CBCS SCHEME

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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. IRC – 6 – 2000 , IS – 456 – 2000 , IS – 458 – 2003 , IRC – 21 – 2000.

		Module – 1	M	L	C
Q.1	a.	With neat sketch, describe the loading case IRC class AA [wheeled vehicle].	6	L2	CO1
	b.	Explain with types the waterways and elaborate on principles of fixing the waterways based on the types of streams.	8	L2	CO1
	c.	Define : i) Afflux ii) Scour depth.	6	L2	CO1
		OR			
Q.2	a.	The following is the cost of one pier and one super – structure span of multiple – span bridges for various span lengths. The cost of the super – structure span excludes the cost of railings and flooring systems. Calculate the economic span.	6	L3	CO1
	b.	Explain the site investigations conducted prior to bridge construction.	6	L2	CO1
	c.	Elaborate the detailed classification of bridges based on different categories.	8	L2	CO1
		Module – 2			
Q.3		Design a reinforced concrete box – culvert having a clear vent way of 3m by 3m. The super imposed dead load on the culvert is 13kN/m^2. The live load on the culvert is 45kN/m^2. Density of soil at site is 18kN/m^3. Angle of repose = 30°. Adopt M – 25 grade of concrete and Ferris grade of steel. Sketch the details of reinforcement in the box culvert. The loading condition is top slab supports the dead load and live load and the culvert is empty with no water pressure from inside.	20	L3	CO2
		OR			
Q.4	a.	Explain in brief the classification of RC pipes with their applications.	5	L2	CO2
	b.	Design a suitable RCC pipe culvert to suit the following data (IRC – 6 , IS – 458 , IS – 456 needs to be provided). Discharge through pipe culvert = 1.53 m^3/s Velocity of flow through pipe = 2 m/s ; Width of road (two lane) = 7.5m Top width of embankment = 1.5 : 1 ; Bed level of stream = 100.00 Top of embankment = 10.3.00 Loading : IRC class AA. Wheeled vehicle with a maximum wheel load of 70kN. Draw the longitudinal section , plan and end view of pipe culvert.	15	L3	CO2

Span (m)	4	8	12	15
Super – structure cost (Rs)	1500	6000	15000	25000
Sub-structures cost (Rs)	26000	27200	24800	23800

		Module – 3			
Q.5		Design a reinforced concrete deck slab for a national highway crossing to suit the following data (limit state method) : Carriage way – Two lane (7.5m wide) ; Foot path – 1m on either side Clear span – 6m ; Wearing coat – 80mm ; Width of bearing – 400mm Materials : M_{25} grade concrete and Fe_{415} grade HYSD bars. Loading – IRC class A – A tracked vehicle.	**20**	**L3**	**CO3**
		OR			
Q.6		Design a deck slab using IRC – 6 – 2000 and IS – 456 – 2000 codes through limit state method of design for the following data : Width of the road – 7.5m ; Foot path – 1m on either side ; Clear span – 5m Wearing coat thickness – 75 mm ; Width of bearing – 40 mm ; Materials M_{25} grade concrete and Fe_{415} steel. Loading case – IRC class A(train).	**20**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Describe in detail the dispersion of loads in slabs spanning in two directions along with schematic diagrams. Also explain the significance of Pigeaud's curves in the design.	**8**	**L2**	**CO4**
	b.	Illustrate the general procedure for the design of interior panel for class A – A (IRC) loading case – (Tracked vehicle).	**8**	**L2**	**CO4**
	c.	With a neat sketch, explain the role and arrangement of longitudinal girder and cross girder.	**4**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain briefly the components of a T – beam bridge with a neat sketch.	**8**	**L2**	**CO4**
	b.	Describe the Courbon's method for the distribution of live loads among longitudinal girders.	**6**	**L2**	**CO4**
	c.	What is the function of cross – girder in a RCC bridge deck system? What spacing is considered as ideal for cross girders and why?	**6**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain in detail, the components of bridge substructure.	**6**	**L2**	**CO5**
	b.	List and describe the types of Bridge piers with neat sketches.	**6**	**L2**	**CO5**
	c.	With neat sketches, explain the types of bridge bearings.	**8**	**L2**	**CO5**
		OR			
Q.10	**a.**	Summarize the salient features of solid bridge pier.	**6**	**L2**	**CO5**
	b.	Explain in detail the types of Abutments without using wall.	**6**	**L2**	**CO5**
	c.	Elaborate the functions of bridge bearings.	**8**	**L2**	**CO5**

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