



### List of Revised Courses

**Department : Civil Engineering**

**Programme Name : B.Tech.**

**Academic Year : 2020-21**

### List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	CE05TPC11	SOIL MECHANICS - I
02.	CE05PPC04	HIGHWAY ENGINEERING LAB
03.	CE05PPC05	SOIL MECHANICS LAB
04.	CE06TPC13	WATER RESOURCES ENGINEERING - I
05.	CE06TPC14	ENVIRONMENTAL ENGINEERING - II
06.	CE06TPC16	SOIL MECHANICS - II
07.	CE06TPE01B	ADVANCED SURVEYING
08.	CE06TOE01B	RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2020-21

School : *School of Studies of Engineering and Technology*

Department : *Civil Engineering*

Date and Time : *July 9, 2020 - 11:00 AM*

Venue : *Department of Civil Engineering*

Department of Civil Engineering  
School of Studies, Engineering & Technology  
Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur C.G.

Minutes of Meeting of BoS

A meeting of Board of Studies (BoS) of Civil Engineering was held on 09-07-2020 at 11.00 AM in the Department of Civil Engineering (through ZOOM APP online) to discuss and finalize the syllabus of B.Tech. 3<sup>rd</sup> year (5<sup>th</sup> and 6<sup>th</sup> Semesters) Civil Engineering w.e.f 2020-21 academic session. The following internal members of ~~BoS~~ were present in the meeting.

1. Dr. M. C. Rao, Chairman BoS, Head of the Department Civil Engg.
2. Dr. Shailendra Kumar, Professor, Civil Engg. Dept., GGV, member of BoS
3. Shri.R.K. Choubey, Asso. Professor, Civil Engg. Dept., GGV, member of BoS
4. Mr.A.K. Parashar, Asst.Professor, Civil Engg. Dept., GGV, member of BoS

The following external members of ~~BoS~~ were attended the meeting through online (ZOOM meeting)

1. Shri. Sunil Kumar Shrivastava, Chief Manager (Civil), SECL Bilaspur, Industry Expert and member of BoS
2. Prof. Umesh K Dewangan, Professor, Civil Engineering Dept., NIT Raipur, Subject Expert and External member of BoS

At the outset the chairman welcomed all the esteemed members.

The chairman of the DRC has presented the B.Tech. Civil Engineering Scheme (Approved in the previous BoS meeting held on 29-06-2019) and the syllabus of B.Tech. 3<sup>rd</sup> year, prepared as per the approved scheme & as per the AICTE guidelines to all the esteemed members. During meeting the members discussed the scheme and syllabus at length and suggested minor changes in both the scheme & syllabus and accordingly the changes are incorporated in both the scheme as well as in the syllabus.

After incorporation of the changes in the scheme and syllabus, the members of BoS have approved the B.Tech. scheme (revised) and detailed syllabus of B.Tech. 3<sup>rd</sup> year (5<sup>th</sup> & 6<sup>th</sup> Semester) Civil Engineering and recommended to be made effective from session 2020-21. Further the external members have also sent their comments through e-mail (copies enclosed).

The meeting ended with vote of thanks.

  
Dr. M. C. Rao

  
Prof. Shailendra Kumar

  
Mr. R.K. Choubey

  
Mr. A.K. Parashar



The following revisions were introduced in the B.Tech. 3rd (5th & 6th semester) civil engineering :

- ❖ SOIL MECHANICS - I (CE05TPC11)
- ❖ HIGHWAY ENGINEERING LAB (CE05PPC04)
- ❖ SOIL MECHANICS LAB (CE05PPC05)
- ❖ WATER RESOURCES ENGINEERING -I (CE06TPC13)
- ❖ ENVIRONMENTAL ENGINEERING - II (CE06TPC14)
- ❖ SOIL MECHANICS - II (CE06TPC16)
- ❖ ADVANCED SURVEYING (CE06TPE01B)
- ❖ RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT (CE06TOE01B)

The following new courses were introduced in the B.Tech. 3rd (5th & 6th semester) civil engineering :

- ❖ MANAGEMENT (ORGANIZATIONAL BEHAVIOUR) (CE05THS07)
- ❖ STRUCTURAL ANALYSIS BY MATRIX METHODS (CE06TPE01A)
- ❖ BASICS OF COMPUTATIONAL HYDRAULICS (CE06TPE01E)
- ❖ METRO SYSTEMS AND ENGINEERING (CE06TOE01A)
- ❖ REMOTE SENSING AND GIS (CE06TOE01C)
- ❖ ICT FOR DEVELOPMENT (CE06TOE01D)

**विभागाध्यक्ष**  
HOD  
सिविल इंजीनियरी विभाग  
Department of Civil Engineering,  
प्रो.स.गु.घा.विश्वविद्यालय, बिलासपुर (छ.ग.)  
I.T., G.G.V. Bilaspur (C.G.)

