

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION JUNE- 2016

M.Tech 4th Semester

COURSE CODE: 11M1WCE133

MAX. MARKS: 35

COURSE NAME: Bridge Engineering

COURSE CREDITS: 03

MAX. TIME: 2 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. This paper has 3 printed sides.

Suitably assume any missing data. Piguard's Curves is allowed.

1. A T-beam bridge (*Figure I*) has to be provided across a channel having the following data. [2+4+4 = 10 Marks]

<ul style="list-style-type: none"> • Flood discharge: 30 m³/s • Bed width: 12 m • Slide slope: 1:1 • Bed level: 50 m • HFL: 51.25 m • Maximum allowable afflux: 1.5 m 	<ul style="list-style-type: none"> • Road: National Highway (2 lanes) • Footpath: 1 m wide on either side • Loading: IRC Class AA • Materials: M40 concrete, Fe 415 steel • No. of longitudinal girders: 3
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- Design the Linear Waterway.
- For the Cantilever Slab Portion (*Figure II*) - Calculate design moment and design shear force only.
- For the Longitudinal Girder -- for IRC Class AA -- Calculate design moment only.

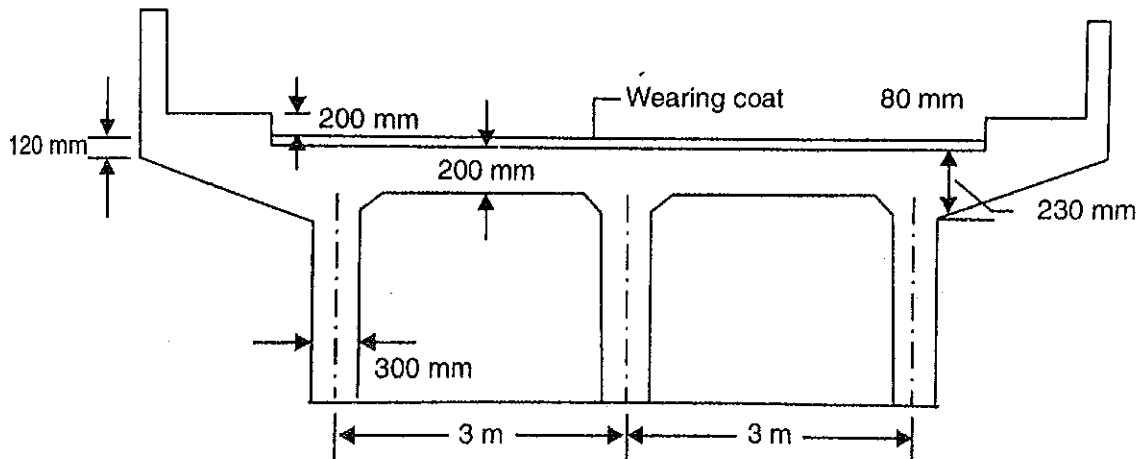


Figure I

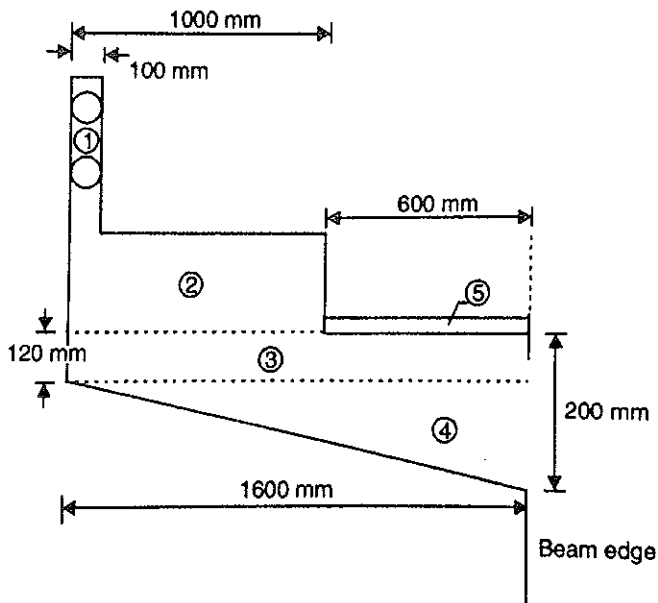


Figure II

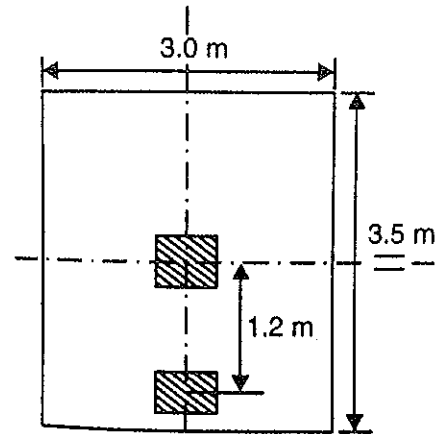


Figure III

2. Obtain the values of short span and long span bending moments in case of an interior panel of a T-beam bridge (*Figure III*) having the following details: [5 Marks]

- Dimensions of the panel: 3 m x 3.5 m
- Loading: IRC Class A
- Loading pattern: One wheel (37 kN) at centre of the panel.

3. Design an elastomeric unreinforced neoprene pad bearing to suit the following data:

