

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

**Total Credits= 24**

Semester-III (B.Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name							
		L	T	P	Int.	Ext.		
BCIES1-321	Surveying	3	0	0	40	60	100	3
BCIES1-322	Fluid Mechanics-I	3	0	0	40	60	100	3
BCIES1-323	Engineering & Solid Mechanics	3	1	0	40	60	100	4
BCIES1-324	Building Materials & Construction	3	0	0	40	60	100	3
BMATH4-301	Mathematics-III (Transform & Discrete Mathematics)	2	0	0	40	60	100	2
BHSMC0-022	Civil Engineering- Societal & Global Impact	2	0	0	40	60	100	2
BCIES1-325	Engineering & Solid Mechanics Lab	0	0	2	60	40	100	1
BCIES1-326	Fluid Mechanics Lab	0	0	2	60	40	100	1
BCIES1-327	Surveying Lab	0	0	4	60	40	100	2
BCIES1-328	Computer-aided Civil Engineering Drawing-I	0	0	2	60	40	100	1
BMNCC0-002	Environmental Science (Mandatory Course)	2	0	0	---	---	---	0
BCIES1-329	Training-I*	0	0	0	60	40	100	2
<b>Total</b>		<b>18</b>	<b>1</b>	<b>10</b>	<b>540</b>	<b>560</b>	<b>1100</b>	<b>24</b>

\*Training will be imparted in the institution at the end of 2<sup>nd</sup> semester for 4-6 week duration.

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

SURVEYING				
<b>Subject Code: BCIES1-321</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Course Objective</b> 1. To understand the importance of surveying in the field of civil engineering 2. To learn the basic of linear/angular measurement methods. 3. To know the basics of levelling and Theodolite survey in elevation and angular measurements. 4. To understand Tacheometric surveying in distance and height measurements. 5. To get knowledge about the different types of curves used in highway and railway etc.				
<b>Course outcomes:</b> On completion of the course, the students will be able to: 1. Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering plan a survey. 2. Taking accurate measurements, field booking, plotting and adjustment of traverse use various conventional instruments involved in surveying with respect to utility. 3. Precisely plan a survey for applications such as road alignment and height of the building undertake measurement and plotting in civil engineering.				
<b>Unit-I (11 Hours)</b>				
<b>1. Fundamental Concepts &amp; Horizontal Measurement:</b> Definitions, Different types of surveys, Scale of map, Principles of Surveying. Distances with chain and tape, Direct & Indirect ranging, Offsets, Selection of stations and base line, Corrections for base line. <b>2. Compass Surveying:</b> Definitions, Types of compass, Temporary adjustments of compass Designation of bearings, , included angles from bearing of lines and vice versa, Declination, Dip of magnetic needle, local attraction.				
<b>Unit-II (10 Hours)</b>				
<b>3. Theodolite:</b> Introduction, Definitions, Temporary and permanent Adjustments, Measurement of horizontal and vertical angle. <b>4. Traversing:</b> Closed & Open traverse, Consecutive and independent co-ordinates, Latitudes and Departures, Closing error, balancing a traverse: Bowditch & Transit Rules.				
<b>Unit-III (12 Hours)</b>				
<b>5. Measurement of Vertical Distance:</b> Introduction, Definitions, Temporary and permanent Adjustments of level, Principle of levelling, Booking and reducing the levels by Rise & Fall method and Height of instrument method. Corrections due to Curvature and Refraction. <b>6. Tachometry:</b> Determine tachometer constants, Measurement of horizontal & vertical distances with tachometer. <b>7. Plane Table Surveying:</b> Principle of plane table survey, setting up the plane table and Methods of plane tabling.				
<b>Unit-IV (12 Hours)</b>				
<b>8. Contouring:</b> Definition, Characteristics of Contours and Methods of Contouring and Uses of Contour maps. <b>9. Curves:</b> Elements of curves, Types of curves, Different methods of setting out of curves.				

