(3) BE – Sem-VIII – CBSGS – Civil – BDE 13/12/17

Q. P. Code : 26135

(3 Hours) **[Total Marks : 80**

N. B. : 1. Q.No.1 is **compulsory**. Attempt **any three** out of remaining **five** questions.
2. Assume suitable **data** if **required** and mention it **dearly**.
3. Answer and **design** must be in accordance to IRC and bridge rules.
4. Support **answers** and **solutions** with suitable **sketches**.

Q1. A] What are different types of bridges "on the basis of nature of traffic, loading, number of lanes, position of carriage way and load transfer mechanism?" **[05]**

B] Write a note on Box Girder Bridge. **[05]**

C] Write a note on IRC-Class A loading. **[05]**

D] What difficulties can arrives in sinking of well foundation and how those can be fixed? **[05]**

Q2. A] Determine design shear force and bending moment on longitudinal girder of a 32m span bridge due to imposed load only. Clear carriage width is 7.8m which is supported by 5 longitudinal girders and cross girders are provided at 4m c/c. Consider IRC Class AA tracked vehicle. **[10]**

B] What are different types of foundations used in bridges? How different factors influence type of foundation? **[05]**

C] Write note on: Dirt wall, wing walls and return wall **[05]**

Q3. A simply supported prestressed concrete deck slab bridge has to carry a Live Load moment and Dead Load moment of 160kN-m and 200kN-m respectively per meter width of carriage way at center of 12 m span. Take thickness of wearing coat 100mm and thickness of deck slab as 450mm. Check suitability of section in Limit State of Serviceability cracking. If modulus of section is insufficient suggest suitable changes. Determine prestressing force and eccentricity at mid span. Use M60 concrete and steel with f_p 1600MPa. Determine spacing of cables if PF in each cable is 1000kN. Consider that concrete has achieved its characteristic compressive strength at transfer. Take η=0.8 **[20]**

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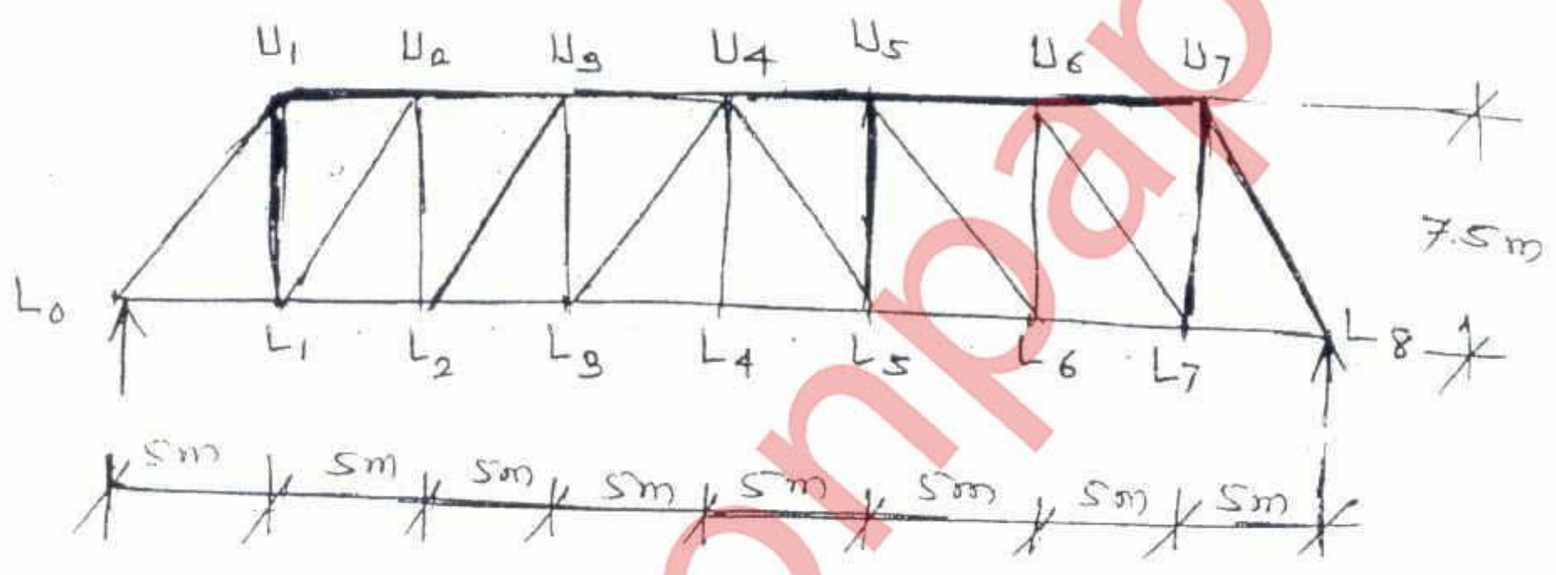
Q4. A] Locate position of IRC-Class B train of vehicles along and across a prestressed concrete girder bridge of span 40m to produce maximum Bending Moment in a critical girder. Carriage width is 7.5m. Longitudinal girders are provided at 2.5 m c/c and cross girders are provided at 5 m c/c. [15]

