GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

M.Tech Structural Engineering
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem II - G1PC204T - Design of Concrete Bridges

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	What are the different types of bridges commonly used?	K1(2)
2)	Demonstrate the concept of box culverts, and in what scenarios are they commonly used?	K2(4)
3)	Describe the concept of effective width in the design of reinforced concrete bridge decks under concentrated loads.	K2(6)
4)	A highway bridge is planned to be constructed in a seismic zone with high traffic density. The bridge needs to accommodate a Class 70R vehicle according to IRC codes. Illustrate the design live load on the bridge if the weight of the Class 70R vehicle is 350 kN.	K3(9)
5)	Illustrate the spacing and size of reinforcement bars required for a T-beam bridge girder subjected to a given load combination.	K3(9)
6)	Design cantilever portion only for the following data for a balanced cantilever bridge Centre to centre of bearings = 32 m Clear width of roadway = 6.8 m Load may be considered as two lanes of class A. Using M25 grade of concrete and Fe415 grade of steel,	K5(10)
7)	Analyze an abutment for a bridge with a skewed alignment, considering the resultant forces and moments acting on the structure.	K4(12)
8)	Conclude the required area of tensile reinforcement (As) at the midspan of the T-beam bridge deck with following data: Span length (L): 12 meters Width of the deck slab (b): 2.5 meters Overall depth of the T-beam (D): 0.6 metersConcrete grade (f_ck): 30 MPa Reinforcement grade (fy): 415 MPa Live load: 20 kN/m (uniformly distributed)	K5(15)
9)	Design the maximum bending moment (M) at the midspan of the T-beam bridge deck. Width of the deck slab (b): 3.0 meters Depth of the T-beam (d): 0.7 meters Concrete grade (f_ck): 30 MPa Reinforcement grade (fy): 415 MPa Live load (P): 80 kN (uniformly distributed)	K5(15)
10)	An engineer is designing a pier for a bridge with a span of 50 meters and a maximum design live load of 800 kN. The soil at the site has a bearing capacity of 150 kN/m². Synthesize the most suitable type of pier (solid, open, or caisson) and its dimensions to ensure stability and safety. The engineer also needs to consider the potential for lateral loads due to wind and seismic forces.	K6(18)