

<b>B. Tech. Structural Engineering</b>			
<b>Course code: Course Title</b>	<b>Course Structure</b>		<b>Pre-Requisite</b>
<b>CE411: Forensic Engineering</b>	<b>L</b>	<b>T</b>	<b>P</b>
	<b>3</b>	<b>1</b>	<b>0</b>
<b>Course Objective:</b> The proposed course is expected to enhance and strengthen the knowledge on role and responsibility of a forensic engineer, different cause of deterioration in structures and its prevention, the uses of different NDT equipment's, awareness regarding the structural health monitoring, knowledge in Different modern techniques of retrofitting will be discussed.			
<b>S. No</b>	<b>Course Outcomes (CO)</b>		
<b>CO1</b>	Enable to conduct thorough investigations, adhere to global standards, and contribute to the advancement of safe and resilient structural systems.		
<b>CO2</b>	A comprehensive understanding of the causes and consequences of structural failures, the importance of accountability, and the strategies to prevent and address such failures in engineering practice.		
<b>CO3</b>	Equipped with the knowledge and skills to diagnose and assess structural distress effectively, utilizing a range of inspection and testing techniques.		
<b>CO4</b>	Equipped with the knowledge and skills to design, assess, and strengthen buildings to ensure their durability, safety, and resilience in the face of environmental and natural hazards.		
<b>CO5</b>	Equipped with the knowledge and skills to effectively repair, retrofit, and maintain structural components using modern techniques and materials.		
<b>S. No</b>	<b>Contents</b>		<b>Contact Hours</b>
<b>UNIT 1</b>	An Introduction to Forensic Structural, Standards and Codes & Practices in FSE (Understanding various codes, standards, applicable practices and ethics involved in various parts of the globe on Forensic Structural Engineering), The Process of Forensic Investigation: Basic steps in a forensic investigation, Presentation of "Life cycle" and "Pathology Base" Approaches as investigation techniques.		8
<b>UNIT 2</b>	Engineering Failure of Structures: Review of the construction theory – performance problems – responsibility and accountability – case studies (Failure of Bridges, Fire Damaged Structures, Pre-cast segmental construction, Geotechnical Failures, Tunnel Collapse) – learning from failures – causes of distress in structural members – design and material deficiencies – over-loading.		8
<b>UNIT 3</b>	Diagnosis and Assessment of Distress: Visual inspection – non-destructive tests, crack detection techniques – case studies – single and multistorey buildings – Fibre optic method for prediction of structural weakness.		8

<b>UNIT 4</b>	Environmental Problems and Natural Hazards: Effect of corrosive, chemical and marine environment – pollution and carbonation problems – durability of RCC structures – damage due to earthquakes and strengthening of buildings – provisions of BIS 1893 and 4326.	8
<b>UNIT 5</b>	Methods of repair in concrete, steel and timber structural components.- Modern Techniques of Retrofitting: Structural first aid after a disaster – guniting, jacketing – use of chemicals in repair – application of polymers – ferrocement and fiber concretes as rehabilitation materials – strengthening by pre-stressing – case studies.- Maintenance – inspection and planning, budgeting, and management.	10
	<b>Total</b>	<b>42</b>

#### **REFERENCES**

S. No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Design and Construction Failures, Dovkaminetzky, Galgotia Publication, New Delhi, 2009.	2009
2	Concrete – Building Pathology, Macdonald S, John Wiley and Sons, 2002.	2002
3	Forensic Structural Engineering Handbook, Robert. T Ratay, Mc Graw Hill, 2009.	2009
4	Understanding Building Failures, James Douglas and Bill Ransom, Taylor and Francis Group, 2007.	2007
5	Concrete Repair and Maintenance, Peter H Emmons, Galgotia Publications, 2010.	2010