CBCS SCHEME

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BCV613A

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

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. Use of codes IRC – 6 , IRC – 21 , IRC –112 , IS – 456 , SP – 16 and Pigeaud's curve are permitted.

		Module – 1	M	L	C
Q.1	a.	Classify bridges on various parameters.	10	L1	CO1
	b.	List out various IRC loads to be considered in the design of bridges. Explain any one with a neat sketch.	10	L1	CO1
		OR			
Q.2	a.	Briefly explain the following terms : i) Linear water way ii) Economic span iii) Afflux iv) Scour Depth v) Flood Discharge.	10	L2	CO1
	b.	Determine the water way for a bridge across a stream with a flood discharge of 225 m^3/s , velocity 1.5 m/s and width of flow at high flood level 60m, if the allowable velocity under bridge is 1.8 m/s. Use Molesworth formula.	10	L3	CO1
		Module – 2			
Q.3	a.	Explain with sketches the First class and Concrete cradle bedding used in pipe culvert.	10	L2	CO2
	b.	Explain steps involved in structural design of pipes in a pipe culvert.	10	L2	CO2
		OR			
Q.4		Design a RCC box culvert having clear unit way of 3m × 3m. The superimposed dead load on culvert is $12.8 kN/m^2$. The live load is $50 kN/m^2$. Density of soil at site is $18 kN/m^3$. Angle of repose is 30°. Adopt M – 20 grade of concrete and Fe – 415 HYSD bars. Sketch the details of reinforcements in the box culvert. The design should confirm to the specifications of IRC : 112 : 2017 or 2020.	20	L5	CO2
		Module – 3			
Q.5		Design RCC slab culvert for NH crossing to suit the following data : Carriage way – Two lane (7.5m wide) ; Foot paths – 1 m on either side Clear span – 6 m ; Wearing coat – 80 mm thick Width of bearing – 400 mm Materials : M – 25 grade of concrete and Fe – 415 Grade of HYSD bars Loading : IRC class AA – Tracked vehicle Also draw reinforcement details.	20	L5	CO3
		OR			

Q.6	A slab culvert across a stream in Highway having following data : Carriage way width = 7.5 m , Footpath = 1 m Effective span of bridge deck = 6.5 m , Wearing coat thickness = 80 mm , M – 25 grade of concrete and Fe – 415 grade of steel. Live load IRC class A loading. Design Deck slab. [Shear analysis and footpath design is not required]. Also sketch the reinforcement of Deck slab.		20	L5	CO3
	Module – 4				
Q.7	Design and detail the Interior slab panel of a T beam bridge with the following data : Spacing of longitudinal girder = 3.5 m Spacing of cross girder = 5 m Thickness of slab = 250 mm Thickness of wearing coat = 80 mm Materials = M – 25 and Fe – 415 Live load = IRC class AA – Tracked vehicles.		20	L5	CO4
	OR				
Q.8	In a SH T beam Girder Bridge is to be constructed across a river. The details are below : Carriage way width = 7.50 m ; Railing width = 0.15 m Wearing coat thickness = 75 mm ; Width of foot path on either side = 1.2 m Effective span of Bridge = 20 m ; Live load = IRC class AA – Tracked vehicle Materials : M25 concrete and Fe – 415 steel. Design outer longitudinal girder of bridge (Shear analysis not required). Take Number of longitudinal girders 3 Nos with spacing 3.5 m C/C. Number of cross girders 5 Nos with spacing 5 m C/C.		20	L5	CO4
	Module – 5				
Q.9	a.	Draw Typical shapes of piers commonly used in concrete Bridges. List out loads and forces to be considered in Pier design.	15	L2	CO5
	b.	List factors to be considered while selecting Bridge bearings.	5	L1	CO5
	OR				
Q.10	Explain the following :				
	a.	General Features of Abutments with a neat sketch.	10	L2	CO5
	b.	Forces acting on Abutments with a neat sketch.	10	L2	CO5

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