

# Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

**AY 2024-25**

## Course Information

<b>Programme</b>	B. Tech. (Civil Engineering)
<b>Class, Semester</b>	Second Year B. Tech., Sem. IV
<b>Course Code</b>	7CV221
<b>Course Name</b>	Open Channel Hydraulics
<b>Desired Requisites:</b>	Fluid Mechanics and Hydraulic Machines

Teaching Scheme		Examination Scheme (Marks)			
<b>Lecture</b>	03 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
<b>Practical</b>	-				
<b>Interaction</b>	-	<b>Credits: 03</b>			

## Course Objectives

1	To instil know-how of open channel hydraulics as a prerequisite to the design of hydraulic structures.
2	To enhance problem-solving abilities by applying theoretical knowledge to analyse real-world open channel flow problems
3	To apply various hydraulic models and theories to analyse and predict flow characteristics in open channels, such as uniform flow, gradually varied flow, and rapidly varied flow.
4	To impart the basics of dimensional analysis and principles of physical modelling

## Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	<i><b>Explain</b></i> fluid flow through open channels.	Understand	II
CO2	<i><b>Analyse</b></i> the open channel flow to determine surface profiles and study energy dissipation	Analyse	III
CO3	<i><b>Apply</b></i> hydraulic models and theories of open channel flow, including uniform flow, gradually varied flow, and rapidly varied flow	Apply	III
CO4	<i><b>Apply</b></i> principles of dimensional analysis and hydraulic model testing.	Apply	III

Module	Module Contents	Hrs
I	<b>Introduction to open channel Flow:</b> Scope and importance, Types of open channel, Types of flows in open channel, Geometric elements, Velocity distribution, Energy and momentum equation applied to open channel flow, Measurement of velocity and discharge.	7
II	<b>Uniform Flow:</b> Uniform flow, Uniform flow characteristics, prismatic channel, Chezy's and Manning's Formulae, Manning's roughness coefficient, Uniform flow computations, Normal depth, Conveyance, Section factor, Hydraulic exponent, Hydraulically most efficient sections.	7
III	<b>Specific Energy and Specific Force:</b> Energy -Depth relationship in open channel flow, Specific energy - definition and diagram, Critical flow, Sub-critical and supercritical flow, Specific force -definition and diagram, Unit discharge and discharge diagram.	6

IV	<b>Gradually Varied flow:</b> Definition and types of non-uniform flow, Gradually Varied Flow (GVF) and Rapidly Varied Flow (RVF), Basic assumptions of GVF; Governing Differential Equation of GVF- Alternative forms; Classification of channel bed-slopes; Zones of GVF profiles; Various GVF profiles, their general characteristics and examples of their occurrence; Control section., Gradually varied flow computations.	8
V	<b>Rapidly varied flow:</b> Phenomenon of Hydraulic jump; Location and examples of occurrence of hydraulic jump; Assumptions in the theory of hydraulic jump; Application of momentum equation to hydraulic jump in rectangular channel; Conjugate depths and relation between conjugate depths. Various terms related to hydraulic jump; Classification of hydraulic jump; Practical uses of hydraulic jump. Energy dissipation in hydraulic jump; graphical method of determination of energy dissipation.	6
VI	<b>Dimensional Analysis and model testing:</b> Dimensional analysis, Buckingham's theorem, Dimensionless numbers and its significance. Model similitude, Model laws, Theory and applications.	6

#### Text Books

1	Modi P.M. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, 9 <sup>th</sup> Edition, 2013
2	Ven Te Chow, "Open channel Hydraulics", Tata McGraw Hill Publishing, 1 <sup>st</sup> Edition, 2000.
3	Rangaraju K.G., "Flow in Open Channels", Tata McGraw Hill, New Delhi, 1 <sup>st</sup> Edition, 1993.

#### References

1	Jain A. K., "Fluid Mechanics", Khanna Publishers, 11 <sup>th</sup> Edition, 2013.
2	Subramanya K., "Flow in Open Channels" Tata McGraw-Hill, 7 <sup>th</sup> Edition, 2009.
3	Chanson, "The Hydraulics of Open Channel Flow an Introduction", Wiley, 1 <sup>st</sup> Edition, 2004.

#### Useful Links

1	<a href="https://www.youtube.com/watch?v=vLfsrd7td14&amp;list=PL485F1F6C7083FBE1&amp;index=3">https://www.youtube.com/watch?v=vLfsrd7td14&amp;list=PL485F1F6C7083FBE1&amp;index=3</a>
2	<a href="https://www.youtube.com/watch?v=8zM_mzXbOck&amp;list=PL485F1F6C7083FBE1&amp;index=13">https://www.youtube.com/watch?v=8zM_mzXbOck&amp;list=PL485F1F6C7083FBE1&amp;index=13</a>
3	<a href="https://www.youtube.com/watch?v=ra5LTEwSumU&amp;list=PL485F1F6C7083FBE1&amp;index=23">https://www.youtube.com/watch?v=ra5LTEwSumU&amp;list=PL485F1F6C7083FBE1&amp;index=23</a>