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

<b>10. Total Station Survey:</b> Features, Setting up and Orientation, characteristics and field procedure of Total Station.
<b>Recommended Books:</b> 1. B.C. Punmia, A. K. Jain, and Arun Kumar Jain, Surveying', Vol. I, II, Laxmi Publications. 2. S.K. Duggal, Tata McGraw Hill. Vol-I 3. R. Agor, Surveying, Khanna Publishers. 4. S.S. Bhavikatti, Surveying & Levelling Vol. I, II. 5. Narinder Singh, Surveying, Tata McGraw Hill. 6. N.N. Basak, Surveying and leveling', Tata McGraw Hill, New Delhi.

FLUID MECHANICS-I				
<b>Subject Code: BCIES1-322</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	0	0	3
<b>Course Objectives:</b> The course should enable the students to: 1. The broad principles of fluid statics, kinematics and dynamics. 2. The definitions of the basic terms used in fluid mechanics. 3. The classifications of fluid flow. 4. To apply the continuity, momentum and energy principles. 5. Dimensional analysis. 6. Flow past immersed bodies.				
<b>Course Outcomes:</b> At the end of the course, the student will be able to: 1. Understand the broad principles of fluid statics, kinematics and dynamics. 2. Understand definitions of the basic terms used in fluid mechanics. 3. Understand classifications of fluid flow. 4. Be able to apply the continuity, momentum and energy principles. 5. Understand dimensional analysis. 6. Understand flow past immersed bodies.				
<b>UNIT-I (13 Hours)</b>				
<b>1. Basic Concepts and Definitions</b> – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.				
<b>2. Fluid Statics</b> - Fluid Pressure: Pressure at a point, Pascal's law and its engineering hydrostatic paradox, pressure variation with temperature, density and altitude. Piezometer, U- Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micro manometers. Pressure gauges, orifices, mouthpieces, notches (rectangular and V-notches) and weirs (sharp crested weirs).				

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

## UNIT-II (13 Hours)

**3. Hydrostatic pressure and force:** (horizontal, vertical and inclined) Submerged surfaces, force on a curved surface due to hydrostatic pressure. Buoyancy and floatation and stability of floating and submerged bodies. Meta-centric height and its determination.

**4. Fluid Kinematics-** Classification of fluid flow : steady and unsteady flow; Uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Velocity and acceleration of a fluid particle, local and convective acceleration. Streamline, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three-dimensional continuity equations in Cartesian coordinates.

## UNIT-III (13 Hours)

**5. Fluid Dynamics-** Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced.

**6. Dimensional Analysis and Dynamic Similitude:** Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies.

## UNIT-IV (06 Hours)

**7. Flow Past immersed bodies:** Drag and lift deformation Drag and pressure drag. Drag on a sphere, cylinder and Airfoil: lift-Magnus Effect and circulation lift on a circular cylinder.

### Recommended Text Books / Reference Books:

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

## ENGINEERING & SOLID MECHANICS

**Subject Code: BCIES1-323**

**L T P C**

**Duration: 60 Hrs.**

**3 1 0 4**

### Course Objectives:

1. To introduce to continuum mechanics and material modeling of engineering materials based on first energy principles, deformation and strain, momentum balance, stress and stress states, elasticity and elasticity bounds, plasticity and yield design.
2. To develop the ability of the student to analyze the engineering objects subjected to different types of forces using the basic principles of statics.

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

3. To involve analytical methods for determining the strength, stiffness (deformation characteristics), and stability of the various members in a structural system.

## Course Outcomes:

The student will be able to:

1. 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.
2. 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.
3. 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, and
4. 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.

## UNIT-I (15 Hours)

**Module1: Simple Stresses and Strains:** Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience Gradual, sudden, impact and shock loadings – simple applications.

**Module 2: Compound Stresses and Strains:** Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain, Relationship between elastic constants.

## UNIT-II (15 Hours)

**Module 3: Shear Force and Bending Moment Diagrams:** Shear force diagrams (SFD) and Bending moment diagrams (BMD). SFD and BMD for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum SF and BM and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

**Module 4: Flexural Stresses-Theory of Simple Bending:** Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$  - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

## UNIT-III (15 Hours)

**Module 5: Shear Stresses:** Derivation of formula –Shear stress distribution across various beam

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

sections like rectangular, circular, triangular, I, T angle sections.

