CS/B.TECH(CE) (SUPPLE)/SEM-7/CE-704/09
STRUCTURAL DESIGN - III (SEMESTER - 7)

1. .....
Signature of Invigilator

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

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

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

CS/B.TECH(CE) (SUPPLE)/SEM-7/CE-704/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JULY – 2009

STRUCTURAL DESIGN - III (SEMESTER - 7)

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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Marks Obtained

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

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Head-Examiner/Co-Ordinator/Scrutineer

S-53047 (30/07)

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STRUCTURAL DESIGN - III

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GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Rankine's Earth Pressure Co-efficient *Ka* is given by

a) $\frac{1 + \sin \phi}{1 - \sin \phi}$ b) $\frac{1 - \sin \phi}{1 + \sin \phi}$

c) $\frac{1 - \sin^2 \phi}{1 + \sin^2 \phi}$ d) none of these. ☐

ii) A flat slab is supported on

a) beams

b) columns

c) beams and coloums

d) columns mono-lithically built with slab. ☐

iii) A slab is called one-way when the ratio of longer dimension to shorter dimension is

a) > 2 b) < 3

c) < 2 d) none of these. ☐

iv) The shape factor of a rolled steel *I*-section is

a) 1·0 b) 1·5

c) 1·24 d) 1·14. ☐

v) The seismic zones in India as per IS : 1983 – 2002, are divided into

a) two parts b) three parts

c) four parts d) five parts. ☐

vi) The diameter of longitudinal bars of a column should never be less than

a) 6 mm b) 8 mm

c) 10 mm d) 12 mm. ☐

vii) Side reinforcement provided in the beam when depth of web in a beam exceeds

a) 50 cm b) 75 cm

c) 100 cm d) 120 cm. ☐

viii) For the design of sleepers in railway bridges, the impact factor should be taken as

a) 0·9 b) 1·0

c) 1·1 d) 1·2. ☐

ix) The maximum permissible slenderness ratio of a steel compression member carrying dead load and superimposed load is

a) 180 b) 200

c) 250 d) 350. ☐

x) In a slab, the pitch of the main reinforcement should not exceed its effective depth by

a) 3 times b) 2 times

c) 4 times d) 5 times. ☐

xi) The portion (A) as marked in the figure given below, is known as

Dia

a) Slab b) Toe slab

c) Heel slab d) Stern. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Define and explain 'Plastic Hinge' and 'Shape Factor' with reference to plastic design of steel structures.

3. Discuss the advantages and disadvantages of pre-stressed concrete w.r.t reinforced concrete.

4. A short column 300 × 500 (mm^2) is reinforced with 6 nos. of 20 mm dia. bars as shown. Determine the bending moment Mu about an axis bisecting the depth, when it is also subjected to Pu = 800 kN. Assume M – 20 grade concrete & Fe–250 steel.

Dia.

5. 4 member in a truss has 3·5 m effective length. It carries a compressive load of 13·0 kN due to wind. Design a single angle for it.

6. Write in detail with names the different components of superstructure and substructure of a typical R.C.C. bridge.

GROUP – C

(Long Answer Type Questions)

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

7. Design an isolated square column footing for a column 400 × 400 mm^2 transferring a load of 500 kN (↓) and a moment of 20 kN-m. The safe bearing capacity of soil is 105 kN/m^2 .

8. Design a built-up steel column of effective length 6·0 m carrying an axial load of 900 kN. Use two channels with suitable lacings.

9. Find out the collapse load for a continuous beam of uniform C/s as shown below

Dia.

10. Design a typical RCC slab culvert for the following data :

    i) Carriage way width — 7·5 m

    ii) Wearing coat — 80 mm (Avg)

    iii) Clear span — 6·0 m

    iv) Width of bearing — 300 mm

    v) Loading case — IRC class AA tracked vehicle as.

11. Design the wall of a R.C.C. rectangular water tank when the maximum moment is 30 kNm/m and maximum tension is 50 kN/m. Use M–20 concrete & Fe – 415. Check for interaction as per J.S. Codes.

END