Overloading , Virtual Function Polymorphism: Static and Dynamic binding, Base and Derived class virtual functions, Pure virtual functions, Abstract classes, C++ Exception Handling and File Handling, Comparison of C++ with C, Java and C#.	50

Text Book/References Books/Websites
1. E. Balaguruswamy;Object Oriented programming with C++; TMH, 2001
2. Yashwant Kanitkar; Let us C++
3. Radha Ganesan;Object Oriented Programming with C++"; Scitech Publication PVT.LTD. Chennai
4. Padam Gulwani & Anshuman Sharma;Elementary Concepts of Computer Design and Hardware

Suggested List of Laboratory Experiments :- (Expandable):

1. Program to print any Message
2. Program for Conditional Statements, Looping Statements and Switch Case
3. Program to implement Arrays, Strings and Pointers
4. Program to implement Functions and Dynamic Memory Allocation
5. Program to implement Class and Objects

6. Program to implement Friend Functions and Constructors
7. Program for Inheritance
8. Program for Polymorphism
9. Program for File Handling
10. Program for Exception Handling

Subject Code	Subject Title	Credit			Theory			Practical		
		L	**T**	**P**	**External**	**Internal**	**Total 100**	**External**	**Internal**	**Total (50)**
BT-1307	**Professional Skills**	-	-	1	**(Nil)**	**(Nil)**	**Nil**	**(Nil)**	**(50)**	Min: 20 (D Grade)

Duration of Theory (Externals): Nil

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Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50

Pre-Requisite	Nil	
Course Outcome	1	Team work and leadership qualities of a leader.
	2	Task planning and its execution.
	3	Business communication and its necessary skills.

Unit	Contents (Theory)	Marks Weightage
I	**Social Skills:** Society, Social structure, Develop sympathy and empathy. **SWOT Analysis**: – Concept, How to make use of SWOT.	50
II	**Inter personal Relation:** Sources of conflict, Resolution of conflict; Ways to enhance interpersonal relations.	
III	**Quantitative Aptitude:** Percentages/Profit & Loss, Time and work, Simple and compound Interest, Series and progression.	
IV	**Reasoning :** Puzzles and seating arrangement, Data sufficiency, Coding-decoding, Blood relation, Order and ranking, Alpha numeric symbol series, Logical reasoning:	
V	**English**: Free quizzes related to synonyms, Antonyms, One word substitution, Idioms and phrases, Spelling correction, Fill in the blanks and common errors in english.	

Text Book/References Books/ Websites : Nil

Suggested List of Laboratory Experiments :- (Expandable): Nil

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (Nil)	Internal (Nil)	Total Nil	External (35)	Internal (15)	Total (50)
CET-1308	AutoCAD-I	-	-	1			Nil			Min: 20 (D Grade)

Duration of Theory (Externals): Nil

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Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 15	Lab work & Sessional - Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05

Pre-Requisite	**Nil**	
Course Outcome	1	To give knowledge about the Auto Cad designing Software.
	2	To give knowledge about how to draw Plan of any structures.
	3	To study of all command uses in drawing.

Unit	Contents (Theory)	Marks Weightage
I	**Students Have to Understand the Working of AutoCAD:** Introduction to computer aided drafting software for 2d and 3d modeling, Benefit, Software's basic commands of drafting entities like line, Polyline , Scale, Trim, Extend, Circle, Polygon, Rectangle editing commands like move, Rotate, Mirror, Array**.** . Practicing commands under draw and dimension menu. . Practicing commands under modify menu. . Practicing commands under tool menu. . Practicing commands under format menu. . Practicing commands under express menu.	50

Text Book/References Books/ Websites :- Nil

Suggested List of Laboratory Experiments :- (Expandable): Nil

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