B] Explain incremental and cantilever method of launching of concrete girders. In what circumstances they are preferred? [05]

Q5. A girder bridge has c/c distance between longitudinal girders 3m and between cross girders 5m. Design an interior slab panel for flexure to carry IRC Class-AA tracked vehicle. Consider 100mm thick wearing coat on 300mm thick RCC slab. **Refer Piguard's curves.** [20]

Q6. Determine design forces due to dead and live load in diagonal member L_2U_3 of a lattice girder bridge of 40m span as shown below.



Consider self weight of different elements per meter span per track as under: Stringers; 3000N/m, Stock rails; 500 N/m, Guard rails; 400 N/m, Cross beams and bracings; 3000 N/m, Sleepers; 2000 N/m, Fasteners; 3000 N/m

Take self weight of each girder (top chord, bottom chord, diagonals and vertical members); 20000 N/m

Bridge is to be designed to carry a single track Broad Gauge Loading-1987 as under;

Span (m)	11	12	13	14	15	16	17	18	19	20
Loading*	1282	1377	1475	1558	1631	1695	1751	1820	1886	1964
Span (m)	21	22	23	24	25	26	27	28	29	30
Loading*	2039	2123	2203	2280	2356	2431	2506	2580	2654	2727

Loading*= Total live load (kN) per track

Take CDA= [0.15+8/ (6+L)] [20]