**Module 6: Slope and deflection:** Relationship between moment, slope and deflection, Double Integration method, Macaulay's method, Use of these methods to calculate slope and deflection for determinant beams.

## UNIT-IV (15 Hours)

**Module 7: Torsion:** Derivation of torsion equation and its assumptions, Applications of the equation for hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stresses and maximum shear stresses under combined loading of bending and torsion, Analysis of closely-coiled-helical springs.

**Module 8: Thin Cylinders and Spheres:** Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

### Recommended Text Books / Reference Books:

1. Timoshenko, S. and Young, D. H., -Elements of Strength of Materials, DVNC, New York, USA.
2. Kazmi, S. M. A., -Solid Mechanics|| TMH, Delhi, India.
3. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall.
4. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd edition New York, NY: McGraw Hill, 1979
5. Laboratory Manual of Testing Materials - William Kendrick Hall
6. Mechanics of Materials - Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf, TMH
7. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

## BUILDING MATERIALS & CONSTRUCTION

**Subject Code: BCIES1-324**

**L T P C**

**Duration: 45 Hrs.**

**3 0 0 3**

### Course Objectives:

The course should enable the students to:

1. Develop knowledge of material science and behaviour of various building materials used in construction.
2. Identify the construction materials required for the assigned work.
3. Provide procedural knowledge of the simple testing methods of brick, cement, lime and concrete etc.
4. Understanding of brick & stone masonry, damp proofing course, finishing, plastering, painting and building floor.

### Course Outcomes:

1. Predict the properties of building stones and its classifications.
2. Understand the concept of various methods of manufacture of bricks.
3. Obtain differentiate the fine aggregates and coarse aggregates under various views.
4. Explain various types of cements and their applications in construction. Various field and laboratory tests on cement



# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

5. Analyze the importance of mineral and chemical admixtures, requirements of the concrete in construction
6. Explain the suitability of floors in buildings like mosaic flooring, terrazzo flooring, rubber flooring, asphalt flooring.
7. Explain the foundations and uses of different types of foundations.
8. Explain the classification of various types of woods. State the properties, seasoning of timber.

## UNIT-I (11 Hours)

**Bricks:** General terms, Composition of good brick earth, Harmful ingredients in brick earth, qualities of good bricks, tests for bricks, classification of bricks

**Timber:** Definition, classification of trees, structure of a tree, seasoning of timber, defects in timber, market forms of timber

**Building Stones:** General terms, Uses of stones, qualities of a good building stone, deterioration of stones, preservation of stones, artificial stones, common building stones of India and their uses

## UNIT-II (12 Hours)

**Lime:** Introduction, definitions: calcination, Hydraulicity, setting, slacking, sources of lime, classification of limes & their uses, tests for lime stones.

**Cement:** Different types of cement, Constituents of cement, manufacturing of Portland cement, hydration of cement, tests for cement, uses of different types of cement.

**Concrete:** Introduction, Constituents of concrete, batching of materials, manufacturing process of cement concrete, workability and factors affecting it, methods to determine workability, segregation and bleeding of concrete, strength of concrete and factors affecting it, tests for concrete.

**Miscellaneous Materials:** Admixtures, Paints, Plastics.

## UNIT-III (11 Hours)

**Foundation and Walls:** Definition, types of foundations, Types of walls and thickness considerations.

**Brick and Stone Masonry:** Terms used, Types of bonds & their merits and demerits, rubble and ashlar joints in stone masonry, cement concrete hollow blocks and their advantages & disadvantage.

## UNIT-IV (11 Hours)

**Damp Proofing:** Causes and bad effects of dampness, preventive measures for dampness in buildings.

**Plastering and Pointing:** Objectives, Methods of plastering, Materials and types, Defects in plastering, special material for plastered surface, distempering, white washing and colour washing.

**Floors:** Introduction, Types of floors used in building & and their suitability, factors for selecting suitable floor for building.

### Recommended Text Books / Reference Books:

1. M.S. Shetty, 'Concrete Technology', S. Chand Publication.
2. S.P. Bindra, S.P. Arora, 'Building Construction', Dhanpat Rai Publication.

