TED (10)–5009 Reg. No. .....

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SIXTH SEMESTER DIPLOMA EXAMINATION IN CIVIL ENGINEERING—MARCH, 2014

**DESIGN OF PRE-STRESSED CONCRETE AND MASONRY WALLS**

[*Time* : 3 hours

(Maximum marks : 100)

[*Note*—I.S. 1343/1980, I.S. 1905/1987 and I.S. 456/2000 are permitted]

Marks

PART—A
(Maximum marks : 10)

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. What is modular ratio ?
2. State two basic assumptions for the design of R.C members by working stress method.
3. As per I.S. 1343 what is the minimum cube strength required for pre-tensioned and post tensioned system.
4. What is the loss of pre-stress due to relaxation of steel as per I.S 1343 ?
5. What are the basic classifications of masonry wall according to loading ? (5×2=10)

PART—B
(Maximum marks : 30)

II Answer *any five* of the following questions. Each question carries 6 marks.

1. Explain under reinforced and over reinforced sections with stress diagrams.
2. Design a R.C. beam 300mm wide to resist a B.M of 20kNm, if the permissible stresses in concrete and steel are 5N/mm$^2$ and 230N/mm$^2$ respectively.
3. List the advantages of pre-stressed concrete over reinforced concrete.
4. What are the requirements of steel and concrete using for pre-stressed concrete ?
5. How can you calculate the loss of pre-stress due to friction as per I.S. 1343 ?
6. Give the design steps of Load bearing masonry walls.
7. Write short notes on :

   (i) Stress reduction factor (ii) Area reduction factor (5×6=30)

Marks

PART—C
(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT—I

III A rectangular R.C beam of $M_{20}$ grade concrete is 250mm wide and 500mm effective depth. It is provided with tensile steel of 4 × 20mm dia mildsteel bars. It carries a uniformely distributed load (inclusive of self weight) of 22KN/m over an effective span of 4.00m. Calculate the stresses in concrete and steel and draw the stress diagram. 15

OR

IV Design a R.C beam 200mm wide to resist a super imposed load of 20KN/m over the entire span 4.50m. Use $M_{20}$ concrete and $Fe_{415}$ steel. Also draw the designed cross-section of beam by working stress method. 15

UNIT—II

V (a) Explain the classifications of pre-stressing system based on anchorages adopted. 8

(b) List the advantages and disadvantages of pre-tensioning system. 7

OR

VI (a) Explain the basic principle of pre-stressing with the aid of neat sketches. 9

(b) Write any four examples of pre-stressing 6

UNIT—III

VII Explain the losses in pre-stressing. 15

OR

VIII A rectangular beam of cross-section 120mm × 300mm carries a Udl over an effective span of 8.00M. If the permissible stress in concrete in compression is 12 Mpa and that its tension is zero, determine the prestressing force and load carrying capacity of the beam. If concentric pre-stressing is applied. 15

UNIT—IV

IX (a) Explain the terms :

(i) Effective length (ii) Slenderness ratio in masonry wall. 6

(b) A masonry wall of 29cm effective thick is subjected to an eccentric load of 100KN at an eccentricity of 30mm. The length of the wall is 2.50m and mortar is of grade M1(cm 1: 5). While the brick used are of compressive strength 5.00 N/mm$^2$. Check the design of wall. Assume slenderness ratio of wall as 12. 9

OR

X (a) Explain the method of calculating effective height of masonry wall. 5

(b) A masonry wall carrying an axial load of 9.8KN/m is of 3-5m effective length. It is not braced by cross walls. The effective height of wall is 2.40m. Design the masonry wall. Assume the thickness of wall as 200mm. 10