BRIDGE ENGINEERING (SEMESTER - 8)

CS/B.TECH(CE - NEW)/SEM-8/CE-802/2/09

1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/B.TECH(CE - NEW)/SEM-8/CE-802/2/09

ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

BRIDGE ENGINEERING (SEMESTER - 8)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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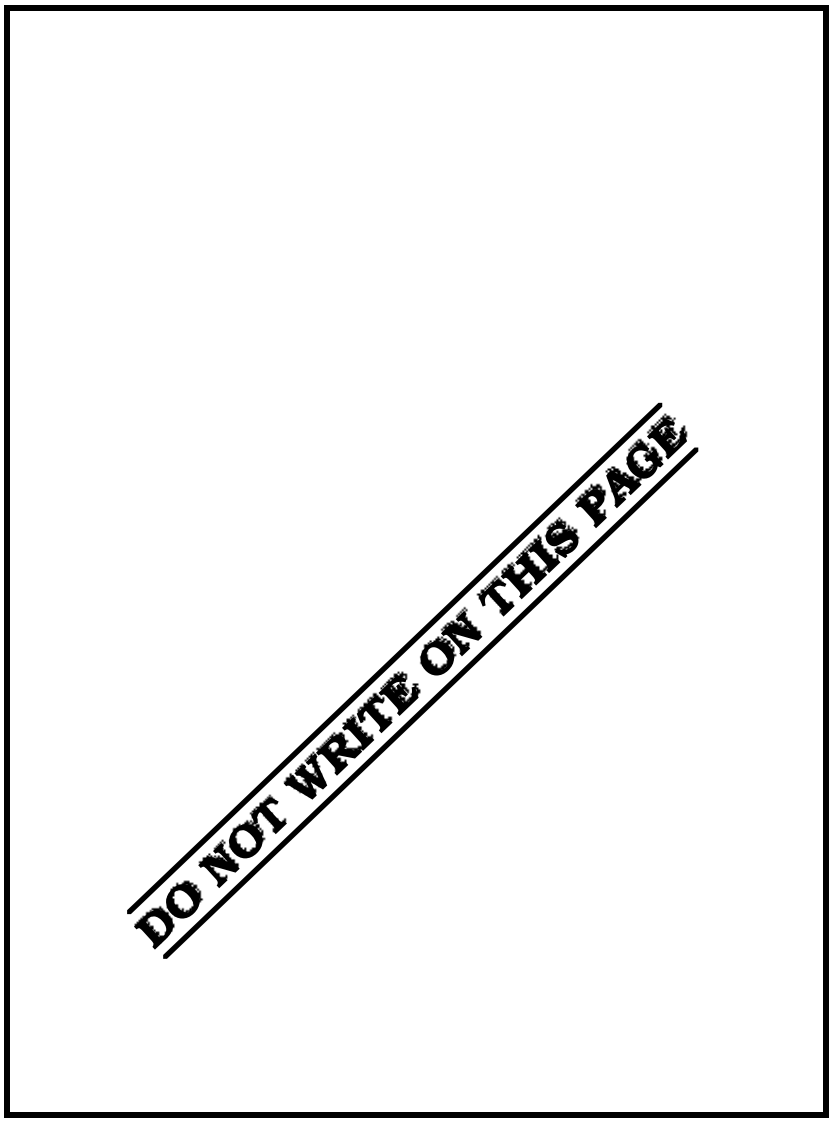
FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

.....
Head-Examiner/Co-Ordinator/Scrutineer

8829–2/5 (21/04)



ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

BRIDGE ENGINEERING

SEMESTER - 8

Time : 3 Hours] [Full Marks : 70

Use of relevant codes are permitted.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct answer for the following : $10 \times 1 = 10$

i) Co-efficient of thermal expansion per degree Centrigrade for steel bridge is

a) $11{\cdot}7 \times 10^{-6}$ b) $10{\cdot}8 \times 10^{-6}$

c) $11{\cdot}0 \times 10^{-5}$ d) $10{\cdot}0 \times 10^{-5}$. ☐

ii) If the span of an R.C.C. bridge is 9·0 m, the impact factor for class (IRC) *A* or *B* loading is

a) 0·45 b) 0·3

c) 0·75 d) none of these. ☐

iii) The horizontal seismic force on a bridge structure is computed from the equation

a) $F_{eq} = L_a (G + A_h)$ b) $F_{eq} = G (A_h + L_a)$

c) $F_{eq} = A_h (G + L_a)$ d) $F_{eq} = G \times A_h \times L_a$. ☐

iv) If the catchment area is 160 km^2 and distance of site from coast is 12 km, maximum flood discharge according to Ryve is

a) 216 m^3/s b) 225 m^3/s

c) 201 m^3/s d) 270 m^3/s. ☐

v) The maximum depth of scour *D* below the HFL for a severe bend is

a) 2·00 dsm b) 1·75 dsm

c) 1·27 dsm d) 1·5 dsm. ☐

vi) For beam, using grade of steel Fe_{415}, the minimum tension reinforcement is

a) 0·25% of bd b) 0·2% of bd

c) 0·12% of bd d) 0·15% of bd. ☐

vii) Modulus of elasticity of concrete grade M 40 is

a) $0{\cdot}40 \times 10^5$ b) $0{\cdot}316 \times 10^5$

c) $0{\cdot}35 \times 10^5$ d) $0{\cdot}45 \times 10^6$. ☐

viii) For economic reasons, the width of the median may be kept low, but should not be less than

a) 1·5 m b) 1·30 mm

c) 1·2 m d) 1·0 m. ☐

ix) The clear distance of wheel from the wheel guard for IRC class *AA* wheel vehicle of carriageway width over 5·3 m is

a) 0·30 m minimum b) 1·2 m minimum

c) 1·20 m maximum d) 0·30 m maximum. ☐

x) Nose to tail length of IRC tracked vehicle is

a) 3·6 m b) 4·0 m

c) 5·6 m d) 7·2 m. ☐

GROUP – B
(Short Answer Type Questions)

Write short notes on any *three* of the following. 3 × 5 = 15

2. Shear connectors

3. Afflux

4. Scour

5. Types of bridge

6. Components of bridge.

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. 3 × 15 = 45

7. Design a deck slab bridge for the following data :

Clear distance between abutment	=	6·70 m
Footpath	=	1·0 m on either side
Wearing coat (average)	=	80 mm
Loading	=	IRC class *AA* Tracked vehicle
Road	=	National Highway (2-lanes)
Materials	=	Grade of concrete M 20 and grade of steel Fe 415

8. Design the cantilever portion of a girder bridge for the following data :

Clear width of road	=	6·8 m
Span C/C of bearing	=	16·0 m
Loading	=	IRC class *A* and class *AA* vehicle
Wearing coat	=	100 mm (average)
Material	=	Grade of concrete M 25 and grade of steel Fe 415.

9. Find out the net bending moment only of a box culvert considering dead load and live load acting from outside, while no water pressure from the inside for the following data :

Inside dimension of Box culvert	=	3·0 m × 3·0 m
Dead load	=	14000 N/m^2
Live load	=	IRC class *AA* Tracked vehicle.
Assume Unit weight of soil	=	18000 N/m^3
Angle of repose of soil	=	30°.

10. Obtain reaction factor and maximum bending moment in case of a *T*-beam bridge having the following details :

Roadway	=	2 lanes
Loading	=	IRC class *A*.
No. of main girders	=	3 nos. C/C spacing = 2·60 m
Span of bridge	=	16 m
Kerb width	=	600 mm on either side.

11. Design a welded plate girder bridge for a broad gauge railway lime, with splayed type wing wall accross a stream from the following data :

Span of bridge	=	25·0 m
D.L. intensity	=	13·5 kN/m
Live load for B.U per track	=	1205 kN
Live load for S.F. per track	=	1313·5 kN
Adopting f_{eb}	=	1728 N/mm^2 , σ_{be} = 157 N/mm^2 .

Design only for plate girder, connection between flange and web.

END