1st Semester Regular / Back Examination – 2016-17
BRIDGE ENGINEERING
BRANCH(S): STRUCTURAL ENGINEERING
Time: 3 Hours
Max Marks: 70
Q.CODE:Y878
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: (2 x 10)
a) What are the preliminary data to be collected for construction of a major bridge?
b) State the condition for design of the most economical span length of a bridge.
c) What is the minimum width of carriageway prescribed for a two lane bridge ?
d) How the design bending moment is for distribution reinforcement for a reinforced concrete slab culvert?
e) What is the total load carrying capacity of a Class AA tracked vehicle?
f) What do you mean by *dispersion length* of a wheel?
g) The bridge deck of a slab culvert is designed as what type of slab?
h) Draw the plan of an abutment with return wing wall.
i) Why prestressing concept is preferred for long span bridge girders?
j) State two advantages of prestressed concrete bridges.

Q2   a) Describe the various loading conditions considered for design of bridge superstructures in addition to the live loads.   (5)
     b) Sketch the loading arrangements for IRC class AA tracked loading system showing all the dimensions in both the directions.   (5)

Q3   a) A two way slab panel of an RCC Tee beam and slab deck of size 3 m by 4.5 m is supported on all four sides with continuity over all the supports. The distance between main beams is 3 m and between cross girders is 4.5 m. Using IRC class A loading, find the design bending moments for all directions. Consider M20 grade of concrete and Fe 415 steel.   (10)

Q4   A reinforced concrete box culvert has a clear ventway of 4 m by 4 m . The superimposed D.L. on culvert is 10 kN/sq m, L.L. on culvert is 15 kN/sq m. Angle of repose is 30 degree. Find the intensity of water pressure. Design the top slab for the following data.   (10)
     Design moment at midspan of bottom slab = 80 kNm and tension = 7 kN. At support section, design moment = -60 kNm, axial compression = 40 kN. Use M20 concrete and Fe 415 steel. Sketch the reinforcement details.

Q5   A RCC box culvert is to be designed with inside dimensions of 3 m height and 3.5   (10)
      m width . The box culvert carries dead load of 8 kN/m^2 and a live load of 25
      kN/m^2. The density of the earth is 17 kN/m^3. Angle of repose of the soil is 30^0.
      Calculate the design bending moment for the top slab , for the following loading
      case. Dead load and live loads acting from outside, while no water pressure acts
      from inside.

Q6 a) Explain the function of a cross-girder in a RCC bridge deck system.   (5)

    b) State the IRC empirical formulae for calculation of Impact factor   (5)
        for IRC Class A loading for RCC bridge and Steel bridge separately.

Q7   Calculate the maximum design bending moment for a deck slab with clear span of   (10)
      6m, width of footpath of 1m in each side and wearing coat of 75 mm considering
      IRC Class AA tracked loading. Assume any other data, if required.

Q8   Write short notes on any **TWO**   (5 x 2)
    a) Pigeauds Method of analysis.
    b) Importance of IRC loading
    c) Advantages of T beam bridge
    d) slabs spanning in two directions'