JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Comprehensive Examination - 2025

Ph.D (CSE//ECE/CE/BT/BI/PMS/MATHS/HSS)

COURSE CODE (CREDITS):17P1WCE131 MAX. MARKS: 100

COURSE NAME: Comprehensive Test

COURSE INSTRUCTORS: Ashish Kumar MAX. TIME: 3 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

(d) Use if IS codes is allowed

Sec A

Q.No	Question	Marks
1	Describe the mechanism of local scour around a bridge pier. How do the flow patterns such as downflow, horseshoe vortex, and wake vortex contribute to sediment removal?	12
2	Explain how inclination of bridge pier affects the scour process and flow characteristics with the help of previous studies/research.	12
3	Discuss the empirical and analytical approaches available for estimating scour depth around bridge piers. Compare at least two widely used equations.	10

Sec B

Q.No	Question	Marks
4	How can you carry out IPR inclusions to maintain effective IPR management for a smart water-conservation and distribution system designed for urban households? Design a methodology from the idea stage to the product development stage by including IPR considerations at every phase for its value addition. What is the role of an ethical model in ensuring fair assessment, responsible innovation, and sustainable release of this IP-protected water management product into the market? Which form of intellectual property would help in generating maximum revenue for this product, and why?	10
5	Explain the different types of scour that occur around bridge piers and discuss the factors influencing the scour depth.	13
6	Explain the threshold motion criteria of sediment in open channel how tractive shear stress of flow and critical shear stress is determined?	10

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Sec C

Q.No	Question	Marks
7	Distinguish between the following: (a) Body waves and surface waves (b) Rayleigh waves and love waves (c) Lithosphere and asthenosphere	7
8	A vibrating system consisting of a mass of 50 kg and a spring of stiffness 4×40^4 N/m is viscously damped. The ratio of two consecutive amplitudes is 20:18. Determine the natural frequency of the undamped system. Also determine the damping ratio and damped natural frequency.	6
9	Describe the various earthquake-resistant features that can be introduced in a masonry building to make it earthquake resistant.	10
10	Explain the following terms with respect to Indian code: (a) Inertial force (b) Response spectrum factor (c) Provisions for torsion (d) Storey drift (e) Soft storey	10