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

3. S.K. Duggal, 'Building Materials', New Age International Publishers.
4. Rangwala, 'Engineering Materials', Charotar Publication House.
5. B.C. Punmia, 'Building construction', Laxmi Publication.
6. Parbin Singh, 'Civil Engineering Materials', S K Kataria and Sons
7. Sushil Kumar, 'Building Construction', Standard Publishers Distributors.

MATHEMATICS-III (Transform & Discrete Mathematics)				
<b>Subject Code: BMATH4-301</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	2	0	0	2
<b>Course Objectives:</b> The course should enable the students to: <ol style="list-style-type: none"> <li>1. To understand the importance of transform calculus in the field of civil engineering</li> <li>2. To learn the Sets, relations and functions.</li> <li>3. To know the basics of logics, ordered set &amp; algebraic structures.</li> </ol> <b>Course Outcomes:</b> <ol style="list-style-type: none"> <li>1. Use mathematical ideas to model real world problems.</li> <li>2. Develop and maintain problem-solving skills.</li> <li>3. Understanding of the mathematical algorithms, etc.</li> </ol>				
<b>UNIT-I (08 Hours)</b>				
<b>Transform Calculus-1:</b> Polynomials – Orthogonal Polynomials – Lagrange's, Chebysev Polynomials; Trigonometric Polynomials, Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, convolution theorem, Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.				
<b>UNIT-II (08 Hours)</b>				
<b>Transform Calculus-2:</b> Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.				
<b>UNIT-III (07 Hours)</b>				
<b>Sets, relations and functions:</b> Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. <b>Propositional Logic:</b> Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, Decision problems of propositional logic, Introduction to first order logic and first order theory.				
<b>UNIT-IV (07 Hours)</b>				
<b>Partially ordered sets:</b> Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices, Boolean and pseudo Boolean lattices. <b>Algebraic Structures:</b> Algebraic structures with one binary operation – semi group, monoid and group, Co-sets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence				



# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

relation and quotient structures. Error correcting code. Algebraic structures with two binary operations-ring, integral domain, and field. Boolean algebra and Boolean ring (Definitions and simple examples only).

## **Recommended Text Books / Reference Books:**

1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
3. R. L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., Addison-Wesley, 1994.
4. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010.
6. N. Deo, Graph Theory, Prentice Hall of India, 1974.
7. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.
8. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

## CIVIL ENGINEERING- SOCIETAL & GLOBAL IMPACT

**Subject Code: BHSMC0-022**

**L T P C**

**Duration: 30 Hrs.**

**2 0 0 2**

### **Course Objectives:**

The course should enable the students to:

1. Awareness of the importance of Civil Engineering and the impact it has on the Society and at global levels.
2. Awareness of the impact of Civil Engineering for the various specific fields of human endeavor
3. Need to think innovatively to ensure Sustainability.

### **Course Outcomes:**

1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future.
3. The Sustainability of the Environment, including its Aesthetics.
4. The potentials of Civil Engineering for Employment creation & its Contribution to the GDP.
5. The Built Environment and factors impacting the Quality of Life
6. Applying professional and responsible judgment and take a leadership role;

### **UNIT-I (07 Hours)**

**Module1:** Introduction to Course and Overview, Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature, Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and

## MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

Ecological Footprint of India Vs other countries and analysis. <b>Module2:</b> Understanding the importance of Civil Engineering in shaping and impacting the world, The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering.
<b>UNIT-II (08 Hours)</b>
<b>Module 3: Infrastructure-</b> Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Awareness of various Codes & Standards governing Infrastructure development; Innovations and methodologies for ensuring Sustainability in civil engineering.
<b>UNIT-III (07 Hours)</b>
<b>Module 4: Environment-</b> Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Environmental Metrics & Monitoring; Innovations and methodologies in civil engineering for ensuring Sustainability.
<b>UNIT-IV (08 Hours)</b>
<b>Module 5: Built Environment-</b> Energy efficient built environments and LEED ratings, Recycling, Temperature/ Sound control in built environment, Intelligent/ Smart Buildings; Conservation, Repairs & Rehabilitation of Structures. <b>Module 6:</b> Civil Engineering Projects – Environmental Impact Analysis procedures; Waste(materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment(projects, facilities management), Innovations and methodologies for ensuring Sustainability during Project development.
<b>Recommended Text Books / Reference Books:</b> <ol style="list-style-type: none"><li>1. NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.</li><li>2. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120<sup>th</sup> ASCE Annual Conference and Exposition</li><li>3. Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure, Review of Current Knowledge, Foundation for Water Research</li><li>4. Blackmore J M., Plant R A J. (2008). Risk and resilience to enhance sustainability with application to urban water systems. J. Water Resources Planning and Management. ASCE.</li><li>5. <a href="http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx">http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx</a></li></ol>

