Sub Code:CE931

Paper Id: 910039 Roll No:

M.TECH
(SEM-III) THEORY EXAMINATION 2019-20
ADVANCED BRIDGE ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.
All relative IS Code allowed

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a.	Classify the choice of type bridges.
b.	Define deck.
c.	Write the method of fraction of the load carried by the longitudinal girders.
d.	What do you mean by impact effect?
e.	Write the condition of impact effect for IRC class AA loadings.
f.	Why is bridge inspection important?
g.	What factors to be considered while selecting suitable site for a bridge ?
h.	What do you understand by bearings of bridges?
i.	Define composite bridges.
j.	What do you understand by suspension bridge?

SECTION B

2. Attempt any *three* of the following: 10x3=30

a.	With neat sketches classify continuous span bridge and cantilever bridge.
b.	The slab panel of an R.C.C. T beam and slab deck is 2.5 m wide between main beam and 4 m long between cross girders. Design the reinforced concrete slab for IRC class A loading. Adopt M20 grade of concrete and Fe 415 grade HYSD bars.
c.	Write the functions of Abutment with neat sketch of Abutment.
d.	Design a mild steel rocker bearing transmitting the super structure reactive load of 1200 kN. Allowable pressure on bearing block 3.8 MPa , Permissible bearing dtress=$0.66f_y$, Permissible bearing stress =100 MPa, Permissible shear stress =100 MPa
e.	Discuss about modern methods of construction of concrete bridge.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	Explain the Courbon's theory for proportioning the live loads on the cross girders in detail.
b.	Discuss the calculations involved in this theory. On which conditions this theory is applicable?

4. Attempt any *one* part of the following: 10x1=10

a.	Design a slab culvert for the following data: Effective span = 4.5m, Clear width of carriageway = 7.5m, Thickness of wearing coat = 70mm,provide footpath of 750mm wide on either side, Loading IRC Class A, Use M20 concrete and Fe 415 steel. Design and detail the slab bridge.
b.	Write a short note on Hendry – Jeagar method.

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5. Attempt any *one* part of the following: 10x1=10

a.	Write the forces acting on bearings. Also explain bearing for Girders Bridges in steel bridge.
b.	Design a box culvert having inside dimensions 4m × 4m for the following data. Dead load = 12 KN/m^2 Live load = 46 KN/m^2 Density of soil = 18 KN/m^3 Use M20 concrete and Fe 415 steel.

6. Attempt any *one* part of the following: 10x1=10

a.	Draw and explain the general arrangements of composite bridge.
b.	Design an elastomeric bearing at the sliding end of a bridge for the following data: Maximum Normal load 1000 KN, Minimum– Normal Load 200 KN, Transverse Lateral Load 40 KN, Longitudinal Load 60 KN, Total Longitudinal Translation 15 mm, Rotation at support 0.0025 radians. Shear modulus of elastomeric bearing = 1.2 N/mm^2. Allowable compressive stress for concrete = 7 N/mm^2. Allowable compressive stress for elastomer = 10 N/mm^2.

7. Attempt any *one* part of the following: 10x1=10

a.	A semi-circular end pier supports the deck forming a major highway. The various forces acting on the pier are listed below. Dead loads from each span = 2000 KN Reaction due to live load on one span = 1000 KN Braking forces = 140 KN Wind pressure on pier = 2.4 KN/m^2 Material of pier = 1:3:6 cement concrete Top width = 2 m, bottom width = 3 m, total height of pier = 10m, HFL is 9m above the base of base, length of pier = 9m.
b.	Explain various types of bridge foundations.

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