Signature & Seal of HoD



## Scheme and Syllabus

### CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

#### SCHEME OF B.TECH.V SEMESTER CIVIL ENGINEERING W.E.F. 2020-21 (ODD SEMESTER)

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
			Theory	L	T	P	CT-I	CT-II			
1	CE05TPC08	Design of Concrete Structures	3	1	0	15	15	30	70	100	4
2	CE05TPC09	Structural Analysis - II	3	1	0	15	15	30	70	100	4
3	CE05TPC10	Highway Engineering	3	0	0	15	15	30	70	100	3
4	CE05TPC11	Soil Mechanics - I	3	0	0	15	15	30	70	100	3
5	CE05TPC12	Environmental Engineering - I	3	0	0	15	15	30	70	100	3
6	CE05THS07*	Management (Organizational Behaviour)	3	0	0	-	-	-	-	-	0
<b>Practical</b>											
1	CE05PPC04	Highway Engineering Lab	0	0	3	↓	↓	30	20	50	1.5
2	CE05PPC05	Soil Mechanics Lab	0	0	3	↓	↓	30	20	50	1.5
<b>Total Credits</b>										20	

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; \* Mandatory Course



**CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY**  
**GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR**

**SCHEME OF B.TECH.VI SEMESTER CIVIL ENGINEERING**

**W.E.F. 2020-21 (EVEN SEMESTER)**

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation			Grand Total	Credits	
						Internal Assessment (IA)					ESE
			Theory	L	T	P	CT-I	CT-II			
1	CE06TPC13	Water Resources Engineering -I	3	0	0	15	15	30	70	100	3
2	CE06TPC14	Environmental Engineering - II	3	0	0	15	15	30	70	100	3
3	CE06TPC15	Design of Steel Structures	3	1	0	15	15	30	70	100	4
4	CE06TPC16	Soil Mechanics - II	3	0	0	15	15	30	70	100	3
5	CE06TPE01	Professional Elective -IX	3	1	0	15	15	30	70	100	4
6	CE06TOE01	Open Elective -IX	3	0	0	15	15	30	70	100	3
		Internship/Industrial Training*									
		<b>Practical</b>									
1	CE06PPC06	Environmental Engineering Lab	0	0	3	-	-	30	20	50	1.5
2	CE06PPC07	Computer Applications in Civil Engg. Lab	0	0	3	-	-	30	20	50	1.5
										<b>Total Credits</b>	<b>23</b>

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; \* Students have to undergo internship/industrial training for a period of 04 weeks during the summer vacation and shall submit a report signed by the concerned organization to the Department in the 7th Semester.



**List of Professional (Core) Electives**

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TPE01X	<b>Professional Elective-1 (PE Group-1)</b>	4	VI
A	CE06TPE01A	Structural Analysis by Matrix Methods		
B	CE06TPE01B	Advanced Surveying		
C	CE06TPE01C	Advanced Concrete Design		
D	CE06TPE01D	Railway Engineering		
E	CE06TPE01E	Basics of Computational Hydraulics		
Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE01X	<b>Professional Elective-2 (PE Group-2)</b>	3	VII
A	CE07TPE01A	Pre-stressed Concrete		
B	CE07TPE01B	Construction Engineering Materials		
C	CE07TPE01C	Disaster Preparedness and Planning		
D	CE07TPE01D	Advanced Structural Analysis		
E	CE07TPE01E	Low Cost Housing Techniques		
Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE02X	<b>Professional Elective-3 (PE Group-3)</b>	3	VII
A	CE07TPE02A	Environmental Geo-technology		
B	CE07TPE02B	Air and Noise Pollution and Control		
C	CE07TPE02C	Solid and Hazardous Waste Management		
D	CE07TPE02D	Design of Hydraulic Structures		
E	CE07TPE02E	Environmental Impact Assessment and Life Cycle Analysis		
Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE03X	<b>Professional Elective-4 (PE Group-4)</b>	3	VII
A	CE07TPE03A	Ground Water Hydrology		
B	CE07TPE03B	Structural Dynamics		
C	CE07TPE03C	Foundation Engineering		
D	CE07TPE03D	Rock Mechanics		
E	CE07TPE03E	Water Resources Planning & Management		



