Mid-West University
Examinations Management Office
End Semester Examinations 2081
Master level/ M. Sc. (Structural Engineering)/ 1st Semester   Full Marks: 60
Time: 3 hours   Pass Marks: 30
Subject: Bridge Analysis and Design (STR514/MSTR504)

- *Attempt all the questions.*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*
- *Allowable code IS456:2000 IS13920 and IS1343:2012, IRC 5 to 83 Volume, Design code for Bearing, IS800:2007, IRC loading Code and others bridge design related codes.*

1. As a bridge designer, what aspects would you consider for designing a bridge? Also show your expertise on how you will select suitable type of bridge for construction at a particular location. Also Write the types of load that Should be Considered for Bridge Design. Write detail about the live load on the bridge. **[3+3+4]**

2. A Two lane slab bridge of a clear span of 9 m, write the Planning and Preliminary design and also Calculate the Maximum Longitudinal bending Moment and Shear Force due to Class AA wheel load with following data: **[10]**
   Carriage way = 7.5m
   Width of kerb = 0.8m
   Thickness of wearing coat = 75mm
   Depth of slab = 700mm
   Assume relevant data if Necessary.

3. Design a longitudinal girder T-beam in bending only for IRC class AA tracked load for a bridge of effective span 14m with following details: **[10]**
   Carriage way: Double Lane
   Kerb on either side: 500mm x 250mm
   Thickness of wearing course: 100mm
   Thickness of Slab: 250mm
   Assume 3No. @ main girder @ 2.5m c/c spacing and 5 No. cross girder @ 3.5m c/c spacing
   Use M25 grade of concrete and Fe 500 HYSD bars.

4. Design a post tensioned concrete I-section beam to carry a live load of 27KN/m over a simply supported span of 22m with M50 grade of concrete and freyssinate cable of 12/5 of fy=2250 Mpa. **[10]**
   Calculate pre-stressing force and steel required.
   Check for ultimate flexural strength.
   Also check for shear criteria for section uncracked in flexure only.

5. Write the data to be acquired from the Traffic, Hydrological, Geological and Geotechnical and Topographic study for bridge analysis and design. Also explain retrofitting strengthening Techniques in Bridge Engineering and its requirement. **[3+4]**

6. Explain Retrofit philosophy and steps, Research and development issues of recent advances in Retrofitting techniques in bridge Engineering. **[6]**

7. Write steps for design pier for stability purpose in following conditions. **[7]**
   a) Two span of deck laid condition.
   b) One span deck laid condition.

The End