Ref. No .Ex /CON/ T/411/2017(S)

B. CONS. ENGG. 4th YEAR 1ST. SEM. EXAM. - 2017

BRIDGE ENGINEERING

(Name in full)

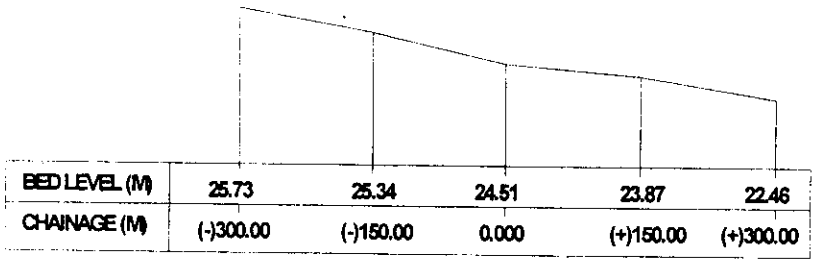
Time : Three hours

PART - 1

Full Marks : 100

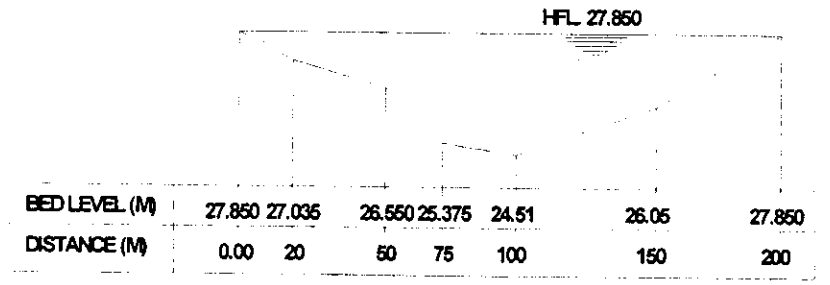
Use a separate Answer – Script for each part

No. of questions			Marks
		Answer any two	
1.	a.	Explain the term. "Regime Width". Explain :Manning's Method of calculating flood velocity .	3+3
	b.	Calculate discharge and "Regime Width" at a particular location of a waterway with the following data. Assume roughosity coefficient 'n' = 0.03.	19



BED LEVEL (M)	25.73	25.34	24.51	23.87	22.46
CHAINAGE (M)	(-)300.00	(-)150.00	0.000	(+)150.00	(+)300.00

LONGITUDINAL PROFILE OF BED THROUGH DEEPEST CHANNEL



BED LEVEL (M)	27.850	27.035	26.550	25.375	24.51	26.05	27.850
DISTANCE (M)	0.00	20	50	75	100	150	200

CROSS SECTION AT BRIDGE LOCATION

FIGURE - 1

2.	a.	What do mean by "scour"? Explain the term silt factor. Given design discharge, linear waterway width, span arrangements and overall dimensions of piers and foundations how will you calculate scour depth? How "normal scour depth" and "design scour depth" are related?	7
	b.	A single span simply supported superstructure of a bridge of span length "L" is supported on Roller bearing at one end and on Roller cum Rocker bearing at the other end. Let the applied horizontal force on superstructure be "H", dead load and live load reactions at Roller end be "R_g" and "R_q" respectively. How much horizontal for will be transferred to Roller end and Roller cum Rocker end? Give reasons.	5
	c.	If in place of Roller and Rocker cum Roller bearing Elastomeric bearing was used for the bridge mentioned in "c" above, how much horizontal force would have transferred to substructure through bearing?	3
	d.	Calculate peak run off for designing a bridge across a stream. Given: Catchment area = 2000 Hectres, f = 0.97 Distance of furthest point, L = 8 km.	10

B. CONS. ENGG. 4th YEAR 1ST. SEM. EXAM. - 2016

BRIDGE ENGINEERING

(Name in full)

PART - 1

Use a separate Answer – Script for each part

	Level difference, H = 38 metres. Characteristics of catchment soil – loamy soil, largely cultivated, P = 0.30 Rainfall: Severest storm that have occurred in 20 years have dropped 25 cm of rain in 4.5 hours.	
3.	Design an Elastomeric bearing with the data given below. Draw a neat labeled sketch of the bearing. Span of the bridge = 25.0 M No. of Girders per span= 4 Grade of Concrete = M 35 Dead Load reaction (all inclusive) per girder = 70.0 T Maximum Dead Load BM per girder = 410 T-M Maximum Live Load Reaction / girder = 42.0 T (including impact) Minimum Live Load Reaction / girder = 8.0 T (including impact) Maximum Live Load Moment /girder = 225.0 T-M (including impact) Long horizontal force / girder acting on superstructure = 11.0 T Moment of Inertia of one girder = $0.8799M^4$	**25**

Ex/CON/T/411/2017(S)

B. CONS. ENGG. 4TH YEAR 1ST SEM EXAM.-2017

BRIDGE ENGINEERING

Part - II Full Marks: 50

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

1. a) Discuss Class A train of vehicles and its Impact factor as per IRC code **5**

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

   The effective span of the bridge is 24 m.
   Width of Carriageway = 7.5 m; Size of Kerb = 1000 X 300
   Thickness of Deck Slab = 200 mm; Thickness of Wearing Coat = 50 mm
   No. of Longitudinal girder = 4; No. of Cross girder = 7
   Size of bottom flange of Longitudinal Girder = 750 X 300 mm
   Web thickness of Longitudinal Girder = 250 mm
   Centre to centre of Longitudinal Girder = 2000 mm
   Overall depth of Longitudinal Girder = 1800 mm
   Size of fillets = 150 mm X 150 mm
   Thickness of Cross girder = 200 mm
   Overall depth of Cross Girder = 1400 mm

2. a) What is role of Cross girder and Abutment in girder type bridges? **5**

   b) Discuss different types of Cable Stayed bridges? **5**

   c) Calculate the Live load moment of the cantilever slab of the RCC girder bridge of problem 1(b). The thickness of cantilever slab = 300 mm to 150 mm. **15**

3. a) What are the ideal characteristics for selection of a site? **5**

   b) Calculate the Live Load moment of a two-lane Culvert due to 70R Tracked vehicle with following data. **20**

   i. Clear span = 6.0 m
   ii. Bearing width = 300 mm
   iii. Thickness of Deck Slab = 280 mm
   iv. Size of kerb = 600 mm X 300 mm
   v. Thickness of Wearing Coat = 60 mm
   vi. Size of Hand Rail = 80 mm X 1000 mm = 1KN/m
   vii. Value of 'α' = 2.90