

LESSON PLAN FOR WINTER 2025

DISCIPLINE : CIVIL ENGINEERING	Semester : 3 rd sem (sec. B)	Name of the Teaching faculty: DEBASHIS BEHERA	
Subject :- Mechanics of Material	No.of Days/ week class allotted : 03 Days	SEMESTER FROM-14/07/2025 to 15/11/2025 NO. OF WEEKS-18 WEEKS	
Week	Class Day	Topics	Remarks
1st week		Chapter 1 Centre of Gravity and Moment of Inertia	
	1st day	Definition of centre of gravity -Centre of gravity of Symmetrical shapes (solid / hollow square, rectangular, circular, ISections)	
	2nd day	Definition of centre of gravity -Centre of gravity of Symmetrical shapes (solid / hollow square, rectangular, circular, ISections)	
	3rd day	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations).	
2nd week	1st day	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations).	
	2nd day	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations).	
	3rd day	M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built up sections about centroidal axes and any other reference axis.	
3rd week	1st day	M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built up sections about centroidal axes and any other reference axis.	
	2nd day	Polar Moment of Inertia of solid circular sections.	
	3rd day	chapter 2 Simple Stresses and Strains	
		Definition of rigid, elastic and plastic bodies, deformation of elastic body under various force, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity	
		Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses.	

4th week	1st day	Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.	
	2nd day	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.	
	3rd day	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.	
5th week	1st day	Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section)	
	2nd day	Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section)	
	3rd day	Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation)	
6th week	1st day	Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation)	
		ch 3 COMPLEX STRESSES AND STRAINS	
	2nd day	Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations – stresses on a given plane –shear and normal stress components on any inclined plane – Mohr's circle and its use in solving problems on complex stresses - Numerical problems	
	3rd day	Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations – stresses on a given plane –shear and normal stress components on any inclined plane – Mohr's circle and its use in solving problems on complex stresses - Numerical problems	
7th	1st day	Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations – stresses on a given plane –shear and normal stress components on any inclined plane – Mohr's circle and its use in solving problems on complex stresses - Numerical problems	
	2nd day	Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations – stresses on a given plane –shear and normal stress components on any inclined plane – Mohr's circle and its use in solving problems on complex stresses - Numerical problems	

8th week		CHAPTER 3 Shear Force and Bending Moment	
	1st day	Types of supports, beams and loads	
		Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation)	
	2nd day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
	3rd day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
9th week	1st day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
		Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
	2nd day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
	3rd day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
10th week	1st day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
	2nd day	Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	
		ch 4 Bending and Shear Stresses in beams	
	3rd day	Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram.	
		Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram	

11th week	1st day	Concept of moment of resistance and simple numerical problems using flexural equation.	
	2nd day	Concept of moment of resistance and simple numerical problems using flexural equation.	
	3rd day	Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.	
13th week	1st day	Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.	
	3rd day	Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.	
14th week	1st day	Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	
	2nd day	Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	
	3rd day	Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	
		ch 5 Columns	
15th week	1st day	Concept of compression member, short and long column, Effective length, Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns	
	3rd day	Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load.	
16th week	1st day	Rankine's formula and its application to calculate crippling load.	
	2nd day	Rankine's formula and its application to calculate crippling load.	
	3rd day	Concept of working load/safe load, design load and factor of safety.	
17th week	1st day	Concept of working load/safe load, design load and factor of safety.	
	2nd day	Revision	
18th week		Revision	

