B. CONS.ENGG. 4TH YEAR 1ST. SEM. EXAM.-2018

BRIDGE ENGINEERING

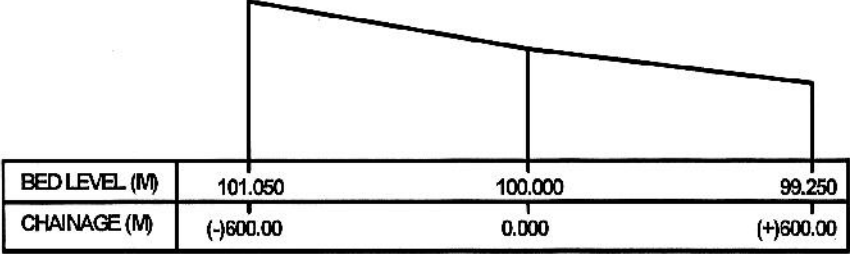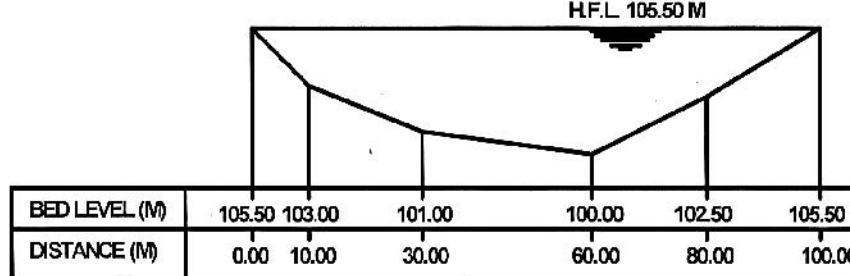Time : Three hours   Full Marks : 100

(50 marks for each Part)

Use separate answer script for each part.

PART I

Answer **any two** Questions. Relevant IRC & IS Codes are allowed.
Assume any relevant data not provided. Draw neat sketches to explain your answer.

1. a) Discuss **Courbon's method** of calculating Reactions of Longitudinal Girder   **5**

    b) Calculate the **Live load moment** for the External Longitudinal Girder of a RCC
    girder bridge with following details.   **20**

    The effective span of the bridge is **25 m.**
    Width of Carriageway = 10.4 m;   Size of Kerb = 800 X 300
    Thickness of Deck Slab = 200 mm; Thickness of Wearing Coat = 75 mm
        No. of Longitudinal girder = 4; No. of Cross girder = 5
    Size of bottom flange of Longitudinal Girder = 750 X 400 mm
    Web thickness of Longitudinal Girder = 300 mm
    Centre to centre of Longitudinal Girder = 2350 mm
    Overall depth of Longitudinal Girder = 2200 mm
        Size of fillets = 150 mm X 150 mm
    Thickness of Cross girder = 250 mm
    Overall depth of Cross Girder = 1500 mm

2. a) Compare critically between **Cable Stayed** and **Suspension** types of bridges   **10**

    b) Calculate the live load moment of the cantilever slab of the RCC girder bridge
    as mentioned above in the question No. 1 (b)   **15**

3. a) What are the different factors to be considered prior to selecting a bridge site? **8**

    b) Calculate the live load moment of a two-lane culvert due to **70R Tracked vehicle**
    with the following data.   **17**

    i.   Clear span = **8.0 m**
    ii.   Bearing width = 400 mm
    iii. Thickness of Deck Slab = 400 mm
    iv.   Size of kerb = 600 mm X 300 mm
    v.   Thickness of Wearing Coat = 60 mm
    vi.   Size of Hand Rail = 100 mm X 1000 mm
    vii. Value of 'α' = 2.90

No. of questions	PART II (50 Marks)	Marks
	Answer any two	
1.	Explain the terms "Regime Width", Linear Waterway" and "Effective Linear Waterway". For what type of soil Lacy's equation for calculating "Regime Width" is valid? Calculate discharge and "Regime Width" at a particular location of a waterway with the following data. Assume roughosity coefficient 'n' = 0.03.	
	LONGITUDINAL PROFILE OF BED THROUGH DEEPEST CHANNEL	
	H.F.L 105.50 M	
	CROSS SECTION AT BRIDGE LOCATION **FIGURE - 1**	7+18
2.	Design a Elastomeric bearing with the data given below. Draw a neat labeled sketch of the bearing. Span of the bridge = 18.0 M No. of long girders = 3 Dead Load (all inclusive, for one girder) per M length of bridge = 18.0 T/M Maximum Live Load Reaction per girder = 45.0 T (including impact) Minimum total Live Load Reaction = 18.0 T (including impact) Maximum Live Load Moment per girder = 137.0 T-M (including impact) Total horizontal force acting on superstructure = 20.0 T Moment of Inertia considering full section of superstructure = 0.3596 M^4	20+5
3.	Explain the term. "Regime Width". Explain :Manning's Method of calculating flood velocity .	3+3
	Suppose in an individual storm "F" cm rain fall. In "T" hours. What is the relationship between mean intensity of rainfall "I" and intensity of rainfall "i" over a short period of time within the duration of rainfall?. Explain the terms "One Hour Rain fall" and "Time of concentration". What are the other parameters required to calculate flood discharge by using "Rational formula".	4+7+3
	Discuss different parameters one needs to look into while selecting a proper site for a river bridge.	5

The following data appears within Figure 1:

Longitudinal profile of bed through deepest channel:

BED LEVEL (M)	101.050	100.000	99.250
CHAINAGE (M)	(-)600.00	0.000	(+)600.00

Cross section at bridge location:

BED LEVEL (M)	105.50	103.00	101.00	100.00	102.50	105.50
DISTANCE (M)	0.00	10.00	30.00	60.00	80.00	100.00