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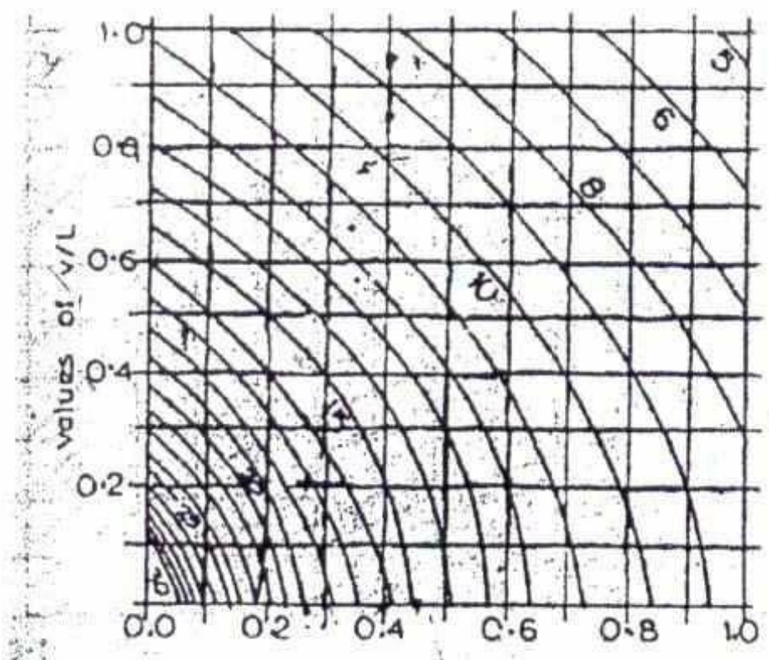
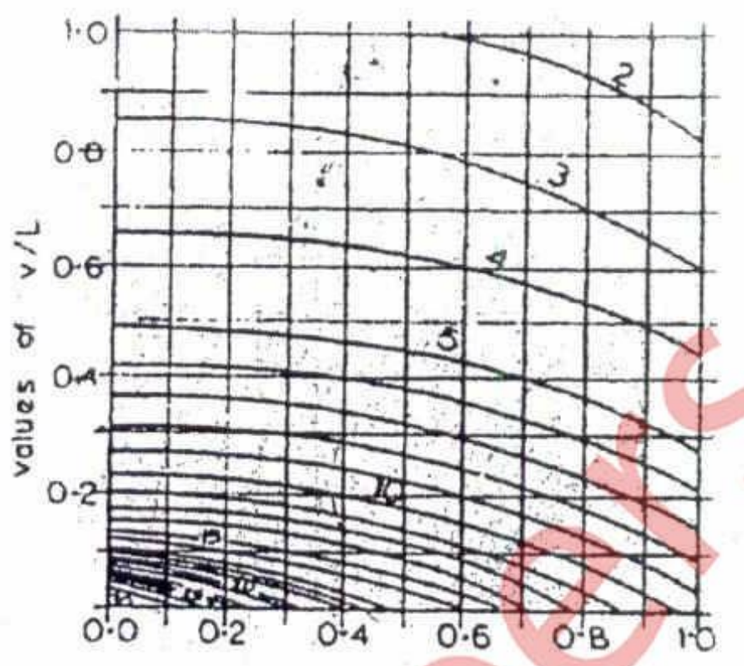
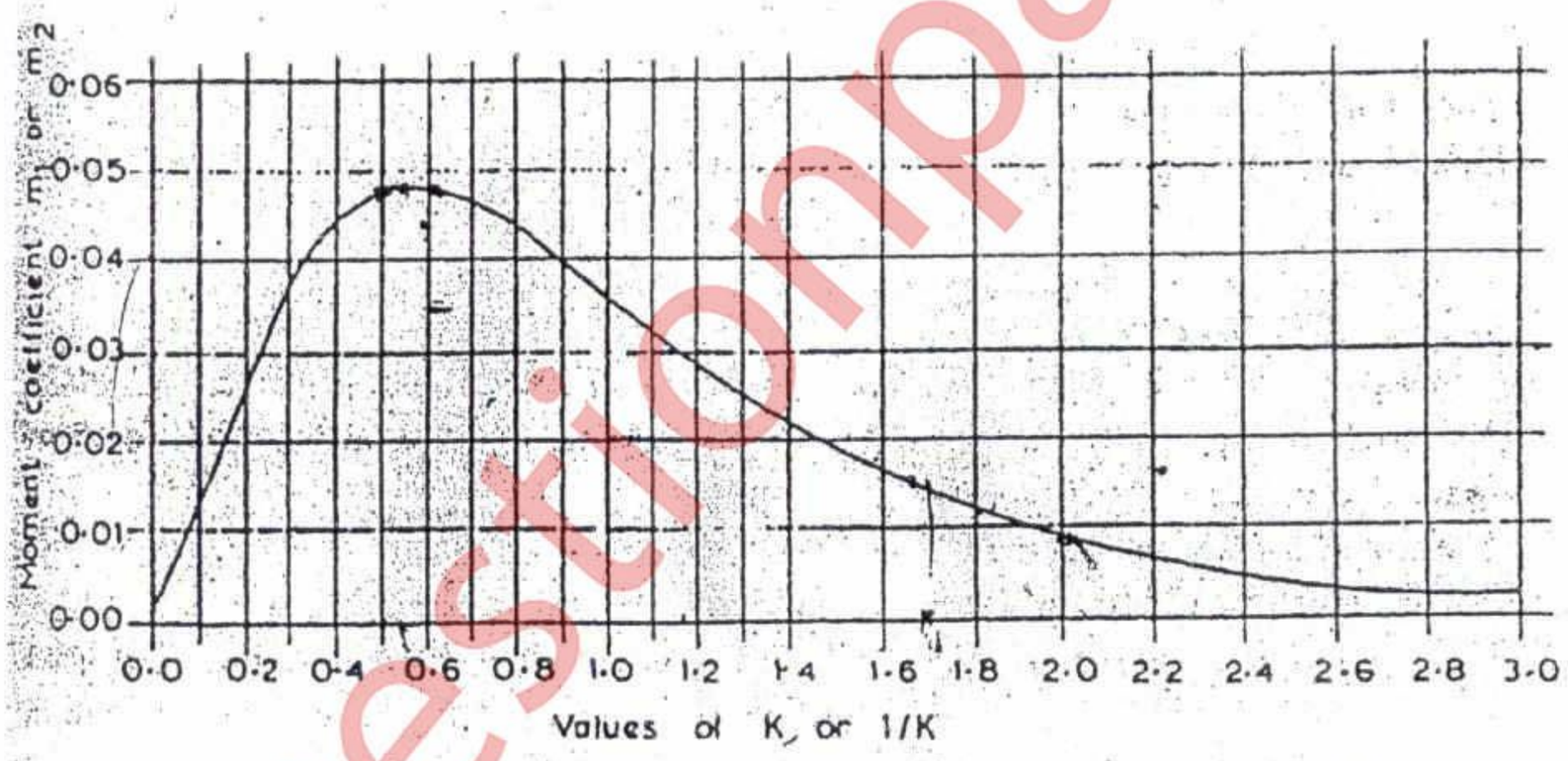
Piguard's curves



a. Coefficient $m_1 \times 100$



b. Coefficient $m_2 \times 100$



Moment Coefficients for Slabs Completely Loaded with Uniformly Distributed Load, Coefficient is m_1 for K and m_2 for $1/K$