#### CO-PO Mapping

Programme Outcomes (PO)													PSO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												2	1
CO2		3											2	1
CO3			2										2	1
CO4			2										2	1

The strength of mapping: - 1: Low, 2: Medium, 3: High

#### Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman
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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year, IV Semester			
Course Code		7CV222			
Course Name		Building Planning and Design			
Desired Requisites:		Building Materials and Construction			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	2 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	Credits: 3			
Course Objectives					
1	Impart Concepts in Building Planning and Functional Design.				
2	Articulate integration of aesthetical concepts and influence of climate in building design				
3	Establish the art of expressing buildings in terms of drawings.				
Course Outcomes (CO)					
CO	At the end of the course, the students will be able to,			Descriptor	Level
CO1	Perceive the requirements of residential/public buildings in terms of structural and functional aspects and apply the principles of planning, bye-laws/regulations during the planning process of buildings.			Understand and Apply	II & III
CO2	Practice the planning ideologies in buildings, in relevance to building services, climatology, acoustics and fire resistance.			Apply	III
CO3	Design buildings by composing functional and aesthetical aspects and illustrate building graphically in terms of engineering drawings.			Create	IV
Module	Module Contents				Hrs
I	<b>Site, Building and Building Drawings</b> Categories of buildings as per NBC, Types of Residential buildings, Site selection, Factors influencing selection of site, guidelines for planning and drawing of buildings, Positions of various building components, types of drawings and relevant scales.				6
II	<b>Principles of Building Planning</b> Conceptual understanding of Aspect, Prospect, Privacy, Furniture, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Flexibility, Elegance, Sanitation, Economy and their interrelationship in the integrated planning of buildings.				7
III	<b>Building Bye laws</b> Objectives, Minimum plot size, Building frontage, open spaces, exemption to open spaces, standard dimensions in buildings, Provision for light & ventilation, Means for access, Drainage & sanitation, FSI, Fungible FSI, Saleable areas, Transfer of development rights, RERA.				7
IV	<b>Climatology and Building design</b> Elements of climate, Climatic zones, Comfort indices, Direction and its characteristics, orientation of buildings, Design of windows, Orientation criteria in various zones, Natural and Artificial means of achieving comfort.				6
V	<b>Aesthetics in Buildings</b> Conceptual understanding of Aesthetics, Subjective and Objective Aesthetics, Aesthetic theory, Influence of Indian Architecture, Aesthetics in Engineering Design, Formal elements of functional design, Composition in Building Architecture				6

VI	<b>Acoustics and Fire resistance in buildings</b> Applications, Sound ratings, conditions of good acoustics, Sound behavior in enclosures, Common acoustical defects, Echo & reverberation, acoustical design of auditoriums. Fire safety & role of designer, causes, fire loads & occupancies, Fire resistance of common building materials, general fire safety recommendations, Fire escapes, Alarms & extinguishing equipment.	7
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#### Text Books

1	Kumarswamy and Kameshwar Rao., "Building Planning and Design," Charotar Publications, 8 <sup>th</sup> Edition, 2010
2	Civil Engineering Drawing - V. B. Sikka, S. K. Kataria and Sons, 7 <sup>th</sup> Edition, 2015

#### References

1	Planning: The Architect's Handbook "E. & OE" by Pierce S Rowland, Iliffe Books Ltd. London
2	"Time Saver Standards for Building Types", John Hancock Callender, Joseph De Chiara, McGraw-Hill, New York, 1983.
3	National Building Code of India 2016 (Vol I and II) SP- 7, Bureau of Indian Standards, New Delhi.

#### CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>		2	2			2	2						2	
<b>CO2</b>		2	2		2	2	2						2	2
<b>CO3</b>	2		2							2			2	

The strength of : 1:Low, 2:Medium, 3:High

#### Assessment

The assessment is based on examinations in the form of MSE for 30 marks and ISE of 20 marks. Also there shall be an End-Semester examination (ESE) of 50 marks. MSE shall be typically on modules 1, 2 and 3, ISE based on peer assessment on planning ideologies and ESE shall be on all modules with nearly 50% weightage on modules 1 to 3 and 50% weightage on modules 4 to 6.

