JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-II Semester (~~CSE/IT/ECE~~/CE/~~BT/BI~~)

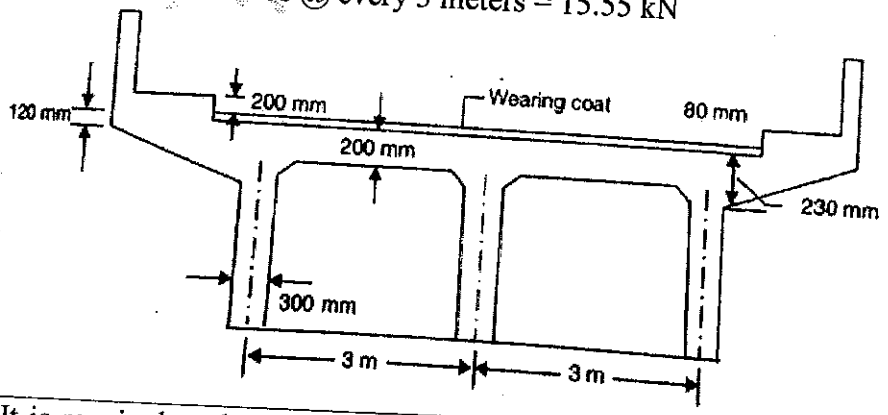
COURSE CODE (CREDITS): ~~18B11CE612~~(3) 11M1WCE133 MAX. MARKS: 35

COURSE NAME: ~~DESIGN OF STEEL STRUCTURES~~ BRIDGE Engg.

COURSE INSTRUCTORS: Dr. KAUSHAL KUMAR MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) IS800:2007 and Steel table or IS 808 is allowed.

Q.No	Question	CO	Marks
Q1	***Answer/describe the following.*** (a) Write the major components of a concrete bridge. (b) Why is design discharge important for bridge design? (c) What is the condition for the most economical span of a bridge? (d) What type of loads are taken into account for impact effect on road bridges? Write the expression for impact factor for IRC Class A loading. (e) Why are cross-beams provided in T-beam bridge? (f) What are the factors affecting selection of type of prestressing, i.e., pre-tensioning or post-tensioning? (g) What is the main advantage of using framed piers over non- framed piers? (h) What is the function of bearings in bridges? (i) What is expansion bearing? Give its various types. (j) List the four classes of quality assurances in maintenance of bridges.	1-5	*10*
Q2	For the longitudinal girder of T-beam bridge in Figure-1, calculate the design moment for IRC Class AA loading. Given, Dead load on per girder (slab +cantilever portion only) = 25 kN/m Dead load due to Ribs @ every 3 meters = 15.55 kN 	3	10
Q3	It is required to design an elastomeric pad bearing for a two-lane RC T-beam bridge of 15 m clear span with the following data: • Maximum dead load reaction per bearing = 280 kN, • Maximum live load reaction per bearing = 520 kN. • Vertical reaction induced by longitudinal forces per bearing = 12 kN • Longitudinal force per bearing = 33 kN	5	10

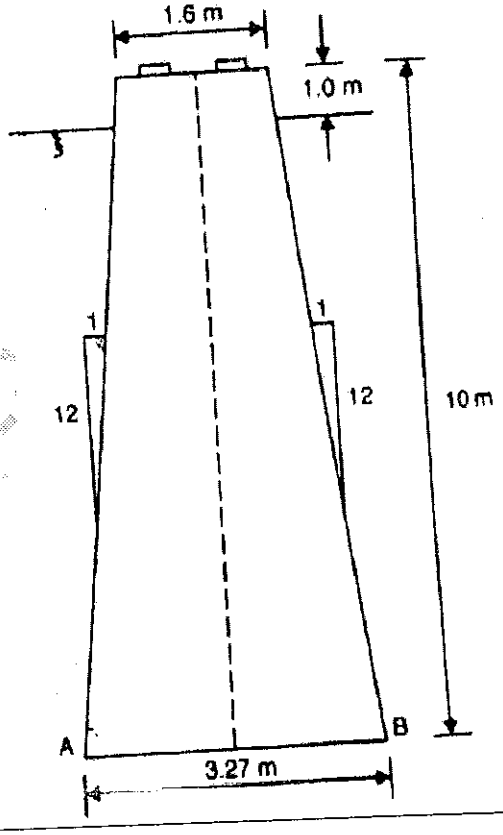
- Concrete grade for T-beam and bed-block over pier = M20.
- Rotation at bearing of superstructure due to D.L. and L.L. = 0.0025 radian.

  Use 250 × 500 mm pads with 39 mm thickness. Take $A_1/A_2 > 2$.

Q4

Verify the adequacy of the dimensions of the pier shown in Figure. The following details are available.

• Top width of the pier: 1.6 m • Height of the pier upto the springing level: 10 m • C/C of bearings on either side: 1 m • Side batter: 1 in 12 • High flood level: 1 m below the bearing level • Span of the bridge: 16 m • Loading on span: IRC Class AA • Road: Two-lane road with 1 m wide footpath on either side	• Superstructure: Consists of three longitudinal girders of 1.4 m depth with a deck slab 200 mm depth • Rib width of girders: 300 mm • Material of pier: M15 concrete • Maximum mean velocity of water current: 3 m/s • Pier length: 9.5 m • Dead load from superstructure: 1480 kN • Unit weight of concrete in pier: 24 kN/m^3.



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