List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TOE01X	Open Elective-1 (OE Group-1)	3	VI
A	CE06TOE01A	Metro Systems and Engineering		
B	CE06TOE01B	Rural Technology and Community Development		
C	CE06TOE01C	Remote Sensing and GIS		
D	CE06TOE01D	ICT for Development		
Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TOE01X	Open Elective-2 (OE Group-2)	3	VII
A	CE07TOE01A	Artificial Neural Network		
B	CE07TOE01B	Economic Policies in India		
C	CE07TOE01C	History of Science and Engineering		
D	CE07TOE01D	Cyber Law and Ethics		
Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE08TOE01X	Open Elective-3 (OE Group-3)	3	VIII
A	CE08TOE01A	Management Information System		
B	CE08TOE01B	Enterprise Resource Planning		
C	CE08TOE01C	Engineering Risk-Benefit Analysis		
D	CE08TOE01D	Human Resources Development and Organizational Behaviour		



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE05TPC11</b>							70	100	03
<b>Subject:</b>	<b>Soil Mechanics - I</b>	3	0	0	15	15	30			

**Course Learning Objectives:**

The objective of this Course is

- To understand the engineering properties of soil.
- To develop the basic understanding of characteristics of soil like permeability, seepage.
- To learn the effective stress and vertical stress in soil.
- To learn the significance of compaction and consolidation on the stability of soil.
- To learn shear strength of different type of soils.

**Course Content:**

**Unit 1:** Introduction to Soil Mechanics and Geotechnical Engineering, Complexity of Soil Nature, Soil Formation and Soil Types.

Index Properties of Soil: Basic Definitions, Phase Relationships, Classification of Soils-The Unified Soil Classification System and Indian Standard Soil Classification System, Soil Structure and Clay Minerals.

**Unit 2:** Soil Compaction: Definition and Compaction Theory, Laboratory Compaction Tests-Standard Proctor Compaction Test & Modified Compaction Test, Factors Affecting Compaction, Effect of Compaction on Engineering Properties of Soil , Field Compaction and Controls.

Principle of Effective Stress, Capillarity and Permeability: Principle of Effective Stress, Capillarity in Soils, Effective Stress under Different Field Conditions, Seepage Pressure, Quick Sand Condition, Permeability, Darcy's Law, Determination of Permeability, Permeability of Stratified Soils, Absolute Co-efficient of Permeability, Factors Affecting Permeability , Seepage through Soils- Laplace's Equation, Flow Nets.

**Unit 3:** Vertical Stresses below Applied Loads: Stresses due to Applied Loads, Boussinessq and Westergaard Theories for Vertical Stresses under Concentrated Loads, Uniformly Loaded Circular and Rectangular Areas, Pressure Bulb, Variation of Vertical Stress under Point Load along the Vertical and Horizontal Planes, Newmark's influence chart.

Stability of Soil Slopes: Introduction, Types of Slope Failures, Slip Circle Method, Determination of Centre of Most Critical Slip Circle, Taylor's Stability Charts, Stabilization of Soil Slopes.





**Unit 4:** Shear Strength: Introduction, Stress at a Point and Mohr's Stress Circle, Normal and Shear Stresses on a Plane, Mohr-Coulomb Failure Criterion, Laboratory Tests for Shear Strength Determination, Shear Strength Parameters, Direct shear test, Triaxial shear test, Unconfined Compression Test and Vane Shear test, Shear Strength Characteristics of Normally Consolidated and Reconsolidated Clays, Factors Affecting Shear Strength.

**Unit 5:** Compressibility: Introduction to Compressibility, Consolidation, Effects of Soil Type, Stress History and Effective Stress on Compressibility, Factors Affecting Consolidation and Compressibility Parameters, Normally Consolidated and Over Consolidated Soils, Types of Consolidation, Terzaghi's Theory of 1-D Consolidation and Time Rate of Consolidation.

