Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: **BRIDGE ENGINEERING** [CIE 429]

REVISED CREDIT SYSTEM
(25/11/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.
- IRC 6, 18, 21 and charts permitted.

1A.	List out any five important factors that has to be considered while the site for construction of bridge.	**5**
1B.	The approximate costs of one superstructure & one pier for multispan bridge are given below. Estimate the economic span. **Span (m)** 10 15 20 **Superstructure** 28,000 66,000 1,43,000 **Substructure** 42,500 45,0001 46,000	**5**
2.	A Tee beam bridge has to be provided across a channel having the following data. Design the cantilever slab portion Span of the bridge: 12.0m Road: National Highway (2 lanes) = 7.5m Footpath: 1m Wide on either Side & 200mm above the wearing coat Loading: IRC class A Materials: M25 concrete. Fe 415 steel No. of longitudinal girders: 3 numbers positioned at 3m centre to centre spacing Rib width of each beam: 300mm Cantilever slab thickness: 240mm at its fixed end and 100mm at its free end.	**10**
3.	Design a deck slab bridge for the following data (check for shear not necessary) Clear distance between abutments =6 m Width of Foot path = 1 m on either side Width of bearing = 400 mm Wearing coat =80 mm average Loading = IRC Class AA (Tracked) Width of road (two lane) =7.5 m Materials = M 25 grade concrete and Fe 415 Steel	**10**

4A.	Describe different types of pier with the help of neat sketch	**5**
4B.	What are the special features of Prestressed concrete bridge in comparison with normal reinforced concrete or steel bridge?	**5**
5A.	With the help of neat sketch, Write short note on (i) Steel Rocker bearing (ii) R.C fixed (rocker) bearing	**4**
5B.	Design an elastomeric unreinforced neoprene pad bearing to suit the following data: Vertical load (sustained) : 220kN Vertical load (Dynamic) :40kN Horizontal force (sustained): 20kN Horizontal force (dynamic) : 20kN Modulus of rigidity of elastomer 'G': $1N/mm^2$ Friction coefficient: 0.3 Adopt, dimension of elastomeric bearing: a = 250mm & b = 500mm	**6**
6A.	Explain various components of well foundation.	**3**
6B.	A prestressing concrete slab deck of a bridge is 450mm thick with an effective span of 8.5m. The service load is computed as 350kNm/m at centre of span section. If the compressive stress permissible at transfer is $16N/mm^2$ and tensile stresses are not permitted, check the adequacy of section & estimate the minimum prestressing force & also calculate the corresponding eccentricity at mid span section. Assume loss ratio=0.8	**7**