80/5/17

BE (civil)(sem VIII) (CBSGS) (BDE)

Q. P. Code: 18226

Maximum Marks: 80   Duration:3 Hours

Note: Q1 is compulsory. Attempt any three out of remaining five questions.
2. Assume suitable data if required and mention it clearly.
3. Answer and design must be in accordance to IRC and bridge rules.
4. Support answers and solutions with suitable sketches.

Q1. A] How the spacing between lattice girders and depth is decided for a broad gauge railway track? Sketch the minimum clearance diagram for the same.   [05]
B] What are different types of bearings used to restrained and permit various movements in bridges? Explain in brief the functioning of one fixed type bearing.   [05]
C] What is permissible limit for tilt and shift of a well foundation? Explain different methods to rectify tilt.   [05]
D] What are different methods of launching of girders? Explain incremental launching method.   [05]

Q2. A] What are the provisions to account dynamic effect of imposed load while designing Roadway and Railway Bridges? Explain in detail how different factors influence on it?   [10]
B] What do you mean by "Economic Span Length" of bridge? How it can be determined? Develop equation for the same. What are its limitations?   [05]
C] What is a balanced cantilever bridge? What are its advantages?   [05]

Q3. Determine design bending moment on longitudinal girder of a 24m span bridge, due to IRC Class AA tracked vehicle and self weight of bridge superstructure. Clear carriage width is 7.8m, footpath on either side is 1.5m and cross girders are provided at 4m c/c. Thickness of deck slab is 300mm, thickness of wearing coat is 100mm. Area of cross girder is 70% of area of longitudinal girder.
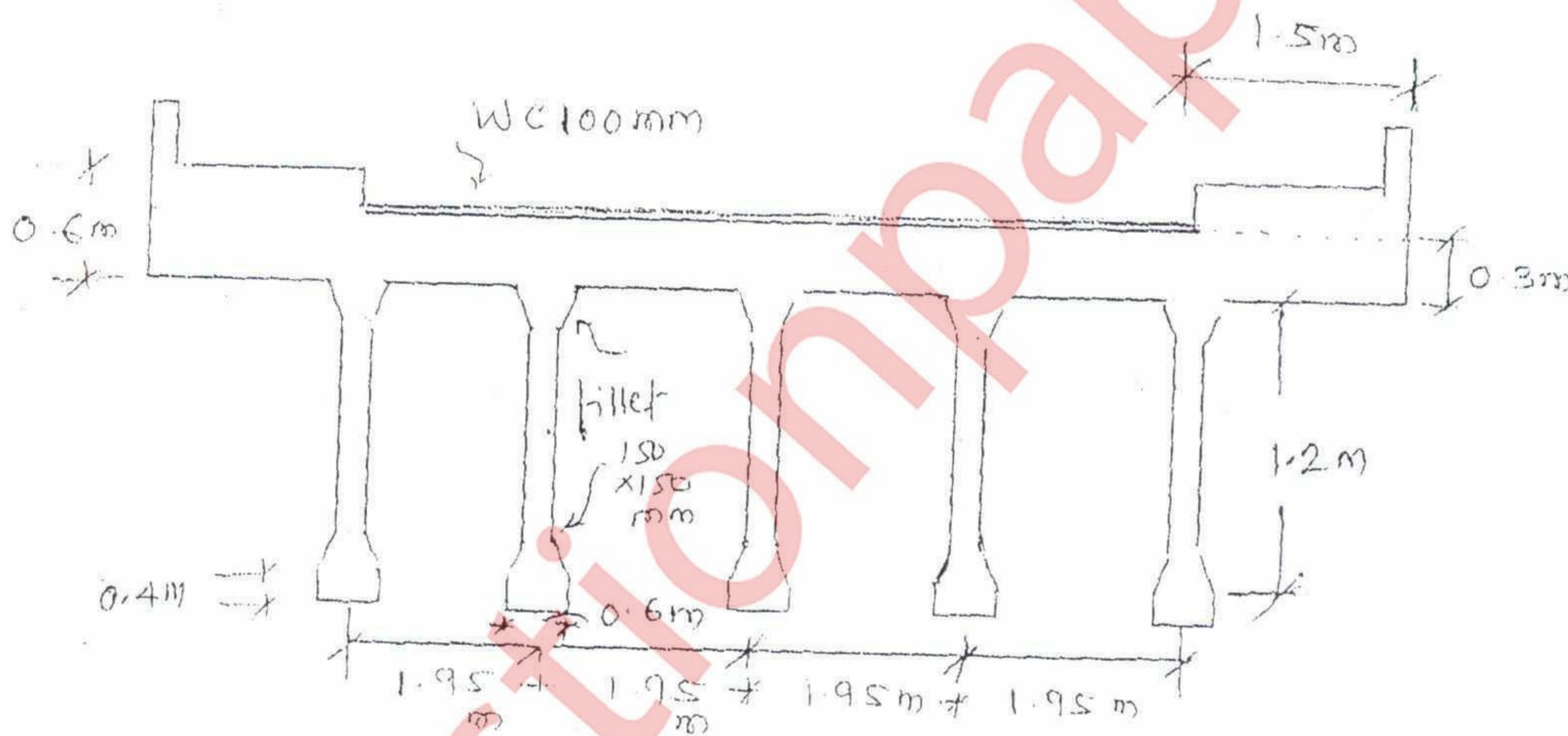
                                                      [20]

