

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

## TEST -3 EXAMINATIONS- 2026

## M.Tech-II Semester (Structural Engineering)

COURSE CODE (CREDITS): 25M11CE232 (3)

MAX MARKS: 35

COURSE NAME: BRIDGE ENGINEERING

COURSE INSTRUCTOR: Dr. KAUSHAL KUMAR

MAX. TIME: 2 Hours

*Note: (a) Questions 1 to 5 are compulsory. For Questions 6 and 7, answer any one.**(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems**(c) Use of calculator is allowed. Design Codes and Pigeaud's Curve is allowed.*

| Q.No | Question                                                                                                                                                                                                                                                                                                                                      | Marks         |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Q1   | Short Answer Questions<br>a) Write the salient features about selection of site for a bridge.<br>b) Explain about scour depth.<br>c) Explain the preliminary drawings briefly.<br>d) write about economical span.<br>e) Explain classification of bridges with neat sketches.<br>f) Explain Carboun's Method of load distribution on Girders. | 1.0 *6<br>= 6 |
| Q2   | Design a slab culvert over an effective span of 7.0 m for the following data:<br>Clear carriage way width 7.0 m, Width of kerb — 650 mm on either side,<br>Load — IRC Class A, Thickness of wearing coat 80 mm,<br>Use M25 and Fe415 grades.                                                                                                  | 6             |
| Q3   | (a). Explain pigeauds theory?<br>(b). Explain the design of simply supported T — beam bridge with a neat sketch and mention any two characteristics and why it is most preferable.                                                                                                                                                            | 2 + 4         |
| Q4   | What are the various types of piers? What are the various forces which are considered in the design of piers?                                                                                                                                                                                                                                 | 4             |
| Q5   | Verify the stability of the abutment for the following data:<br>Top width — 1.5m<br>Height — 4.0 m<br>Back batter 1 in 6<br>Front face of abutment is vertical                                                                                                                                                                                | 6             |

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|    | <p>Type of material — Stone masonry</p> <p>Unit weight of soil — 18 KN/m<sup>3</sup></p> <p>Angle of repose - 30°</p> <p>Superstructure — T- beam bridge of span 15.0 m</p> <p>Loading — IRC class A-A (Tracked)</p> <p><i>Assume suitable dimensions for the components of the superstructure.</i></p>                                                                                                                                                                                                                                                                                                                      |   |
| Q6 | <p>Design an elastomeric bearing for following data:</p> <p>Dead load reaction per bearing = 230 KN</p> <p>Live load reaction per bearing = 480 KN</p> <p>Longitudinal force = 38 KN</p> <p>Effective span of bridge = 16.0 m</p> <p>Total estimated shear strain due to creep, shrinkage and temperature = <math>6 \times 10^{-4}</math></p> <p>Estimated rotation at bearing of the girder due to dead and live loads = 0.002</p> <p>Concrete for beam and bed block = M20</p>                                                                                                                                             | 7 |
| Q7 | <p>A well foundation is to be designed for an abutment of 10 X 5 m base dimensions. The well is founded on sandy soil, the following data is</p> <p>Height of bearing above maximum scour level = 28 m</p> <p>Permissible horizontal displacement of the bearing level = 50 mm</p> <p>Height of abutment = 6.0 m</p> <p>Total vertical load including weight of abutment and well = 20,000 KN</p> <p>Total lateral load at the scour level = 400 KN</p> <p>Submerged unit weight of soil = 10 KN/m<sup>3</sup></p> <p>Design the well and verifying the stresses in the steining. Also sketch the reinforcement details.</p> | 7 |