[5 Marks]

- | | |
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| <ul style="list-style-type: none"> • Vertical load (sustained): 200 kN • Vertical Load (dynamic): 40 kN • Horizontal force: 60 kN | <ul style="list-style-type: none"> • Modulus of rigidity of elastomer: 1 N/mm² • Friction coefficient: 0.3 |
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4. A plate girder railway bridge of clear span 7m. The bridge is meant for a single track on broad gauge main line. The following data is provided for bridge design: [5 Marks]

Dead Load of sleeper = 10kN/m

Dead Load of rails and fitting = 15kN/m

Design the steel bridge for Dead load and live load. Calculate the economical depth.

(Assume CDA value suitably if required)

5. Verify the adequacy of the dimensions for the pier shown in the (Figure IV). The following details are available: [10 Marks]

<ul style="list-style-type: none"> • Top width of the pier: 1.6 m • Height of the pier up to the springing level: 10 m • c/c of the bearings on either side: 1.0 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. 	<ul style="list-style-type: none"> • Superstructure: Consists of three longitudinal girders of 1.4 m depth with a deck slab of 200 mm depth. • Rib width of girders = 300 mm • Material of the pier: Concrete M15 • Maximum mean velocity of water current: 3m/s • Pier length: 9.5m • Dead load from superstructure: 1480 kN • Take unit weight of concrete in pier: 24kN/m^3
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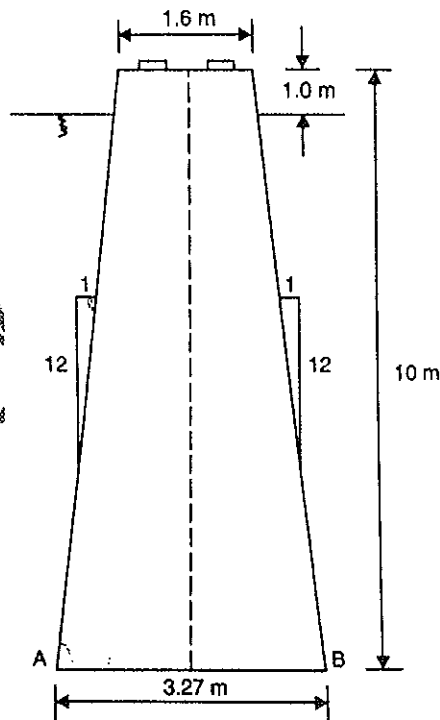


Figure IV