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

ENGINEERING & SOLID MECHANICS LAB			
Subject Code: BCIES1-325	L	T	P C
	0	0	2 1
<b>Course Objectives:</b> <ol style="list-style-type: none"><li>1. To deal with an experimental determination and evaluation of material behavior in order to explain the deformation and fracture behavior of structural materials.</li><li>2. To determine the mechanical and structural properties of materials from the laboratory.</li><li>3. To test the materials under accurately known forces or loads.</li><li>4. To study the material behavior by careful observations and measurements.</li><li>5. To provide students with all information concerning principle, way of measurement, as well as practical application of mechanical behavior of materials.</li></ol>			
<b>Course Outcomes:</b> <ol style="list-style-type: none"><li>1. Students will be able to operate the laboratory equipment, interpret the laboratory data including conversion of measurements into engineering values.</li><li>2. They will be able to find the deviation of material properties (strength and stiffness) from the engineering values,</li><li>3. They will be able to observe various modes of failure in compression, tension, and shear.</li><li>4. They will be able to observe various types of material behavior under similar loading conditions.</li><li>5. They will be able to observe material behavior under repeated loading.</li></ol>			
<b>Laboratory Experiments:</b> <ol style="list-style-type: none"><li>1. To determine Impact Strength of Mild Steel.</li><li>2. To determine the spring constant / stiffness of the given spring.</li><li>3. To determine Brinell and Vicker's Hardness numbers of mild steel.</li><li>4. To determine the Rockwell Hardness number of metals.</li><li>5. To determine the Fatigue Strength of mild steel.</li><li>6. To determine Torsional Strength of mild steel and cast iron.</li><li>7. To determine Tensile Strength of mild steel.</li><li>8. Determination of shear forces in beams.</li><li>9. Determination of bending moments in beams.</li><li>10. Measurement of deflections in statically determinate beams.</li></ol>			
<b>Recommended Books / Manuals:</b> <ol style="list-style-type: none"><li>1. Experimental methods in Structural Mechanics by C.B. Kukreja and V.V. Sastry, Standard Publishers Distributors, Delhi.</li><li>2. Laboratory Manual of Testing Materials - William Kendrick Hall</li><li>3. Analysis of Structures, Volume – I, by V. N. Vazirani &amp; Ratwani.</li></ol>			