Q4. A simply supported post-tensioned prestressed concrete deck slab bridge of 12m effective span is designed to carry IRC-Class AA loading. Verify its safety in limit state of serviceability of cracking and flexure for the following specifications.
Carriage width: 7.5m;   Footpath on either side: 1.5m; Depth of kerb above wearing coat is 300mm
Wearing coat: 100mm; Depth of deck slab: 500mm;
Initial strength of concrete is 50MPa and characteristic strength is 60MPa
Characteristic strength f_p of prestressing steel is 1600MPa
Cables are tensioned to 1000kN initially and spaced 300mm c/c at 100mm from soffit of the slab at mid span. Prestressing force in each cable accounting all losses is 800kN.
Consider Moderate environmental conditions.
Value of α change linearly from 2.12 to 2.36 for b/l_0 from 0.7 to 0.9 respectively.   [20]   Turn Over

Q5. Design an interior slab panel in RCC for flexure which has to carry IRC Class A wheeled vehicle. Cross girders are provided at 4m c/c and longitudinal girders are provided at 2m c/c. Thickness of deck slab is 250mm. Thickness of wearing coat is 100mm. Use M30 and Fe415.   [20]

Refer Peguard's curves

a.Coefficient $m_1 \times 100$

b.Coefficient $m_2 \times 100$
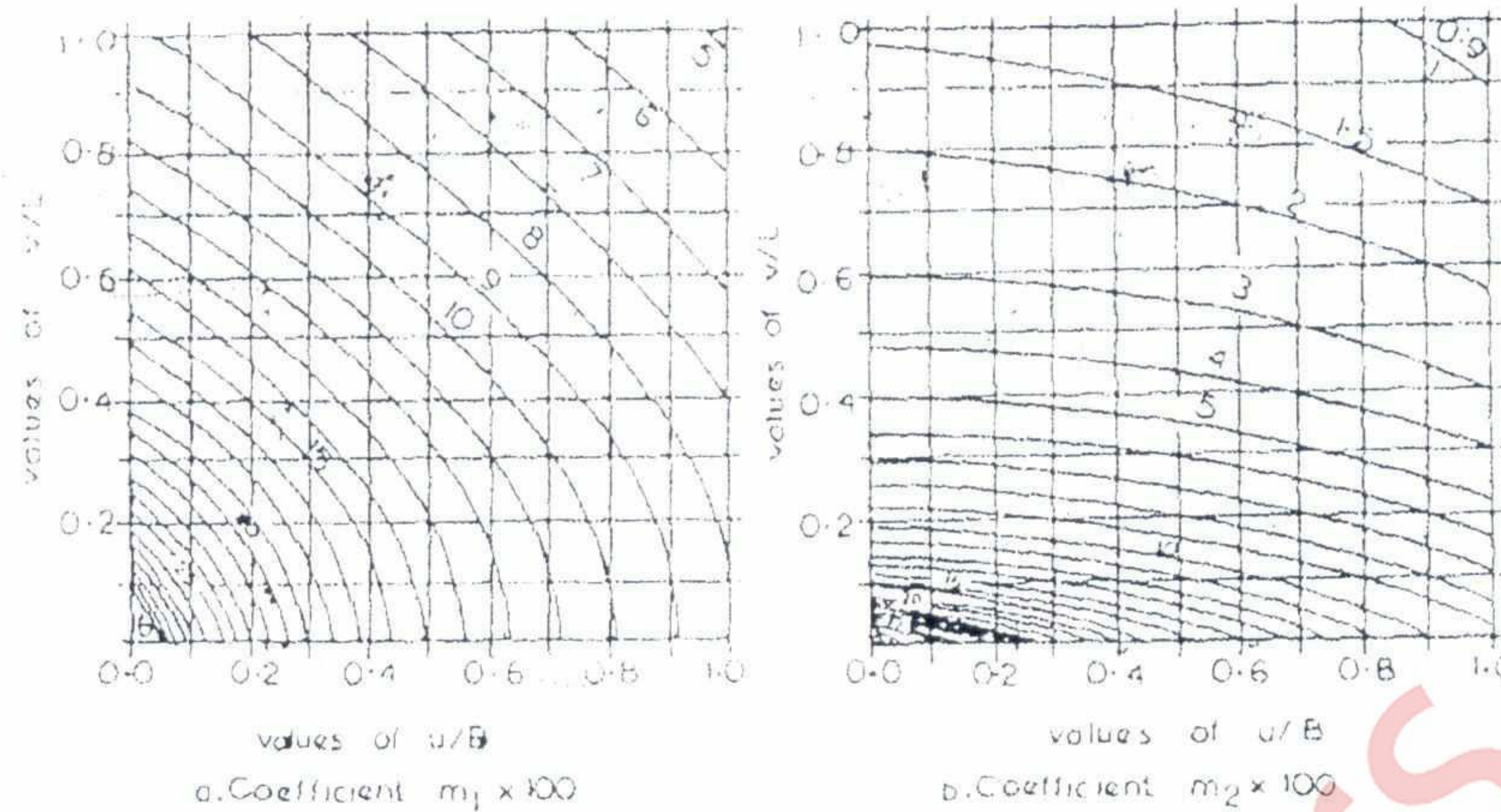
Moment coefficients m_1 and m_2 for $K = 0.5$
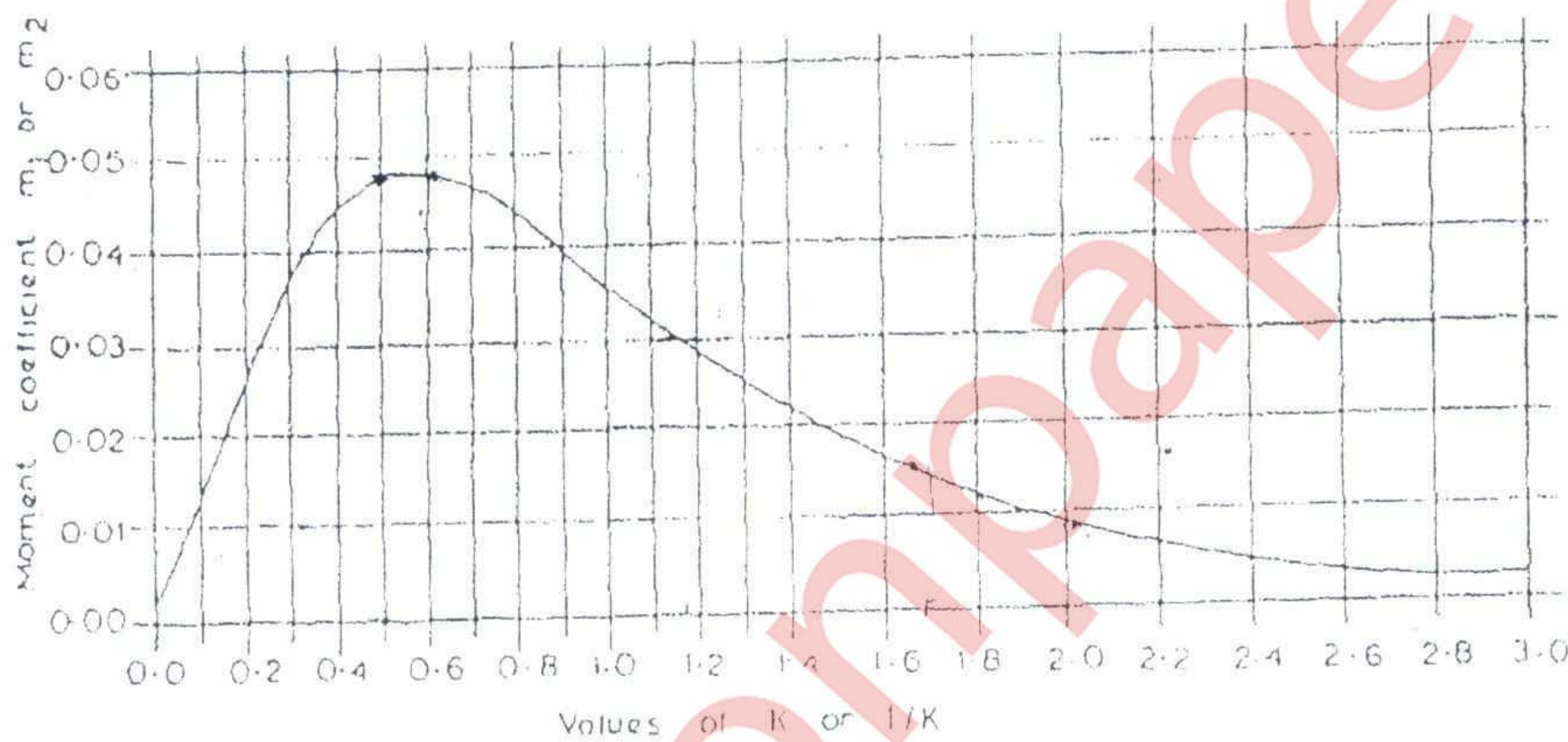
Moment Coefficients for Slabs Completely Loaded with Uniformly Distributed Load. Coefficient is m_1 for K and m_2 for $1/K$