**Text Books:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Textbook of Soil Mechanics and Foundation Engineering Geotechnical Engineering Series (PB 2018) by V. N. S. Murthy, CBS Publication, New Delhi.
3. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002.
4. Soil Mechanics by Robert V. Whitman & T. William Lambe, Wiley India Pvt Ltd, New Delhi.
5. Soil Mechanics and Foundation Engineering by Purushotama Raj, Pearson Publications, New Delhi.
6. Soil Mechanics and Foundation Engineering (Geotechnical Engineering) by Dr. P. N. Modi, Standard Book House (Rajsons Publications Pvt Ltd) New Delhi-110002

**Course Outcomes**

At the end of the course the students shall be able

- To have an understanding of soil capable to behaving in different practical conditions.
- To have an idea of engineering properties of soil suitable for foundation.



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE05PPC04</b>									
<b>Subject:</b>	<b>Highway Engineering Lab</b>	0	0	3	-	-	30	20	50	1.5

**Course Learning Objectives :**

The objective of this Course is

- To introduce Bitumen and & its engineering behavior.
- To introduce Aggregate & its engineering behavior.
- To introduce Concept of traffic behavior.

**Course Content:**

Minimum 10 experiments to be performed

1. To determine the crushing value of the given aggregate sample.
2. To determine 10% finer value of the given aggregate sample.
3. To determine the abrasion value of the given aggregate sample by los angles apparatus.
4. To determine the impact value of the given aggregate sample.
5. To determine the elongation index of the given aggregate sample.
6. To determine the flakiness index of the given aggregate sample.
7. To determine the water absorption of the given coarse aggregate.
8. To determine the specific gravity of the given coarse aggregate.
9. To determine the penetration value of the given bitumen material.
10. To determine the softening point of the given bitumen material.
11. To determine the ductility of the given bitumen material.
12. To determine the viscosity of the given bitumen material

**13. CBR Test**

**Course Outcomes**

At the end of the course the students shall be able

- To identify engineering properties of aggregate.
- To identify the grade & properties of bitumen.
- To find out peak hour traffic & peak time for a given location on the road.
- To calculate design speed, maximum speed & minimum speed limits of a location through spot speed.
- To draw parking accumulation curve and find out parking duration & turnover of parking lot/stretch



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA )			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE05PPC05</b>							20	50	1.5
<b>Subject:</b>	<b>Soil Mechanics-Lab</b>	0	0	3	-	-	30			

**Course Learning Objectives:**

The objective of this Course is

- To learn the basic tests analysing engineering properties of soil.
- To learn the practical tests computing bearing capacity of soil.
- To learn the sampling of soil.

**Course Content:**

Minimum 10 experiments to be performed

1. To determine the water content of soil (%) by Oven dry method.
2. To determine the specific gravity of soil sample by
  - a) Pycnometer Bottle Method.
  - b) Density Bottle Method.
3. To determine the particle size distribution of a soil by Mechanical Analysis.
4. To determine the grain size distribution by Hydrometer apparatus
5. To determine the liquid limit and Plastic limit of a soil sample and Shrinkage limit of a soil sample.
6. To determine in situ dry density of soil by
  - a) Core cutter method.
  - b) Sand replacement method.
7. To determine the permeability of soil by
  - a) Falling Head Methods.
  - b) Constant Head Methods.
8. To determine the shear strength of a coarse grained soil (Direct Shear Test).
9. To determine the compressive shear strength of Clay (Unconfined Compression Test/UCS test).
10. To determine the shear strength of  $c-\phi$  Soil (Triaxial Test).
11. To determine the consolidation of soil/Clay sample.

**Text Books:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002

**Course Outcomes**

At the end of the course the students shall be able

- To have an understanding of performing various tests on soil accurately giving them practical exposure.



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE06TPC13</b>									
<b>Subject:</b>	<b>Water Resources Engineering -I</b>	3	0	0	15	15	30	70	100	03

**Course Learning Objectives:**

The objective of this Course is

- To understand the need of Irrigation, types of irrigation systems and Methods of Irrigation.
- To understand the Canal Irrigation systems and design of stable channels in alluvium.
- To understand Water Logging and its Control.
- To know the River behaviour, control and training.
- To know the Reservoir Planning, Hydrograph and Flood Routing and its principle.

