CBCS SCHEME - Make-Up Exam

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BCV613A

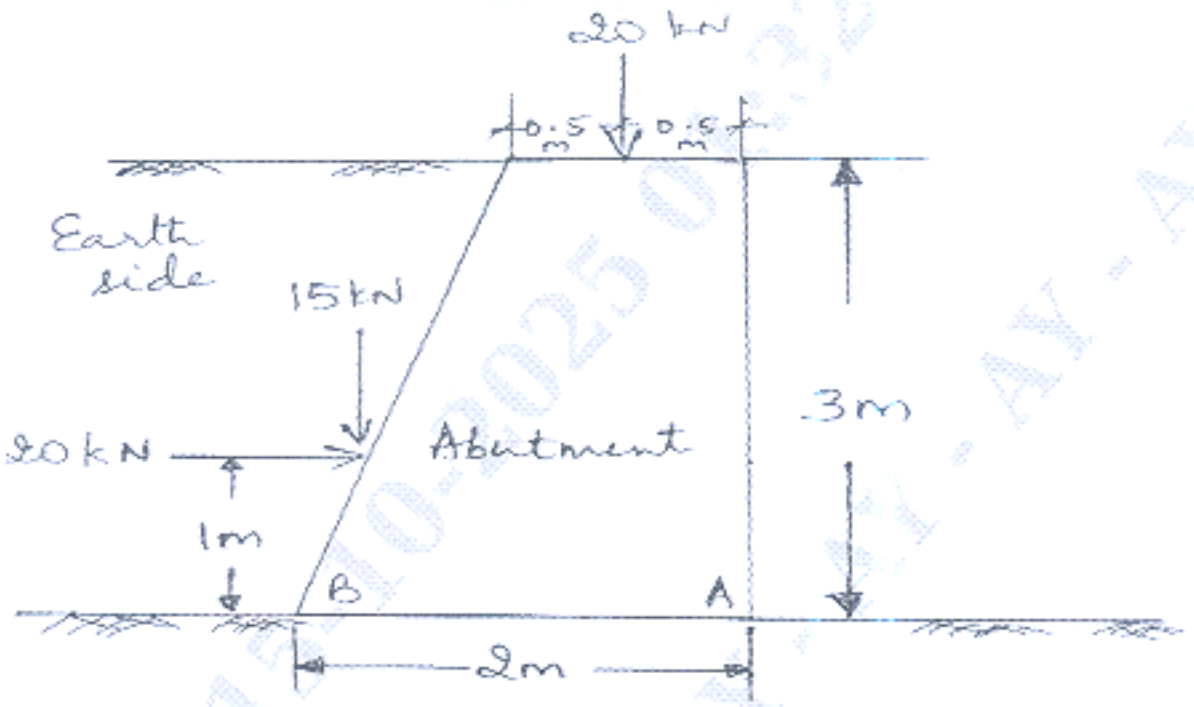
Sixth Semester B.E/B.Tech. Degree Examination, June/July 2025
Design of Bridges

Time: 3 hrs. Max. Marks:100

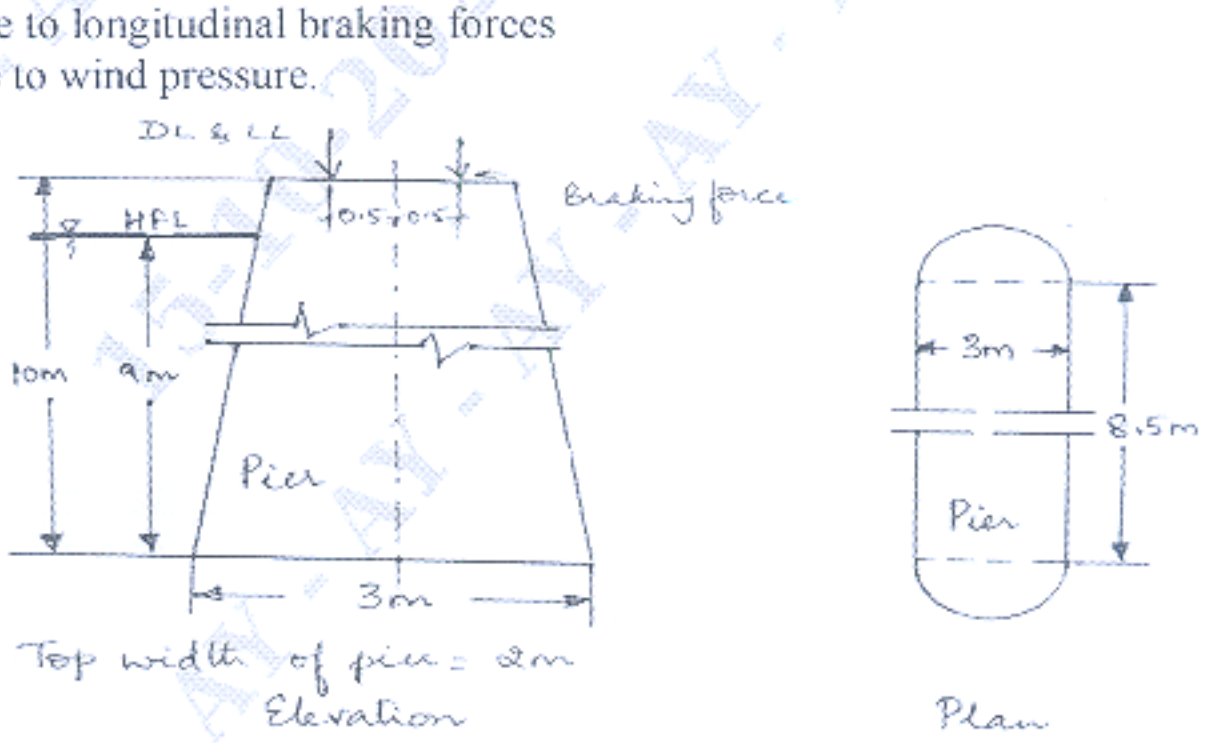
Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Any missing data may be suitably assumed
4. Relevant charts and codes may be permitted.