Debasish
14/09/2025

SIGNATURE OF THE FACULTY

LESSON PLAN

Department: Civil Engineering	Semester : 5TH	Name of the Teaching faculty: DEBASHIS BEHERA	
Subject :- Th4. WATER SUPPLY AND WASTE WATER ENGINEERING	No.of Days/ week class allotted : 04 DAYS (05 PERIODS)	Semester from date: 14/07/2025 to 15/11/2025 No. of Weeks : 18 Topics to be covered:-	
Week	Class Day	Topics	Remarks
1. Introduction to Water Supply, Quantity and Quality of water (10P)			
1ST WEEK	1	1.1 Necessity of treated water supply	
	2	1.2 Per capita demand, variation in demand and factors affecting demand	
		1.3 Methods of forecasting population, Numerical problems using different methods	
	3	1.3 Methods of forecasting population, Numerical problems using different methods	
2ND WEEK	4	1.3 Methods of forecasting population, Numerical problems using different methods	
	1	1.4 Impurities in water – organic and inorganic, Harmful effects of impurities	
	2	1.5 Analysis of water –physical, chemical and bacteriological	
3RD WEEK	3	1.5 Analysis of water –physical, chemical and bacteriological	
	1	1.6 Water quality standards for different uses	
2. Sources and Conveyance of water (8P)			
3RD WEEK	2	2.1 Surface sources – Lake, stream, river and impounded reservoir 2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well	
	3	2.3 Yield from well- method s of determination, Numerical problems using yield formulae (deduction excluded)	
	4	2.4 Intakes – types, description of river intake, reservoir intake, canal intake	
4TH WEEK	1	2.5 Pumps for conveyance & distribution – types, selection, installation	
	2	2.6 Pipe materials – necessity, suitability, merits & demerits of each type 2.7 Pipe joints – necessity, types of joints, suitability, methods of jointing Laying of pipes – method	
	3	2.7 Pipe joints – necessity, types of joints, suitability, methods of jointing Laying of pipes – method	
3. Treatment of water (12P)			
11TH WEEK	1	3.1 Flow diagram of conventional water treatment system 3.2 Treatment process / units : 3.2.1 Aeration ; Necessity	
	2	3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance	
	3	3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)	
12TH WEEK	3	3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)	
	4	3.2.4 Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features	
13TH WEEK	2	3.2.5 Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super chlorination	
	3	3.2.5 Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super chlorination	
14TH WEEK	1	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)	
	2	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)	

		4. Distribution system and Appurtenance in distribution system (8P)	
15TH WEEK	3	4.1 General requirements, types of distribution system-gravity, direct and combined	
	4	4.1 General requirements, types of distribution system-gravity, direct and combined	
16TH WEEK	3	4.2 Methods of supply – intermittent and continuous	
	4	4.3 Distribution system layout – types, comparison, suitability	
17TH WEEK	1	4.3 Distribution system layout – types, comparison, suitability	
	2	4.4 Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, Fire hydrants, Water meters	
	3	4.4 Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, Fire hydrants, Water meters	
SECTION B: WASTE WATER ENGINEERING			
6. Introduction(5P)			
5TH WEEK	1	6.1 Aims and objectives of sanitary engineering	
	2	6.2 Definition of terms related to sanitary engineering Carriage System – features, comparison, suitability	
	4	6.2 Definition of terms related to sanitary engineering Carriage System – features, comparison, suitability	
6TH WEEK	1	6.3 Systems of collection of wastes– Conservancy and Water	
7. Quantity and Quality of sewage (7P)			
6TH WEEK	2	7.1 Quantity of sanitary sewage – domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage.	
	3	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring	
7TH WEEK	1	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring	
	3	7.3 General importance, strength of sewage, Characteristics of sewage-physical, chemical & biological	
	4	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD	
8TH WEEK	1	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD	
8. Sewerage system (5P)			
8TH WEEK	2	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability	
	4	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability	
9TH WEEK	1	8.2 Shapes of sewer – rectangular, circular, avoid-features, suitability	
	2	8.3 Laying of sewer-setting out sewer alignment	
9. Sewer appurtenances and Sewage Disposal (7P)			
9TH WEEK	2	9.1 Manholes and Lamp holes – types, features, location, function	
	3	9.2 Inlets, Grease & oil trap – features, location, function	
10 TH WEEK	1	9.3 Storm regulator, inverted siphon – features, location, function	
	2	9.4 Disposal on land – sewage farming, sewage application and dosing, sewage sickness-causes and remedies	
	3	9.4 Disposal on land – sewage farming, sewage application and dosing, sewage sickness-causes and remedies	
	4	9.5 Disposal by dilution – standards for disposal in different types of water bodies, self purification of stream	
10. Sewage treatment (8P)			
17TH WEEK	4	10.1 Principles of treatment, flow diagram of conventional treatment	
18TH WEEK	1	10.1 Principles of treatment, flow diagram of conventional treatment	
	2	10.2 Primary treatment – necessity, principles, essential features, functions	
	3	10.2 Primary treatment – necessity, principles, essential features, functions	
	4	10.2 Primary treatment – necessity, principles, essential features, functions	
EXTRA CLASSES		10.3 Secondary treatment – necessity, principles, essential features, functions	
		10.3 Secondary treatment – necessity, principles, essential features, functions	

EXTRA CLASSES	5. W/s plumbing in building (2P)	
	5.1 Method of connection from water mains to building supply	
	5.2 General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.	
	11. Sanitary plumbing for building (3P)	
	11.1 Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage.	
	11.2 Plumbing arrangement of single storied & multi storied building as per I.S. code practice.	
	11.3 Sanitary fixtures – features, function, and maintenance and fixing of the fixtures – water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe.	