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Walchand College of Engineering, Sangli					
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AY 2024-25					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year B. Tech.			
Course Code		7CV223			
Course Name		Structural Analysis			
Desired Requisites:		Engineering Mechanics, Strength of Materials			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	30	40	100
Practical	-				
Interaction	-	Credits: 3			
Course Objectives					
1	To explain the fundamental concepts of determinacy, stability of 2D structures etc.				
2	To provide the knowledge of methods of analysis of indeterminate structures.				
3	To introduce students to the matrix methods of analysis of structures.				
Course Outcomes (CO)					
CO	At the end of the course, the students will be able to,			Blooms Taxonomy	
				Descriptor	Level
CO1	Explain the concepts of determinacy, stability, principle of superposition.			Understand	2
CO2	Analyze the determinate and indeterminate structures determinate beams using suitable method.			Analyse	3
CO3	Analyse the indeterminate beams and frames using the Slope deflection and Moment distribution method.			Analyse	3
CO4	Explain and apply the basic concepts of matrix methods of structural analysis to beams.			Understand and Apply	2/3
Module	Module Contents				Hrs
I	<b>Slope and Deflection of Beams:</b> Types of structures, Equilibrium and compatibility conditions, Determinacy and Stability of structures, Static and kinematic degree of indeterminacy for beams, trusses and frames. Principle of superposition. Computation of Slope and Deflections in Determinate beams: Double Integration Method, Macaulay's method, Moment area method and Conjugate beam method.				7
II	<b>Energy principles in structural analysis:</b> Strain energy due to axial force, shear force, bending moment and torque. Castigliano's Strain Energy theorems. Computation of deflections in determinate structures such as beams, arches, trusses. Betti’s Law and Maxwell's reciprocal theorems. Method of virtual work for slope and deflection of determinates structures				7
III	<b>Analysis of Indeterminate trusses and Arches</b> Three hinged Arch, Two hinged arch, SFD and BMD for arches, Indeterminate truss analysis, Lack of fit of truss members, temperature stresses in Truss members.				7
IV	<b>Influence Line Diagrams:</b> Muller-Breslau’s principle and its application to statically determinate simple and compound beams. Influence line diagrams for support reaction, shear force and bending moment, ILD for member forces in statically determinate trusses				7
V	<b>Slope Deflection Method:</b> Slope deflection equations, Case of sinking of supports, Analysis of indeterminate beams and portal frames with and without sway.				8

VI	<b>Moment Distribution Method:</b> Carry over theorem, Distribution theorem, Relative and absolute stiffness, Distribution factors, Case of sinking of supports, Analysis of beams, frames with and without sway.													6
	<b>Introduction to matrix methods for structural analysis</b> Flexibility and stiffness coefficients, development of flexibility and stiffness coefficient matrix													
Text Books														
1	Reddy C. S., “Basic Structural Analysis”, Tata McGraw Hill, 3 <sup>rd</sup> Edition, 2011.													
2	Devdas Menon, “Structural Analysis”, Alpha Science Intl, Ltd., 2 <sup>nd</sup> Edition, 2008													
3	Pandit & Gupta, “Structural Analysis - Matrix Approach”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 4 <sup>th</sup> Edition, 2004.													
References														
1	Hibbeler R. C., “Mechanics of Materials”, Pearson Education, 10 <sup>th</sup> Edition, 2016.													
2	Weaver and Gere J. M., “Matrix Analysis of Framed Structures”, CBS Publications and Distributors, 2 <sup>nd</sup> Edition, 2004.													
3	Wang C. K., “Indeterminate Structural Analysis”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1 <sup>st</sup> Edition, 1983.													
Useful Links														
1	Mod-01 Lec-01 Review of Basic Structural Analysis I - YouTube													
2	Lecture -1 Structural Analysis - YouTube													
3	NPTEL: Civil Engineering - Structural Analysis II													
4	<a href="https://www.youtube.com/channel/UCeZaQte8MpBtv_0i1MspYUQ/">https://www.youtube.com/channel/UCeZaQte8MpBtv_0i1MspYUQ/</a>													
CO-PO Mapping														
	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2													2
CO2		3												2
CO3		3												2
CO4	3	3												2
The strength of mapping: - 1: Low, 2: Medium, 3: High														
Assessment														
<ul style="list-style-type: none"><li>○ The assessment is based on MSE, ISE, and ESE.</li><li>○ MSE shall be typically on modules 1 to 3.</li><li>○ ISE shall be taken throughout the semester in the form of a teacher’s assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.</li><li>○ ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.</li><li>○ For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</li></ul>														

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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year B. Tech., Sem. IV			
Course Code		7CV224			
Course Name		Water Resources Engineering			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	02 Hrs/week	MSE	ISE	ESE	Total
Tutorial	01 Hr/week	30	20	50	100
Practical	-				
Interaction	-	Credits: 03			
Course Objectives					
1	To impart knowledge about concepts of hydrology, precipitation and its data analysis.				
2	To impart knowledge about runoff, stream flow measurement and groundwater hydrology.				
3	To impart knowledge about fundamental concepts in irrigation.				
4	To provide necessary knowledge about canal irrigation and watershed management practices.				
Course Outcomes (CO)					
CO	Description			Blooms Taxonomy	
	At the end of the course, the students will be able to,			Descriptor	Level
CO1	Explain concepts of hydrology and methods of precipitation data analysis.			Understand	II
CO2	Describe runoff, stream flow measurement and groundwater hydrology.			Understand	II
CO3	Use Soil water plant Relationship, for different methods of Field water application with basics of irrigation engineering.			Apply	III
CO4	Demonstrate components related to canal engineering and Apply different principles of watershed development for sustainable water and soil conservation solutions			Apply	III
Module	Module Contents				Hrs
I	Introduction to hydrology Hydrological cycle and application of hydrology. Precipitation: Types of Precipitation, measurement, analysis of Precipitation data, mass rainfall curves, intensity-duration curves, and concept of depth area duration analysis, frequency analysis. Evaporation, transpiration, evapotranspiration and infiltration.				5
II	Runoff Rainfall-runoff relationships, Flow Duration Curve, Flow-mass Curve Applications Hydrograph analysis: Factors affecting runoff, Unit hydrograph theory and applications. Stream flow measurement. Floods Estimation and control, flood frequency analysis, Introduction to flood routing.				5
III	Groundwater hydraulics Occurrence, Aquifers, hydraulic conductivity, transmissivity, Aquifer yield. Well irrigation: Well hydraulics, Tube wells- Types, Methods for drilling, Well Development. Open wells - Classification, Yield, Advantages and Disadvantages of well irrigation, Ground water recharge methods and its efficiency.				5