**Course Content:**

**UNIT 1:** Introduction: Need for Irrigation, advantages and disadvantages of irrigation, types of irrigation systems – Flow irrigation, Lift irrigation. Methods of Irrigation: Introduction, requirement of irrigation methods, surface and sub-surface irrigation. Water Requirement of crops: Introduction, water requirement of crop, crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta, duty and base period, factors affecting duty.

**UNIT 2:** Canal Irrigation: Classification of canal, parts of canal irrigation system, canal alignment, typical canal cross section, command areas, losses in irrigation systems. Design of stable channels in alluvium. Introduction, Kennedy's silt theory, Lacey's Theory, Lacey's regime equations, Lacey's shock theory, Design of channels by Kennedy's and Lacey's theories, maintenance of irrigation channels.

**UNIT 3:** Water Logging and its Control. Causes and ill effects of water logging, prevention and control, reclamation of water logged lands, surface drainage. Design of Lined Channels. Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

**UNIT 4:** River behaviour, control and training. Objects, river characteristics, classification of river training works, methods of river training embankments, bank protection, cut-offs, meandering causes and parameters. Flood Control; Introduction, channel improvement, flood ways evacuation and flood plain zoning.

**UNIT 5:** Reservoir Planning: Introduction, type of reservoirs, investigation for reservoir planning, site selection criteria for reservoir, basic terms and definitions of reservoir, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity,



reservoir losses, reservoir sedimentation, factors affecting sedimentation, type of sediment load, life of reservoir, safe field.

**TEXT BOOKS:**

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)
3. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
4. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)
5. Irrigation and Water resources Engineering – Asawa G.L. (New Age International Publications)
6. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros)
7. Water Resources Engineering Larry -W. Mays (Wiley, John & Sons)

**Course Outcomes**

At the end of the course the student shall be able

- To describe about the types of Irrigation systems, and methods of irrigation.
- To design irrigation canals and canal network
- To illustrate about the solution regarding water logging and drainage.
- To illustrate river training work and Flood Control of river.
- To find out capacity of reservoir and use Flood Routing principle for Reservoir Planning.



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	SEMESTER-VI	Periods/ Week			Internal Assessment ( IA )			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE06TPC14									
Subject:	Environmental Engineering - II	3	0	0	15	15	30	70	100	03

**Course Learning Objectives:**

The objective of this Course is

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena in the sewage
- To understand the concept successful design, operation and maintenance of sewage treatment plant

**Course Content:**

**UNIT 1:** Objective, design period, Physical, Chemical and Biological characteristics. Waste water sampling, self-purification of natural streams, effluents Standards, Oxygen Sag Curve, sources of sewage. Design of sanitary sewers, minimum size of sewer, velocities in sewers and gradient of sewers. Sewer appurtenances viz. manholes, street inlets, flushing devices, Vent pipes etc.

**UNIT 2:** Waste Water primary Treatment: characteristics of wastewater. Effluent discharge standards, Primary, secondary and tertiary treatment of wastewater. Types of screens, design of screen chamber, sources of grit, design of grit chamber, disposal of grit, oil and grease removing skimming tanks, design of PST with inlet and outlet details, primary sludge and its disposal

**UNIT 3:** Aerobic Treatment UNITS: Biological principle of ASP, SVI, sludge bulking and control; biological principle of Trickling filter, re-circulation, operational troubles; Rotating biological contactor. Low cost treatment methods: Principle of Oxidation pond, symbiosis, principle of Aerated Lagoons, aeration method, Principle of Oxidation Ditches, sewage farming, ground water recharge.

**UNIT- 4:** Anaerobic Treatment UNITS: Septic tanks, biological Principle, method of treatment and disposal of tank effluent. Anaerobic digester, principle of anaerobic digestion, Stages of digestion, bio-gas production. Sludge disposal methods, advantages and disadvantages, Design of STP.

**UNIT 5:** Municipal Solid Wastes: Characteristics, generation, collection & transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment & disposal), environmental & health implications, disposal of solid waste by land filling, composting and incineration methods. Hazardous waste management, environmental and health implications due to Exposure, incineration, landfill disposal, site remediation, disposal of refuse by Composting.



