



A. Proff. Dr. Magdy Salama & Dr. Galal Elsamak

- Notes: - Assume any missing data reasonably.  
 - Only steel tables and formula sheets are allowed.  
 - Unless otherwise noted, steel used is St. 44

1- The cross section of a double track railway deck bridge is shown in **Figure (1)**. It has an open timber floor 4 stringers carrying the two tracks. The main girders are simply supported welded plate girders with a total span 30.0 ms which divided into 6 equal panels 5.0 ms each (spacing between cross girders 5.0 ms). The following data can be assumed:

- Dead load of each track = 600 kg/m.
- Total weight of the steel bridge = 4 t/m.
- Live load and wind load are according to Egyptian code requirements.

**It is required to: (55 Marks) (ILOS a.4, a.13,b.15, a.6, c.10)**

- a- Draw a general layout of the bridge (plan, elevation and side view) showing the arrangement of all bracing systems. Use a suitable scale.
- b- Design a suitable rolled section for the continues stringers.
- c- Give a full design for the intermediate cross girder.
- d- Give a full design for the main girders ( $h_w = 300$  cm) by the flange area method (Suggest a reasonable arrangement for the horizontal and vertical stiffeners of the main girder). Check the stresses, fatigue and deflection. Determine the size of weld connecting web plate and flange plates.
- e- Design a suitable section for the end bearing vertical stiffener.
- f- Design a bolted field splice for the plate girder at section 6.0 ms from the support. Use bolts M24 grade 10.9. Draw to scale 1:10 the elevation and plan showing the details of the field splice.

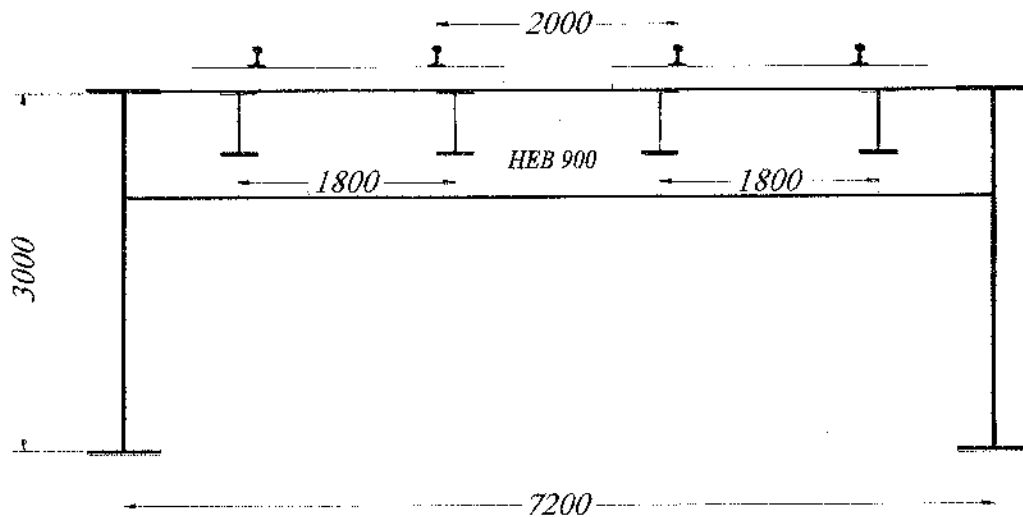


Figure 1

2- Figure (2) shows a cross section of a roadway bridge has a span of 40.0 ms and is divided to 8 equal panels 5.0 ms each.

It is required to: (25 Marks) (ILOS a.13, b.15)

- a- Find the straining actions acting on an intermediate stringer.
- a- Calculate the maximum bending moment in an intermediate cross girder due to live loads only.

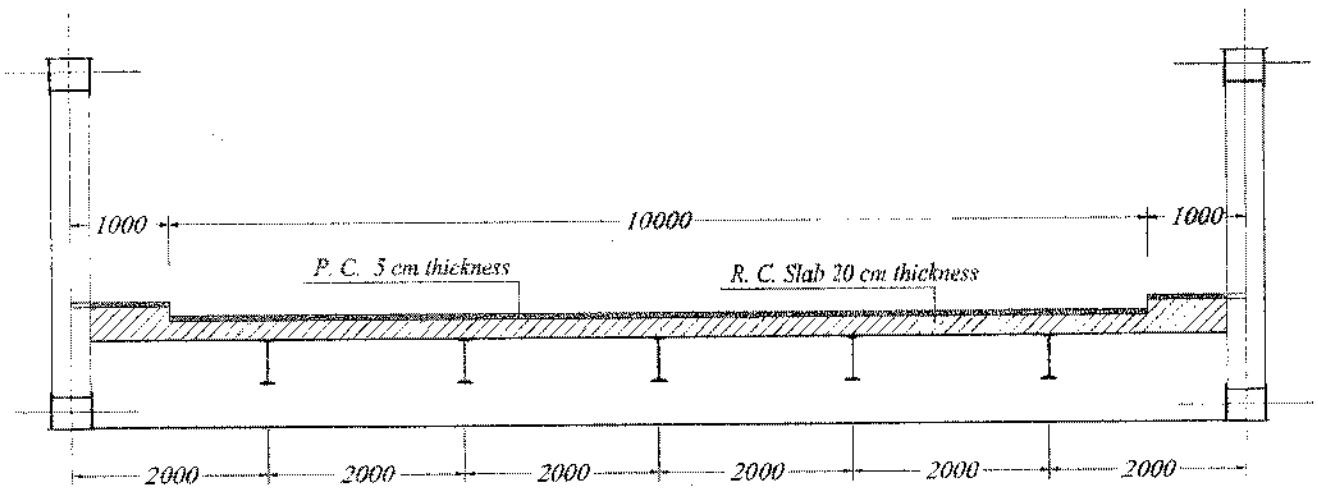


Figure 2

Best Wishes: Dr. Hany Jemel & Dr. Galal Elsamak