IV	<b>Introduction to Irrigation Engineering</b> Water requirement of crops, Soil Water-Plant Relationship, Methods of Field Water Application, Effects of excess water for irrigation, cropping pattern. Irrigation: Necessity, Survey and data collection for irrigation project, Reservoir planning and sediment control Types of Irrigation Schemes, performance assessment of irrigation scheme	5
V	<b>Canal Irrigation</b> Canal and Canal structures, Canal lining, Diversion head works- Weir and Barrages, Cross-Drainage works- Aqueduct, Siphon aqueduct, Super passage, Canal siphon, Canal Maintenance, Canal revenue assessment methods, canal water losses and its preventive measures	4
VI	<b>Water Shed Development</b> Check dam, Nala bund, Bandhara Irrigation- Construction and Working, Advantages and Disadvantages, Percolation tank- Need, Selection of site, Construction, Watershed management, the importance of stakeholder involvement, Soil conservation measures, Methods and design of Rainwater harvesting systems.	4

#### Text Books

1	Garg S. K., "Water resources Engg. Vol. II, Irrigation Engineering & Hydraulic Structures", Khanna publisher, Delhi, 24 <sup>th</sup> edition, 2011.
2	Garg S. K., "Water resources Engg. Vol. I, Hydrology & water resources Engg.", Khanna publisher, Delhi, 15 <sup>th</sup> edition, 2010.
3	Deodhar M. J., "Elementary Engineering Hydrology", Pearson Education, 1 <sup>st</sup> Edition, 2009.

#### References

1	Raghunath H. M., "Hydrology: principles, analysis, design", New Ace International (P) Limited, Publishers, 4 <sup>th</sup> edition.
2	Punmia B. C., Pande Brij Basi Lal, Arun Kumar Jain, Ashok Kumar Jain, "Irrigation and Water Power Engineering", Laxmi Publications, 16 <sup>th</sup> edition, 2009.
3	Asawa G. L., "Irrigation and Water Resources Engineering", New Age International Publishers, 1 <sup>st</sup> edition, 2005.

#### Useful Links

1	<a href="https://www.youtube.com/watch?v=pxXsyE-TXg&amp;list=PLwdnzlV3ogoU-zxx2wMFG_FSDsGKvQ93g&amp;index=19">https://www.youtube.com/watch?v=pxXsyE-TXg&amp;list=PLwdnzlV3ogoU-zxx2wMFG_FSDsGKvQ93g&amp;index=19</a>
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#### CO-PO Mapping

	Programme Outcomes (PO)												PSO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	3	2				1	1						1	1
<b>CO2</b>	3	2				1	1						1	1
<b>CO3</b>	3	2				1	2						1	1
<b>CO4</b>	3	2				1	2						1	1

The strength of mapping: - 1: Low, 2: Medium, 3: High

#### Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman
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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year B.Tech., IV			
Course Code		7CV271			
Course Name		Open Channel Hydraulics Laboratory			
Desired Requisites:		Fluid Mechanics and Open Channel Hydraulics			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	-	LA1	LA2	Lab ESE	Total
Tutorial	-	30	30	40	100
Practical	2 hrs/week				
Interaction	-	Credits: 1			
Course Objectives					
1	To demonstrate behaviour of fluid flow through open channel using lab scale models				
2	To provide hands on experience to measure open channel flow by using different lab scale Arrangements.				
3	To provide hands-on practice to specific energy and energy dissipation in open channel flow.				
4	To develop the analytical skills required for interpretation and analysis.				
Course Outcomes (CO)					
CO	Description			Blooms Taxonomy	
	At the end of the course, the students will be able to,			Descriptor	Level
CO1	Interpret behaviour of fluid flow through open channel.			Apply	III
CO2	Calculate open channel flow by using different lab scale arrangements.			Apply	III
CO3	Calculate specific energy and energy dissipation in open channel flow.			Apply	III
CO4	Interpret and analyze data obtained through lab-scale experiments performed on uniform and non-uniform flows			Apply	III
List of Experiments / Lab Activities					
List of Experiments:					
1. Measurement of velocity for open channel flow by using pitot tube and current meter.					
2. Determination of Manning’s and Chezy’s constant for open channel flow by using uniform flow Formulae.					
3. Study of nappe profile over a sharp crested weir by providing with and without ventilation below the lower nappe.					
4. Measurement of open channel flow by using					
i. Rectangular Notch					
ii. Triangular Notch					
iii. Broad Crested Weir.					
iv. Round Crested Weir.					
v. Venturi flume.					
5. Develop specific energy and specific force diagrams of hydraulic jump in the open channel flow.					
6. Develop the different type of hydraulic jumps in open channel flow and estimation of loss of energy.					