**TEXT BOOKS:**

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Waste Water Engineering – S.K. Garg (Khanna Publication).
3. Manual on sewerage & sewage Treatment published by Ministry of UrbanDev. GOI, Ministry of Urban development
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
5. Hazardous Waste management: M.D. LaGrega, P.L. Buckingham, J.C. Evans
6. Manual on Municipal Solid Waste Management: CPHEEO (Ministry of Urban Dev.)
7. Environmental Engineering-II.P. Venugopala Rao Tata McGraw Hill
8. Water and Wastewater Technology ,Hammer ( PHI)

**Course Outcomes**

At the end of the course the students shall be able

- To estimate sewage generation and design sewer system including sewage pumping stations
- To understand the characteristics and composition of sewage, self-purification of streams
- To perform basic design of the unit operations and processes that are used in sewage treatment



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE06TPC16</b>									
<b>Subject:</b>	<b>Soil Mechanics - II</b>	3	0	0	15	15	30	70	100	03

**Course Learning Objectives:**

The objective of this Course is

- To understand the effect of backfill on retaining wall.
- To learn the bearing capacity of soil and methods to calculate it.
- To learn the analysis of stability of shallow and deep foundation for superstructure loading.
- To learn about exploration and sampling of soil.

**Course Content:**

**Unit 1:** Soil Exploration: Introduction, Different Phases of Soil Explorations, Methods of Subsurface Exploration- Trail Pits, Boring Methods, Sounding Test and Geophysical Explorations, Samples and Samplers, Soil Exploration Reports and Bore Log.

**Unit 2:** Earth Pressures: Introduction, Effect of Wall Movement on Earth Pressure, Earth Pressure at Rest, Rankine's Earth Pressure Theory and its Limitations, Coulomb's Theory of Earth Pressure, Culmann's Graphical Method, Additional Earth Pressure due to Surcharge.

**Unit 3:** Shallow foundations: Types of shallow foundations and choice, basic requirements, significance of these foundations

Bearing capacity of foundation: Introduction, Bearing Capacity and its Different Forms, Modes of Shear Failure, Evaluation of Bearing Capacity- Prandtl's Method, Terzaghi's Bearing Capacity, Skempton's Method, Meyerhof's Method, Hansen's and Vesic's Assumptions and IS Code Recommendations, Estimation of Bearing Capacity Based on Field Methods-Standard Penetration Test, Static Penetrations Test and Plate Load Test, Settlement of Shallow Foundations.

**Unit 4: Pile Foundations:** Introduction, Classifications of Piles, Cast in Situ Pile Construction, Selection of Pile Type, and Pile Load Capacity in Compression- Static Pile Load Formulae, Pile Load Test, Dynamic Pile Formulae, Group Action of Piles, Negative Skin Friction, Group Efficiency of Piles and Settlements.

**Unit 5: Well Foundation:** Introduction, Types of Well or Caissons, Components of Well Foundation, Shapes of Wells, Depth of Well Foundation, Forces Acting on Well Foundation, Construction and Sinking of a Well.





**Text Books:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Textbook of Soil Mechanics and Foundation Engineering Geotechnical Engineering Series (PB 2018) by V. N. S. Murthy, CBS Publication, New Delhi.
3. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002.
4. Foundation Engineering by B. C. Chattopadhyay & Joyanata Maity, PHI Learning Private Limited, Delhi-110092.
5. Soil Mechanics by Robert V. Whitman & T. William Lambe, Wiley India Pvt Ltd. New Delhi.
6. Soil Mechanics And Foundation Engineering by P.Purushotama Raj, Pearson Publications, New Delhi.
7. Geotechnical Engineering by B. M. Das, Bharat Singh, SamsherAlam.
8. Soil Mechanics and Foundation Engineering (Geotechnical Engineering) by Dr. P. N. Modi, Standard Book House (Rajsons Publications Pvt Ltd) New Delhi-110002.

**Course Outcomes**

At the end of the course the students shall be able

- To have an understanding of suitable foundation for different practical conditions.
- To have an idea about sampling of soil for various tests.