		Module – 1	M	L	C
1	a.	List out the components of a bridge and explain functions of any two.	10	L2	CO1
	b.	Determine the design discharge at a bridge site after computing the maximum discharge by i) Empirical Method ii) Rational Method iii) Area velocity Method , given the following data : Catchment area = 160 km^2 Peak intensity of rainfall = 60 mm/hour Cross-sectional area of stream at MFL at the bridge site = 120 m^2 Wetted perimeter of stream at MFL at bridge site = 90 m Slope of stream = 1/500 C – constant for that tracts = 6.8 Percentage coefficient of run-off for catchment characteristics (P) = 0.3 Factor to correct for variation of intensity of rainfall over catchment area = 0.669 Concentration time in hours (t_c) = 4 hours Coefficient of roughness (η) = 0.03	10	L3	CO1
		OR			
2	a.	Describe the classification of bridges based on various criteria.	10	L2	CO1
	b.	Explain linear waterway, afflux and economical span.	10	L2	CO1
		Module – 2			
3		Design a RCC pipe culvert for the following data : C_c = 2.29; influence coeff C_s = 0.032 Discharge through culvert = 1.57 m^3/s Velocity of flow = 2 m/s; Density w = 18KN / m^3 Width of lane = 7.5 m Side slopes of embankment = 1.5:1 Bed level of stream = 100.00 Top of embankment = 103.00 Loading : 1 RC class AA wheeled vehicle with maximum wheel load of 62.5 KN. Draw the longitudinal section, plan and end view of the pipe culvert.	20	L4	CO2

		OR			
4		Design a RC box culvert having a clear vent way of 3 m by 3 m. The superimposed dead load on the culvert is 12.8 KN /m^2. Live load is 50 KN/ m^3, density of soil if 18 KN/m^3, angle of repose = 30°. Use M20 concrete and fe415 HYSD bars. Sketch the details of reinforcements in the culvert. Consider the critical case when the top slab supports the dead and live load and the culvert is empty. Use the following values for moments and thrusts. Midspan of bottom slab M_u = 114.15 KNm ; N_u = -11.14 KN (T) Support section M_u = -81.64 KNm ; N_u = 51.97 KN (c) Midpoint of vertical side wall M_u = -83.83 KNm : N_u = 232.65 KN (c)	**20**	**L4**	**CO2**
		Module – 3			
5		Determine the dead load bending moment, live load bending moment and live load shear in a RC slab for the following data : Carriageway = 7.5 m Footpaths = 1 m on either side Clear span = 6 m Wearing coat = 80 mm Width of bearing = 400 mm Materials : M 25 concrete, Fe415 steel Loading : IRC class AA tracked vehicle.	**20**	**L4**	**CO3**
		OR			
6		Determine the design moments in the slab panel which has 2.5 m wide deck between main girders and 4 m between cross girders. Use M20 concrete and Fe415 steel. Loading is IRC class A train.	**20**	**L4**	**CO3**
		Module – 4			
7	a.	Describe types of T beam slab decks with simple sketches.	**10**	**L2**	**CO**
	b.	Describe the steps involved in the design of longitudinal girders in T beam bridges.	**10**	**L2**	**CO**
		OR			
8	a.	Explain any ONE rational method used for estimation of load distribution in longitudinal beams in a T beam bridge.	**10**	**L2**	**CO**
	b.	Describe the steps involved in the design of interior slab panels in a T – beam bridge.	**10**	**L2**	**CO**
		Module – 5			
9	a.	Explain the types of piers with sketches.	**10**	**L2**	**CO4**

	b.	Fig. 9(b) shows the section of a stone masonry abutment used for a highway bridge with the forces acting per unit length of the abutment. Safe bearing capacity of soil = 150 KN /m^2 Coefficient of friction between masonry and soil = 0.5 Density of stone masonry = 25 KN /m^3 Compute the stresses developed at the base and check for stability of the abutment.  Fig. Q.9 (b)	10	L3	CO4

OR

10	a.	Explain any 5 types of bridge bearings with simple sketches.	10	L2	CO5
	b.	A pier shown in fig 10(b) supports the deck forming a major highway. The various forces acting on the pier are : Dead loads from each span = 2000 KN Reaction due to live load on one span = 1000 KN Braking forces = 140 KN Wind pressure on pier = 2.4 KN m^2 Material of pier = 1:3:6 cement concrete Density of concrete = 24 KN/m^3 Calculate stress developed at the base of the pier due to : i) Dead load and self weight of pier ii) Effect of buoyancy iii) Due to eccentricity of live load iv) Due to longitudinal braking forces v) Due to wind pressure.  Fig. Q.10 (b)	10	L3	CO5

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