Model Question Paper

DESIGN OF BRIDGES (BCV613A)

Module -1			
Q.01	a	With a net sketch, explain term afflux.	10
	b	Derive an expression for economic span of bridge and list out the assumptions made economic span.	10
OR			
Q.02	a	Critically review the methods normally used for the estimation of the design discharge of a bridge site.	10
	b	Determine the waterway for a bridge across a stream with a flood discharge 225 m^3/s, velocity 1.5 m/s and with of flow at high flood level 60 m, if allowable velocity under the bridge is 1.80 m/sec. Take safe velocity is 90% of allowable velocity.	10
Module-2			
Q. 03	a	A box culvert has internal dimensions 3.00x3.00 m with the following data: Super imposed dead load = 16 kN/m^2 Live load including impact allowance = 52 kN/m^2 Insitu density of soil = 18 kN/m^3 Angle of internal friction = 30 degrees Concrete grade = M30 Steel grade = Fe415 Considering empty condition, design and detail the box culvert.	20
OR			
Q.04	a	Design a pipe culvert through a road embankment of height 6 m. The width of the road is 7.5m and the formation width is 10m. The side slop of the embankment is 1.5:1. The maximum discharge is 5 m^3/sec. The safe velocity is 3 m/sec. Class AA tracked vehicle is to be considered as live load. Assume bell mouthed entry. Given Cc = 1.5, Cs = 0.010 and the unit weight of the soil is 20 kN/m^3. Draw cross section of pipe showing reinforcement details.	20
Module-3			
Q.05	a	Design a deck slab for the following particulars: Clear span : 5.5 m Width of footpath: 1m on either side Wearing coat: 100 mm Loading: IRC class AA (Tracked), Materials : M35 concrete and Fe415 steel. Design the slab only for flexure.	20
OR			

Q.06	a	Design a reinforced concrete deck slab bridge for a National Highway to suit the following data Width of carriage way = 7.5m (Two lane traffic) Footpath on either side = 1m Clear Span = 6m Wearing Coat = 80mm Width of bearing = 400mm Materials = M30 grade concrete and steel Fe415 Laoding = IRC Class-A The design should confirm to the new code specifications using Limit State Method. Check for Shear and Design of footpath is not necessary.	
Module-4			
Q.07	a	An R.C.C T-beam bridge is proposed across a stream of bed width 15 m and side slopes 1:1. Following data are available. Clear roadway : 7.5 m Effective span: 16 m Loading : IRC class AA (Tracked), Materials: M20 concrete, Fe415 steel. Spacing of three number of longitudinal beams: 2.5 m centre to centre Spacing of five number of cross beams: 4 m centre to centre Design: i) An intermediate panel of deck slab using pigeauds theory (shear need not to be checked) ii) An interior longitudinal beam using Kourbons theory.	20
OR			
Q.08	a	Design and detail the cross girder in a T-beam bridge with the following data: Spacing of longitudinal girders = 2.5 m C/C; Spacing of cross girders = 4.0 m C/C; Thickness of deck slab = 200 mm Thickness of wearing course = 80 mm Live load = Class AA (Tracked) Material = Mo concrete and Fe415 steel.	20
Module-5			
Q.09	a	Verify the adequacy of the dimensions of the pier of a bridge with the following details Top width of the pier : 1.6 m Height of the pier up to springing level : 10 m C/C of bearing on either side : 1 m Side batter : 1 in 12 High flood level: 1 m below the bearing level. Span of the bridge: 16 m Loading on span: IRC class AA Road : Two-lane with 1 m wide footpath. Superstructure : Three longitudinal beams of 1.4 m depth with a deck slab of 200 mm depth. Rib width : 300 mm Material: Concrete M_{15}.	20

Q.10	a	With a net sketch, explain rocker and roller bearing	10
	b	What are the requirements of expansion joint in a bridge? Explain them briefly	10