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SYLLABUS		(SEMESTER-VI)						
<b>Subject Code:</b>	<b>CE06TPE01X</b>	CREDITS: 4			SESSIONAL - TA			ESE
<b>Subject:</b>	<b>Professional Elective -1X</b>	L	T	P	CT-I	CT-II	TOTAL	
		3	1	-	15	15	30	70
Professional Elective-1A or Professional Elective-1B or Professional Elective-1C or Professional Elective-1D or Professional Elective-1E		Any one subject to be Selected from the Professional Electives (Group-1 i.e. CE06TPE01A or CE06TPE01B or CE06TPE01C or CE06TPE01D or CE06TPE01E)						
Professional Electives Group -1								
CE06TPE01A		Structural Analysis by Matrix Methods						
CE06TPE01B		Advanced Surveying						
CE06TPE01C		Advanced Concrete Design						
CE06TPE01D		Railway Engineering						
CE06TPE01E		Basics of Computational Hydraulics						



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SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	<b>CE06TPE01B</b>									
<b>Subject:</b>	Advanced Surveying (Professional Elective -IX)	3	1	0	15	15	30	70	100	04

**Course Learning Objectives:**

The objective of this Course is

- To understand about concepts of Astronomical Surveying.
- To know the applications of cadastral surveying in different projects.
- To be capable to compute the accuracy of observations made.
- To learn the theory of triangulations surveying.
- To learn about various advanced equipment of surveying

**Course Content:**

**UNIT 1:** Triangulation and Baseline Measurements: Triangulation figures or systems, station marks, signals, towers, baseline measurement by rigid bars, flexible apparatus, problems, satellite station and reduction to centre.

**UNIT 2:** Theory of Errors: Types and sources of errors, theory of least squares, method of weights, method of correlates, angle and station adjustment, figure adjustment. Land Surveys: Layouts, measurements.

**UNIT 3:** Aerial photogrammetry : Introduction, Principle, Uses, Aerial camera, Aerial 6 10 photographs, Definitions, Scale of vertical and tilted photograph,, Ground Co-ordinates, Displacements and errors, Ground control, Procedure of aerial survey, Photomaps and mosaics, Stereoscopes, Parallax bar.

**UNIT 4:** Field Astronomy: Introduction, purposes, astronomical terms, determination of azimuth, latitude , longitude and time corrections to the observations.

**UNIT 5:** Remote Sensing Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation, Digital image processing, Global Positioning system.

Geographical Information System Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data, spatial information system Geospatial analysis, Integration of Remote sensing and GIS and Applications in Civil Engineering.



**Text Books:**

1. Borden D. Dent, Jeffrey Troguson, Thomas W. Hodler, Cartography: Thematic Map Design, McGraw-Hill Higher Education, 2008.
2. Gopi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson Education India, 2007.
3. Hoffman.B, H.Lichtenegga and J.Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.
4. Punmia B. C, Ashok K. Jain, Arun K. Jain, Higher Surveying, Laxmi Publications, 2005.
5. Surveying Vol. I, II and III by Dr. B.C. Punamia, Laxmi Publishers. New Delhi
6. Surveying and Levelling Vol. I and II by T.P Kanetkar and S.V Kulkarni, Pune Vidhyarthi Gruh
7. Surveying Vol. I, II and III by Dr. K.R. Arora, Standard Book House. New Delhi
8. Surveying Vol. I and II by S. K. Duggal, Tata Mcgraw Hill, New Delhi
9. Surveying and Levelling by N.N. Basak, Tata Mcgraw Hill, New Delhi
10. Surveying and Levelling by R. Agor, Khanna Publishers, New Delhi
11. Advanced Surveying by R. Agor, Khanna Publishers, New Delhi
12. Fundamentals of Surveying by Roy, S.K., Prentice Hall India, New Delhi
13. Surveying and Leveling by Subramanian, R., Oxford University Press, New Delhi
14. Remote Sensing and GIS by B Bhatia, Oxford University Press, New Delhi.
15. Remote sensing and Image interpretation by T.M Lillesand,. R.W Kiefer,. and J.W Chipman, 5th edition, John Wiley and Sons India
16. Surveying theory and practice 7th Edition by James M Anderson and Adward M Mikhail Tata McGraw Hill Publication.

**Course Outcomes**

At the end of the course the students shall be able

- To be able to understand the aspects of astronomical surveying.
- To be able to define boundaries of construction area of projects.
- To be able to adapt the surveying equipment on the field.



DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-VI)							
<b>Subject Code:</b>	<b>CE06TOE01X</b>	CREDITS:3			SESSIONAL - TA			ESE
<b>Subject:</b>	Open Elective - IX	L	T	P	CT-I	CT-II	TOTAL	
		3	-	-	15	15	30	70
Open Elective-1A or Open Elective-1B or Open Elective-1C or Open Elective-1D		Any one subject to be Selected from the Open Electives Group ( i.e. CE06TOE01A or CE06TOE01B or CE06TOE01C or CE06TOE01D )						
Open Electives Group 1								
CE06TOE01A		Metro Systems and Engineering						
CE06TOE01B		Rural Technology and Community Development						
CE06TOE01C		Remote Sensing and GIS						
CE06TOE01D		ICT for Development						



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SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment ( IA )			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	CE06TOE01B									
<b>Subject:</b>	Rural Technology and Community Development (Open Elective -IX)	3	0	0	15	15	30	70	100	03

**Course Learning Objectives:**

The objective of this Course is

- To understand theories and practices in the rural development model.
- To learn and analyse rural life and rural economy.
- To understand different measures in rural development.
- To learn different technologies used in upliftment of rural life.

**Course Content:**

**UNIT 1: INTRODUCTION: RURAL DEVELOPMENT** - Concepts and connotations, Basic Elements, Growth vs. Development, Why rural development, Rising expectations and development, Development and Change, Human beings as cause and consequences of development. **RURAL ECONOMY OF INDIA** - Introduction, size and structure, The characteristics of rural sector, The role of agricultural sub-sector, The role of non-agricultural sub-sector, Challenges and opportunities

**UNIT 2: RURAL DEVELOPMENT - MEASURES AND PARADIGMS: MEASURES OF DEVELOPMENT** - Introduction, Measures of level of rural development, Measures of income distribution, Measures of development simplified, Concepts and measures of rural poverty. **PARADIGMS OF RURAL DEVELOPMENT** - Introduction, The modernization theory, The dependency theory of Marxist School, Rosenstein- Rodan's theory of 'Big Push', Lewis' model of economic development, The human capital model of development, The Gandhian Concept of Rural Development theories from other social sciences.

**UNIT 3: TECHNOLOGIES FOR RURAL DEVELOPMENT** Using Water Resources - The water cycle, Drinking Water, Water quality testing, Water filtering ,Extraction from Groundwater ,Pumps Rope and washer pump ,Manuel pumps, Treadle pump, Irrigation for agriculture, Channel systems, Sprinkler systems, Drip systems Water diversion ,Water storage Building Infrastructures and Creating Energy - Basic energy uses , Energy Sources - Firewood, Solar Energy, Hydro-electricity, Hydro-mechanical, Wind Energy, Energy Storage, Connecting to the Electrical Network, Environmental Use of ICT in Rural and agricultural development - Education, Healthcare, Agriculture, Business, Resource Mapping, Digital and Social Media Marketing Decision Support Systems for soil conservation and farm management Waste Management and Sanitation.



**UNIT 4: COMMUNITY DEVELOPMENT:** Introduction, Service Learning and community development, Theory and practice of community development, Community development issues. The diverse meaning of community development, the knowledge base of community development, International community development.

**UNIT 5: COMMUNITY DEVELOPMENT - RURAL ENTREPRENEURSHIP:** Different forms of Rural Entrepreneurship, Significance, Business planning for a new venture: the concept of planning paradigm, Forms of business enterprises-Sole proprietorship, partnership and corporations, Product and Process development, Marketing analysis and competitive analysis, strategies; Financial resources; debt financing, banks and financial institutions and other non-bank financial sources; Government programmes : direct loan assistance and subsidies; Industrial and legal issues for rural enterprises.

**Text Books:**

1. Rural Development: Principles, Policies and Management” - Katar Singh, Sage Publications.
2. Introduction to Community Development - Theory, Practice and Service Learning”, Edited by J W Robinson, Sage Publications.
3. G. N. Tiwari, Solar Energy: Fundamentals, Design, Modelling and Applications, Narosa, 2002.
4. “Fundamentals of Entrepreneurship”, H. Nandan, Third Edition, PHL Learning Pvt. Ltd.,
5. Monetary Economics-Institutions, Theory and Policy”, First Edition, S B Gupta, S Chand Publications, ISBN – 9788 121904346.

**Course Outcomes:** At the end of the course the students shall be able to

- Understand rural development model.
- Learn different measures in rural development and its impact on overall economy.
- Understand and learn importance of technologies in rural and community development.
- Understand challenges and opportunities in rural development.