Text Books	
1	Likhi, S.K., “Hydraulics: Laboratory Manual”, New Age International Publishers, 1 st Edition, 1995
2	Aswa G.L., “Experimental Fluid Mechanics”, Vol. I & II, Nem Chand & Bros., Roorkee, 1 st Edition, 1983
3	Rangaraju K.G., “Flow in Open Channels”, Tata McGraw Hill Publication Co. Ltd., New Delhi, 1 st Edition, 1993
References	
1	Modi P.M. and Seth S.M., “Hydraulics and Fluid Mechanics”, Standard Book House, 9th Edition, 2013
2	Subramanya K., “Theory and Applications of Fluid Mechanics” Tata McGraw Hill Publishing Co., Ltd., 7 th Edition 2000
3	Ven Te Chow, “Open channel Hydraulics”, Tata McGraw Hill Publishing, 1 st Edition, 2000
Useful Links	
1	<a href="https://www.youtube.com/watch?v=bY0PJgnITTI">https://www.youtube.com/watch?v=bY0PJgnITTI</a>
2	<a href="https://www.youtube.com/watch?v=XpGZmYMa3rA">https://www.youtube.com/watch?v=XpGZmYMa3rA</a>
3	<a href="https://www.youtube.com/watch?v=28MIrjhhcug">https://www.youtube.com/watch?v=28MIrjhhcug</a>

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				3									1	1
CO2				3									1	1
CO3				3									1	1
CO4				3									1	1
The strength of mapping: 1:Low, 2:Medium, 3:High														

Assessment				
There are three components of lab assessment, LA1, LA2, and Lab ESE IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B.Tech. (All branches)			
Class, Semester		Second Year B.Tech., Sem - II			
Course Code					
Course Name		Employability Skills Development (ESD)			
Desired Requisites:		--			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	4Hrs/week	ISE	MSE	ESE	Total
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	Credits: 2			
Course Objectives					
1	To improve the problem-solving skills of students				
2	To understand the approach towards problem solving				
3	Understanding the sectional cut-offs for different companies				
Course Outcomes					
CO1	Ability to improve the accuracy percentage				
CO2	Understand the current changing recruitment trends				
CO3	Understanding the differential marking scheme in papers				
CO4	Performance improvement in competitive exams like CAT, GATE				
Module	Module Contents				Hours
I	Arithmetic I  Ratio, Proportion, Mark Up & Discount, Averages, Mixtures & Alligations, Simple & Compound Interest				6

II	<b>Arithmetic II</b> Percentages, Profit & Loss, Time & Work, Time, Speed & Distance, Boat & Streams, Linear Races	8
II	<b>Numbers</b> Cyclicity, Remainders, Cyclicity of Remainders, Indices, Factors, LCM, HCF	4
III	<b>Permutation, Combination, Probability</b> Fundamental principal of counting, Arrangements, Selection, Grouping, Distribution, Independent Events, Conditional Probability, Binomial Distribution	6
IV	<b>Logical Reasoning</b> Clocks, Calendars, Games & Tournaments, Analytical Puzzles, Binary Logic, Blood relations, Directions, Coding, Decoding, Seating Arrangement (Linear, Circular & Rectangular)	6
V	<b>Verbal Ability I</b> Vocabulary - Synonyms, Antonyms, Analogies Reading Comprehension, Para Jumbles	6
VI	<b>Verbal Ability II</b> Parts of Speech, Tenses, Subject Verb Agreement	4

#### Text Books

1	Quantitative Aptitude - Abhijit Guha
2	Quantitative Aptitude - Sarvesh Agarwal

#### References

1	Quicker Maths - M. Tyra
2	Quantitative Aptitude - Chandresh Agarwal
3	Puzzles to puzzle you - Shakuntala Devi

#### Useful Links

1	<a href="http://www.campusgate.co.in">www.campusgate.co.in</a>
2	<a href="http://www.Lofoya.com">www.Lofoya.com</a>
3	<a href="http://www.brainbashers.com">www.brainbashers.com</a>

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>CO1</b>											3				
<b>CO2</b>							2								
<b>CO3</b>									3						
<b>CO4</b>										3					
The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.															

Assessment
The assessment is based on the MCQ test which will be conducted online through the platform and it will be a proctored test. No negative marking will be there in the test. Test will be of 60 minutes with 20 questions each on Quantitative Aptitude, Logical Reasoning & Verbal Ability

Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year B.Tech.			
Course Code		7IK201			
Course Name		IKS: Introduction to Ancient Indian Technology			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs./week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	Credits: 3			
Course Objectives					
1	To understand development of architecture solutions within the restraints imposed by prevalent social and cultural setup, available building materials, climate and geography of particular region.				
2	Insight of the evolution of architecture in Indian subcontinent.				
Course Outcomes (CO)					
CO	Description	Blooms Taxonomy			
		Descriptor	Level		
CO1	<i>Understand</i> evolution of architectural styles in Indian subcontinent	Understand	II		
CO2	<i>Understand</i> the development of construction technology in Indian subcontinent	Understand	II		
CO3	<i>Understand</i> impact of previous architectural styles on successive architectural styles	Understand	II		
CO4	<i>Differentiate</i> various Indian architectural styles	Understand	II		
Module	Module Contents				Hours
I	<b>Harappan and Vedic Architecture</b> Architecture and town planning of Harappan civilization such as towns of Lothal, Mohenjo Daro, Dholavira, Kalibanga etc. Understanding of Vedic architecture and settlements.				4
II	<b>Buddhist and Jain Architecture</b> Architectural examples of Mahayana and Hinayana Buddhism; Rock-cut and free standing. Study of caves, stupas, and viharas of places like Sanchi, Amravati, Karle, Ajanta etc. Medieval Jain temple architecture of western India.				4
III	<b>Hindu Architecture</b> Study of chronological development of religious and secular Hindu architecture and settlement planning; Early examples of monolithic and rock-cut architecture of South India. Development of Nagara and Dravidian temple architecture under different dynasties; such as like Cholas, Vijaynagar, Chandels, Hampi, Tanjavur, Khajuraho. Characteristic features of East, South, Central, West, and North Indian temple architecture for plan, shikhara, pillars, decoration, sculpture, etc. Theoretical base of Indian Architecture; examples from treatises like Mayamatam, Manasara, Samarangana Sutradhara etc.				6
IV	<b>Islamic Architecture</b> Introduction early Islamic architecture in India. Characteristic features of Islamic architecture; minarets, domes, gardens, geometrical and calligraphic decorations. The buildings of different dynasties of Delhi, Agra, Deccan, Gujarat etc.				4

V	<b>Colonial Architecture</b> English, French, Dutch and Portuguese Colonial architecture in Indian subcontinent. Architectural literary research work of scholars like Ram Raz, P.K. Acharya etc.	4
VI	<b>Contemporary Architecture</b> Post Independence architecture and planning; New city planning: Chandigarh, Gandhinagar etc. Modern foreign and Indian architects and their works in India.	4
<b>Text Books</b>		
1	Brown Percy, "Indian Architecture (Buddhist and Hindu period)," Read Books Ltd., 2013 Edition.	
2	Brown Percy, "Indian Architecture (Islamic Period)," Read Books Ltd., 2013 Edition.	
3	Sir Fletcher B., "History of Architecture," Architectural Press, 20 <sup>th</sup> Edition.	
<b>References</b>		
1	Grover Satish, "The Architecture of India: Buddhist and Hindu period," Vikas Publications, Illustrated Edition 2007.	
2	Grover Satish, "The Architecture of India: Islamic," Vikas Publications, Illustrated Edition 2007.	
<b>Useful Links</b>		
1	<a href="https://www.youtube.com/watch?v=m8fcpZxrkwI&amp;list=PLyqSpQzTE6M_5jEwMql2g6Twh_XilMDDiF">https://www.youtube.com/watch?v=m8fcpZxrkwI&amp;list=PLyqSpQzTE6M_5jEwMql2g6Twh_XilMDDiF</a>	
2	<a href="https://www.youtube.com/watch?v=uZVfgosyQil&amp;pp=ygUeSGlzdG9yeSBvZiBJbmRpYW4gQXJjaG10ZWNoZXJl">https://www.youtube.com/watch?v=uZVfgosyQil&amp;pp=ygUeSGlzdG9yeSBvZiBJbmRpYW4gQXJjaG10ZWNoZXJl</a>	

<b>CO-PO Mapping</b>														
	<b>Programme Outcomes (PO)</b>												<b>PSPO</b>	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	3													
<b>CO2</b>	3						2							
<b>CO3</b>	3													
<b>CO4</b>	3													
The strength of mapping: - 1: Low, 2: Medium, 3: High														

<b>Assessment</b>
<ul style="list-style-type: none"> <li>○ The assessment is based on MSE, ISE, and ESE.</li> <li>○ MSE shall be typically on modules 1 to 3.</li> <li>○ ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.</li> <li>○ ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.</li> <li>○ For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</li> </ul>

Prepared by	DAC/BoS Secretary	Head/BoS Chairman
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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
Programme		B. Tech. (Civil Engineering)			
Class, Semester		Second Year B. Tech., Sem IV			
Course Code		7VSCV272			
Course Name		Advanced Surveying Lab			
Desired Requisites:		Engineering Surveying and Engineering Surveying Laboratory			
Teaching Scheme		Examination Scheme (Marks)			
Practical	2 Hrs/ Week	LA1	LA2	Lab ESE	Total
Interaction	1 Hrs/ Week	30	30	40	100
		Credits:1			
Course Objectives					
1	To demonstrate advanced surveying techniques through field exercises.				
2	To develop and retain a basic understanding of employing special functions of advanced survey Instruments for land Surveys.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s	Bloom's Taxonomy			
		Description	Level		
CO1	Study digital level, digital theodolite, auto reduction tachometer and total station and use appropriate surveying instruments for field exercises.	Applying	III		
CO2	Demonstrate the use of advanced instruments for topographic survey.	Understand	II		
List of Experiments / Lab Activities/Topics					
List of Experiments:					
Part I: Field Exercises					
1. Levelling					
a. Study of Digital level					
b. Levelling exercises					
c. Digital data processing					
2. Digital Theodolite					
a. Study of micro optic theodolite					
b. Angle measurement and traversing					
c. Trigonometric levelling					
3. Tacheometry					
a. Determination of constants of Tacheometer					
b. Stadia tacheometry for length, gradient, and area determination					
c. Study of subtense bar					