Debashis
14/07/2025

LESSON PLAN WINTER 2025

DISCIPLINE : CIVIL	Semester : 5th sem (sec. A)	Name of the Teaching faculty: DEBASHIS BEHERA	
Subject :- ESTIMATION & COST EVALUATION - II	No. of Days/ week class allotted : 02 DAYS (04 PERIODS)	Semester from date: 12/07/2025 to 15/11/2025 No. of Weeks : 18 Topics to be covered:-	
Week	Class Day	Topics	Remarks
1. Detailed estimate of culverts and bridges(12period)			
1ST WEEK	1	1.1 Detailed estimate of a RCC slab culvert with right angled wing walls with bar bending schedule.	
	2	1.1 Detailed estimate of a RCC slab culvert with right angled wing walls with bar bending schedule.	
2ND WEEK	1	1.1 Detailed estimate of a RCC slab culvert with right angled wing walls with bar bending schedule.	
	2	1.2 RCC Hume pipe culvert with splayed angled wing wall	
3RD WEEK	1	1.2 RCC Hume pipe culvert with splayed angled wing wall	
	2	1.2 RCC Hume pipe culvert with splayed angled wing wall	
2. Estimate of irrigation structures(14)			
4TH WEEK	1	2.1 Detailed estimate of simple type of vertical fall to given specification	
	2	2.1 Detailed estimate of simple type of vertical fall to given specification	
5TH WEEK	1	2.1 Detailed estimate of simple type of vertical fall to given specification	
	2	2.1 Detailed estimate of simple type of vertical fall to given specification	
6TH WEEK	1	2.2 Detailed estimate of drainage siphon to given specification.	
	2	2.2 Detailed estimate of drainage siphon to given specification.	
8TH WEEK	1	2.2 Detailed estimate of drainage siphon to given specification.	
3. Detailed estimate of roads(12)			
8TH WEEK	2	3.1 Detail estimate of a water bound macadam road 3.2 Detailed estimate of a flexible pavement in cutting / filling	
9TH WEEK	1	3.1 Detail estimate of a water bound macadam road 3.2 Detailed estimate of a flexible pavement in cutting / filling	
	2	3.1 Detail estimate of a water bound macadam road 3.2 Detailed estimate of a flexible pavement in cutting / filling	
10TH WEEK	1	3.1 Detail estimate of a water bound macadam road 3.2 Detailed estimate of a flexible pavement in cutting / filling	
	2	3.2 Detailed estimate of septic tank and soak pit for 50 users	
11TH WEEK	1	3.2 Detailed estimate of septic tank and soak pit for 50 users	
4. Miscellaneous estimates(12)			
11TH WEEK	2	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	
13TH WEEK	1	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	
	2	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	
14TH WEEK	1	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	
	2	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	

15TH WEEK	1	4.1 Tube well, Piles and Pile cap, Isolated and combined footings.	
		5. PWD Accounts works(10)	
15TH WEEK	2	5.1 Works 5.1.1 Classification of work-original, major, petty, repair work, annual repair, special repair, quadrantal repair.	
16TH WEEK	1	5.1.2 Concept of Method of execution of works through the contractors and department, contract and agreement, work order, types of contract, piece work agreement.	
	2	5.2 Accounts of works – 5.2.1 Explanation of various terms Administrative approval, technical sanction, tender, preparation of notice inviting tender, quotations, earnest money, E-tendering, security deposit, advance payment, intermediate payment, final payment, running bill, final bill, regular and temporary establishment, cash, major & subhead of account, temporary advance (imprest money), supervision charges, suspense account, debit, credit, book transfer, voucher and related accounts	
17TH WEEK	2	5.2.2 Measurement book use & maintenance, procedure of marking entries of measurement of work and supply of materials, labour employed, standard measurement books and common irregularity 5.2.3 Muster roll : Its preparation & use for making payment of pay & wages 5.2.4 Acquittance Roll : Its preparation & use for making payment of pay & wages 5.2.5 Labour & labour report, method of labour payment, use of forms and necessity of Submission	
18TH WEEK	1	5.2.6 Classification of stores, receipt / issue statement on standard form, method of preparation of stock account, preparation and submission of returns, verification of stocks, shortage and excess 5.3 Building BYLAWS and REGULATORY Bodies, Development authorities, types and their levels, RERA etc.	
	2	REVISION	


 14/07/2025
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