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

FLUID MECHANICS LAB				
Subject Code: BCIES1-326	L	T	P	C
	0	0	2	1
<b>Course Objectives:</b> The course should enable the students to: <ol style="list-style-type: none"><li>1. To determine the various parameters related to fluid flow in Pipe and in open channels.</li><li>2. The Fluid Mechanics laboratory is used to examine the properties of fluids and to conduct experiments involving both in incompressible and compressible flow.</li><li>3. Facilities are available for investigating the fundamentals of fluid statics as well as kinematics &amp; Kinetics of fluid flow to enhance the hands-on experience of our students.</li><li>4. The laboratory is also equipped to conduct experiments on open channel flow, centrifugal pumps and groundwater flow.</li></ol>				
<b>Course Outcomes:</b> Upon successful completion of this course, student will be able to: <ol style="list-style-type: none"><li>1. Predict the met centric height of floating vessel and utility in vessel design.</li><li>2. Calibrate various flow measuring devices (venturimeter, orifice meter and notches).</li><li>3. Authenticate the Bernoulli's theorem experimentally.</li><li>4. Assess the discharge of fluid over broad crested weir.</li><li>5. Compute various losses and velocity in pipe flow in field.</li><li>6. Predict the coefficient of discharge for Broad Crested Weir.</li><li>7. Determine the hydraulic coefficients for flow through an orifice.</li><li>8. Determine the friction coefficient for pipes of different diameter.</li></ol>				
<b>Laboratory Experiments:</b> <ol style="list-style-type: none"><li>1. To determine the metacentric height of a floating vessel under loaded and unloaded conditions.</li><li>2. To study the flow through a variable area duct and verify Bernoulli's energy equation.</li><li>3. To determine the coefficient of discharge for an obstruction flow meter (venturimeter /orifice meter).</li><li>4. To determine the discharge coefficient for a V-notch or rectangular notch.</li><li>5. To determine the coefficient of discharge for Broad crested weir.</li><li>6. To determine the hydraulic coefficients for flow through an orifice.</li><li>7. To determine the friction coefficient for pipes of different diameter.</li><li>8. To determine the head loss in a pipe line due to sudden expansion / sudden contraction/ bend.</li><li>9. To determine the velocity distribution for pipe line flow with a pitot static probe.</li><li>10. To study the transition from laminar to turbulent flow and to ascertain the lower critical Reynolds number.</li></ol>				
<b>Recommended Books / Manuals:</b> <ol style="list-style-type: none"><li>1. Practical Fluid Mechanics for Engineering Applications (Mechanical Engineering (Marcell</li></ol>				

# MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

- Dekker) By John J. Bloomer  
2. Fluid Mechanics Practical Manual by S. Sarabjit Singh

SURVEYING LAB			
Subject Code: BCIES1-327	L	T	P C
	0	0	4 2
<b>Course Objectives:</b> To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.			
<b>Course Outcomes:</b> At the end of the course, the student will practically be able to draw plans & maps to determine the areas before taking up any civil engineering works.			
<ol style="list-style-type: none"><li>1. Surveying of an area by chain survey (closed traverse) &amp; plotting.</li><li>2. Survey of a given area by prismatic compass and surveyor compass and plotting after adjustment.</li><li>3. Radiation method, intersection methods by plane table survey.</li><li>4. Two point and three point problems in plane table survey.</li><li>5. Levelling – Longitudinal and cross-section and plotting</li><li>6. Trigonometric levelling using Theodolite</li><li>7. Height and distances using principles of tacheometric surveying</li><li>8. (a) Measurement of Horizontal angle &amp; vertical angle (b) Distance between inaccessible points by theodolite.</li></ol>			
<b>Laboratory Experiments:</b> <ol style="list-style-type: none"><li>1. Measurement of distance, ranging a line.</li><li>2. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.</li><li>3. To find the level of different points by height of instrument, rise &amp; fall methods.</li><li>4. Measurement of horizontal and vertical angle by Theodolite.</li><li>5. Determination of tachometric constants and determination of reduced levels by tachometric observations.</li><li>6. Plane table survey, different methods of plotting, two point &amp; three point problem.</li><li>7. Determination of height of an inaccessible object.</li><li>8. Setting out of circular curves, transition curve in the field using different methods.</li><li>9. Working of Total Station.</li></ol>			
<b>Recommended Books / Manuals:</b> <ol style="list-style-type: none"><li>1. B.C. Punmia, A. K. Jain, and Arun Kumar Jain, Surveying, Vol. I, II, Laxmi Publications</li></ol>			

## MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS 2019 BATCH ONWARDS

2. S.K. Duggal, Tata McGraw Hill. Vol.-I
3. R. Agor, Surveying, Khanna Publishers.
4. S.S. Bhavikatti, Surveying & Levelling Vol. I, II.
5. Narinder Singh, Surveying, Tata McGraw Hill.
6. N.N. Basak, Surveying and leveling, Tata McGraw Hill, New Delhi.