d. Auto reduction tacheometry for length, gradient, and area determination

#### 4. Study of Total Station

- a. Exercises based on various functions
- b. Digital data processing

**Part II: Field Projects** Project Survey for setting out, alignment, contouring, earthwork computations, drawing preparation etc.

#### Textbooks

1	Arora K. R. "Surveying", Vol. 1 & 2, Standard Book House, Kota 16th edition, 2018,. 2015.
2	Basak N. N., "Surveying and Levelling", Tata Mcgraw Hill Education Pvt. Ltd, New Delhi, 2nd Edition, 2017.
3	Punmia B. C. and Jain, "Surveying", Vol. 1, 2 & 3, Laxmi Publications, New Delhi. 17th edition,

#### References

1	Duggal S. K, "Surveying", Tata Mcgraw Hill Education Pvt Ltd, 4th edition, Delhi, 2017.
2	Bannister and Raymond, "Surveying", ELBS, Longman Group Ltd., England.
3	Davis R. E., F. Foote and J. Kelly, "Surveying; Theory and Practice", McGraw Hill Book Company, New York.
4	

#### CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	1				3								3	2
<b>CO2</b>				2	3				2				3	2

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High  
Each CO of the course must map to at least one PO, and preferably to only one PO.

#### Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli						
(Government Aided Autonomous Institute)						
AY 2024-25						
Course Information						
Programme		B.Tech. (Civil Engineering)				
Class, Semester		Second Year B.Tech., IV				
Course Code		7VSCV271				
Course Name		Mini Project: Building Planning and CAD				
Desired Requisites:		Building Materials and Construction				
Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA2	Lab ESE	Total	
Tutorial	-	30	30	40	100	
Practical	2 hrs/week					
Interaction	-	Credits: 1				
Course Objectives						
1	Impart the approach to functionally plan and design a typical building by applying concepts of principal of planning and implementation of byelaws.					
2	Contribute necessary knowledge to apply the various building services viz. plumbing, electrification and furniture within the buildings.					
3	Create awareness of aesthetics and architectural ornamentation in buildings through engineering drawings					
Course Outcomes (CO)						
CO	Description				Descriptor	Level
CO1	Illustrate the requirements of residential/public building in terms of structural, functional, architectural aspects and apply the principles of planning, bye laws during planning process and designing building for chosen project.				Apply	III
CO2	Study and Integrate different building services, namely, water supply, drainage facilities and electrification services for the selected project.				Integrate	
CO3	Communicate and interact as a team to apply the drawing techniques and compose buildings using conventional and modern tools.				Create	VI
List of Experiments / Lab Activities						
List of Activities:						
1. Forming groups of 4-5 students in each batch and allocating a type of building as a project work. An overall ideation of the various planning phases will be explained to the students.						
2. For the type of building chosen, each group will visit 2-3 existing buildings and will present the development in planning for the given problem: Size & nature of plot, Soil conditions and gradient, Structural system, Requirements of the building, Drawings to be submitted, during the second week.						
3. For the selected type of building, presentation on the following: Bubble diagram, grouping of various rooms, a tentative plan of the building based on principles of planning privacy, ventilation, lighting, sizes for functional comfort, openings.						
4. The group will present scaled drawings on graph sheets about the Building Plan based on principles of planning and bye laws. Drawing sheets based on orientation of buildings, climate, Minimizing internal heat gain, Design of staircase. The group will present the revised scaled drawings on Drawing sheets based on, Plumbing for water supply and drainage, Design of the plumbing system, Electrification, Location of Switchboards, min. no. of points, safety devices.						
5. The various phases and improvements in of planning process will be a continuous activity and should lead to a final ideal plan for which detailed drawings using Auto CAD are to be submitted as under:						
I. Municipal drawings- Plan, section and front elevation, site plan, area calculations statement.						
II. Plans showing furniture and electrification details						
III. Plan showing water supply and plumbing layout, terrace slope and drainage, table of materials used.						
6. Students will have to draw all the finalized building plans using AutoCAD and attach its print along with the previous sheets as submission work						

Text Books	
1	N. Kumarswamy and A. Kameshwar Rao., “Building Planning and Design,” Chraotar Publishing House Pvy. Ltd., 8th edition, 2010.
2	A Course in Civil Engineering Drawing - V. B. Sikka, S. K. Kataria and Sons, 7 <sup>th</sup> Edition, 2015.
3	National Building Code of India 2016, SP- 7, Bureau of Indian Stds. New Delhi, 2nd Edition.
References	
1	Planning: The Architect's Handbook "E. & OE" by Pierce S Rowland, Iliffe Books Ltd. London
2	Time saver’s standards of Architectural design data, Callender, Tata Mc Graw Hill Pub.
3	Architecture and Town Planning – S.C Agarwal. Dhanpat Rai and Sons, 2013
Useful Links	
1	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>		2	3										2	
<b>CO2</b>			2				3						2	
<b>CO3</b>	2				2				3	1			2	
The strength of mapping: 1:Low, 2:Medium, 3:High														

