Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: BRIDGE ENGINEERING [CIE 429]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	What is the importance of geotechnical and hydrological investigations in the design of a major bridge? List the data to be obtained from such explorations.	**6**
1B.	A stream with hard banks has a width of 80 m. Its bed is alluvial and discharge through the section is 500 m^3/s. Calculate the maximum scour depth under the bridge having a single span of 50 m. (f = 1.1)	**4**
2.	Design a suitable pipe culvert to suit the following data Discharge through pipe culvert = 3 m^3/s Velocity of flow through pipe = 2 m/s Width of road (two lane) = 7.5 m Side slope of embankment = 1.5 : 1 Bed level of stream = 100.00 Top of road level = 102.68 Loading: Two IRC class A vehicle Unit weight of soil = 18 kN/m^3 C_s = 0.032, C_e = 1.8 Design a suitable pipe for the culvert and check the structural adequacy for the pipe designed.	**10**
3.	Design a deck slab bridge for the following data (check for shear not necessary) Clear distance between abutments = 7 m Width of road (two lane) = 7.5 m Foot path = 1 m on either side Width of bearing = 400 mm Wearing coat = 80 mm average Loading = IRC Class AA (Tracked) Materials = M 25 concrete and Fe 415 Steel.	**10**
4A.	Obtain the value of short span and long span design bending moments in case of interior panel of T beam bridge having following details Dimension of the panel = 2.5m X 5m Thickness of the slab = 200 mm Thickness of the wearing coat = 80 mm Loading IRC Class AA (Tracked).	**6**
4B.	Mention the different types of abutment and explain any two with a neat sketch.	**4**

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5A.	A symmetrical I section girder has been used for a continuous post tensioned pre-stressed concrete bridge deck of span 40 m. The section properties, permissible stresses and design bending moment at the critical support section are as follows. $A = 880 \times 10^3$ mm^2 Mg = 9400 kNm I= 0.45 m^4 M_q = 1100 kNm $Y_1 = Y_b$ = 1 m η = 0.85 $Z_t = Z_b$ = 0.45m^3 f_{ct} = 16 N/mm^2 h = 2 m $f_{tt} = f_{tw}$ = 0 Check the adequacy of the section and design the prestressing force and eccentricity to resist the design bending moment.	**6**
5B.	Define the two types of bearing and explain elastomeric bearing.	**4**
6A.	Write a short note on caissons and its type.	**6**
6B.	Discuss with the sketch the special features of (i) Hammer head pier and (ii) Framed pier.	**4**