COMPUTER-AIDED CIVIL ENGINEERING DRAWING-I			
Subject Code: BCIES1-328	L	T	P C
	0	0	2 1
<b>Course Objectives:</b> The students will be able to: <ol style="list-style-type: none"><li>1. Develop structural designs.</li><li>2. Understand design procedures and ways- The student learn to interpret drawings, and to produce designs using Civil Engineering software.</li></ol>			
<b>Course Outcomes:</b> <ol style="list-style-type: none"><li>1. Design and draw working structural drawings of various concrete structures and their members.</li><li>2. Understand and interoperate design aids and handbooks.</li><li>3. Use of relevant Indian Standard specifications applicable to Reinforced concrete structures.</li></ol>			
<b>Laboratory Drawing Works:</b> <ol style="list-style-type: none"><li>1. Basic Structural Drawings of concrete &amp; steel elements such as plan, Elevation, side plans of beams, columns, slabs, Connections, Tension Members, Compression Members, steel Beams, Foundations, Roof Trusses, etc.</li></ol>			

ENVIRONMENTAL SCIENCE			
Subject Code: BMNCC0-002	L	T	P C
	2	0	0 0
<b>Course Objectives:</b> <ol style="list-style-type: none"><li>1. To identify and understand the importance and related problem of natural resources.</li><li>2. To realize the importance of ecosystem and biodiversity for maintaining ecological balance.</li><li>3. To identify the major pollutants and abatement devices for environmental &amp; waste management and sustainable development.</li><li>4. To understand the conceptual process related with the social issues, various climatologically associated problems, and their possible solutions.</li></ol>			
<b>Course Outcomes:</b> Based on this course, the students will understand/evaluate/develop: <ol style="list-style-type: none"><li>1. Technologies based on ecological principles and environmental regulations, which in turn helps</li></ol>			



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<p>in sustainable development.</p> <ol style="list-style-type: none"><li>2. Conceptualize the processes and various factors involved in the formation of environment.</li><li>3. Recognize the importance of environment and the sustainable natural resources.</li><li>4. Use scientific reasoning to identify and understand environment problems and evaluate potential solution.</li><li>5. Identify the impacts of human activities on environment and role of society in these impacts.</li></ol>
<p style="text-align: center;"><b>UNIT-I (07 Hours)</b></p> <p><b>Natural Resources:</b> Renewable and Non-renewable Resources: Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation. Timber extraction and their effects on forests, tribal people and case studies. (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits &amp; problems and case studies. (c) Mineral resources: Use and over-utilization, environmental effects of extracting and using mineral resources.</p>
<p style="text-align: center;"><b>UNIT-II (08 Hours)</b></p> <p><b>Ecosystems:</b> (a) Concept of an ecosystem. (b) Structure and function of an ecosystem. (c) Producers, consumers and decomposers. (d) Energy flow in the ecosystem. (e) Ecological succession. (f) Food chains, food webs and ecological pyramids.</p> <p><b>Biodiversity and its Conservation:</b> Introduction – Definition: genetic, species and ecosystem diversity (b) Bio-geographical classification of India (c) Value of biodiversity: consumptive use, productive use, social and ethical aesthetic.</p>
<p style="text-align: center;"><b>UNIT-III (08 Hours)</b></p> <p><b>Environmental Pollution:</b> Definition (a) Causes, effects and control measures of: i) Air pollution ii) Water pollution iii) Soil pollution iv) Marine pollution v) Noise pollution vi) Thermal pollution vii) Nuclear pollution</p> <p>(b) Solid Waste Management: Causes, effects and control measures of urban and industrial waste.</p>
<p style="text-align: center;"><b>UNIT-IV (07 Hours)</b></p> <p><b>Social Issues and the Environment:</b> (a) From unsustainable to sustainable development (b) Urban problems and related to energy (c) Water conservation, rain water harvesting, Watershed Management (d) Resettlement and rehabilitation of people; its problems and concerns. (e) Environmental ethics: Issues and possible solutions (f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.</p>
<p><b>Recommended Text Books / Reference Books:</b></p> <ol style="list-style-type: none"><li>1. C.P. Kaushik, 'Environmental Science'.</li><li>2. J.G. Henry and G.W. Heinke, 'Environmental Sc. &amp; Engineering', Pearson Education, 2004.</li><li>3. G.B. Masters, 'Introduction to Environmental Engg. &amp; Science', Pearson Education, 2004.</li><li>4. ErachBharucha, 'Textbook for Environmental Studies', UGC, New Delhi.</li></ol>