Assessment				
There are three components of lab assessment, LA1, LA2, and Lab ESE IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Project activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Drawing Sheets, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Mini-Project PoE Performance and documentation	Lab Course faculty	Marks Submission during External PoE	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Prepared by	DAC/BoS Secretary	Head/BoS Chairman
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Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
Programme		B. Tech. (Other than Civil Engg.)			
Class, Semester		Second Year, Semester IV			
Course Code		7MDCV221			
Course Name		Building Planning and Construction			
Desired Requisites:		Nil			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial		30	20	50	100
		Credits: 3			
Course Objectives					
1	To impart Necessary knowledge and concepts in Building Planning and functional design.				
2	To impart Necessary knowledge and concepts in the utilization of building materials, their properties and their applications in construction of building.				
Course Outcomes (CO) with Bloom’s Taxonomy Level					
At the end of the course, the students will be able to,					
CO1	Grasp the principles of planning, building bye laws to apply in the planning of residential/public buildings in relation to functional planning.			Understand	II
CO2	Classify the various components and their relationships in buildings and identify the materials and building services to be adopted for different buildings.			Apply	III
Module	Module Contents				Hours
I	Site, Building and Building Drawings Categories of buildings, Types of Residential buildings, Site selection, Factors influencing selection of site, guidelines for planning and drawing of buildings, Positions of various building components, types of drawings and relevant scales.				6
II	Principles of Building Planning and Building Bye laws Principles of planning: Aspects, prospect, Privacy, Furniture, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Flexibility, Elegance, Sanitation, Economy. Bye laws: Minimum plot size, building frontage, open spaces, standard dimensions in buildings, Provision for light & ventilation, FSI, Height of Building.				7
III	Planning concepts in Buildings Requirements in different types of buildings, Integrated approach to planning in various aspects like aesthetics, landscape, interior, etc. Guidelines for planning & drawing residential and public buildings.				6
IV	Components of building Sub structure, Foundations, Bearing Capacity of Soils, Types of Shallow and Deep foundations, Conditions for their applications, masonry, Bonds, Doors, Windows, Staircases, Roofs and Floors, Flooring and their Applications				7
V	Construction Materials Types, Engineering properties and Uses of Bricks, Stones, Aggregate, Lime, Cement, Steel, Aluminium, PVC, Glass. Concrete: Ingredients, Preparation, Properties of concrete, Types of concrete and their applications				7

VI	<b>Building Services and Finishes</b> Plumbing services for water supply, plumbing services for drainage, symbols, Electrification, symbols of electrical fixtures, Types of Plastering and Pointing, Defects, Paints and Varnishes Types, Application, Methodology on various surfaces, Defects.	7
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Textbooks		
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1	R.K.Rajput S. 'Building Materials' S. Chand Publications.
2	Bindra and Arora, "Building Construction", Dhanpat Rai and Sons
3	Kumarswamy and Kameshwar Rao., "Building Planning and Design," Tata McGraw Hill Pvt. Ltd, 1995.
4	Civil Engineering Drawing - V. B. Sikka, S. K. Kataria and Sons.

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References		
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1	Punmia, Jain, Jain, "Building Construction", Laxmi Publications Ltd. 2005
2	Mantri Institute's 'The A to Z of Practical Building Construction and its Management' Mantri Institute of Devp. and Research. Pune, 1994.
3	Building drawing with Integrated approach – Shah, Kale & Patki, Tata Mc Graw Hill Pub.
4	National Building Code of India and SP- 7.

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Useful Links		
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1	<a href="https://www.youtube.com/watch?v=pYLKA4YQMyI&amp;list=PL46yD-wnVQqxZ8f-g1PZaFjJlXnJWyFE">https://www.youtube.com/watch?v=pYLKA4YQMyI&amp;list=PL46yD-wnVQqxZ8f-g1PZaFjJlXnJWyFE</a>
2	<a href="https://www.youtube.com/watch?v=4kLXfCGB_RI&amp;list=PL46yD-wnVQqxZ8f-g1PZaFjJlXnJWyFE&amp;index=5">https://www.youtube.com/watch?v=4kLXfCGB_RI&amp;list=PL46yD-wnVQqxZ8f-g1PZaFjJlXnJWyFE&amp;index=5</a>
3	<a href="https://www.youtube.com/watch?v=2tb1heySCx0">https://www.youtube.com/watch?v=2tb1heySCx0</a>
4	<a href="https://www.youtube.com/watch?v=Y0Y8zuETHOQ">https://www.youtube.com/watch?v=Y0Y8zuETHOQ</a>

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	2													
<b>CO2</b>	2												1	

Assessment
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The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)