Q6. Determine design forces in central top chord and bottom chord to dead and live load of a lattice girder bridge of 50m span as shown below.

7 m

10 panels of 5 m each
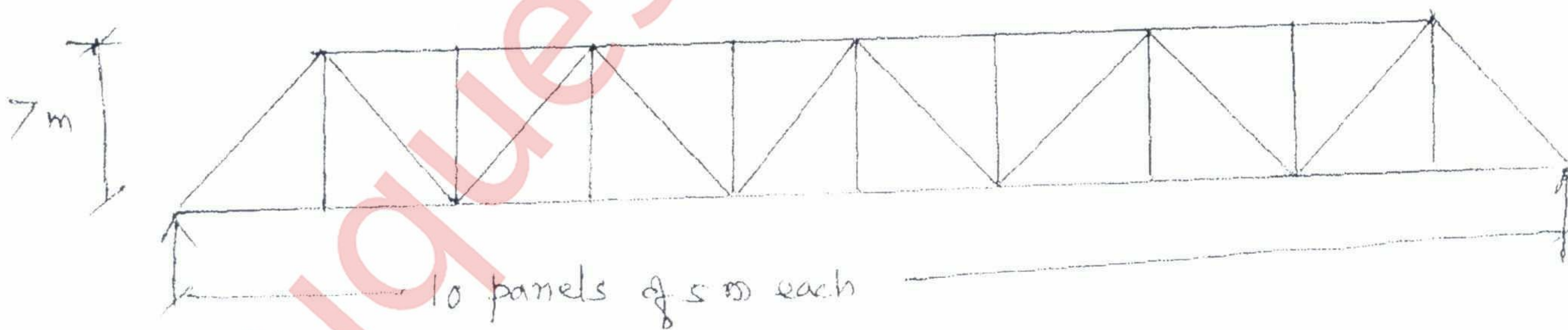
Consider self weight of different elements (per track) as under:
Stringers; 3000N/m, Stock rails; 500 N/m, Guard rails; 400 N/m, Cross beams and bracings; 3000 N/m, Sleepers; 2000 N/m, Fasteners; 3000 N/m
Take self weight of each girder (top chord, bottom chord, diagonals and vertical members); 20000 N/m
Bridge is to be designed to carry a single track Broad Gauge Loading-1987 as under;
Consider total live load per track as 4253kN for 50m span. Consider appropriate CDA.   [20]

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