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(Revision 2010)

Reg. No.....

SIXTH SEMESTER DIPLOMA EXAMINATION IN CIVIL  
ENGINEERING – MARCH 2013

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

[Total Marks: 100]

[Time: 3 Hours]

(Note: IS 456-2000, IS 1905-1987 and IS 1343-1980 are permitted)

**PART- A**  
(Maximum Marks: 10)

Marks

- I. Answer the following questions in one or two sentences. Each question carries 2 marks.
1. What is lever arm?
  2. What is meant by economical percentage of steel?
  3. What is circular pre stressing?
  4. What is creep coefficient?
  5. What is effective thickness of masonry wall? (5x 2=10)

**PART – B**  
(Maximum Marks: 30)

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

1. What are the assumptions in the working stress method?
2. A rectangular reinforced concrete beam of size 250mm X 500mm (overall) is reinforced with 3 bars 16mm diameter in the tension zone. The clear cover is 25mm. Determine the position of the actual neutral axis if  $m=18.7$ .
3. Why high strength materials should be used in pre stressed concrete?
4. Describe pre tensioning.
5. Describe the loss of stress in steel due to elastic shortening of concrete.
6. A masonry wall 300mm thick carries an axial load of 70KN and an eccentric load of 20KN at an eccentricity of 20mm from the centre of the wall. Determine the stress in the masonry at the plane of loading.
7. Differentiate between Load bearing walls and Non load bearing walls with example. (5x6=30)

**PART - C**  
(Maximum Marks: 60)

(Answer one full question from each unit. Each question carries 15 marks. Missing data may suitably assumed. Unit – I shall be answered in working stress method.

**UNIT-I**

- III. a. Write short notes on 1. Under reinforced section 2. Over reinforced section  
3. Balanced section. (9)

- b. A simply supported reinforced concrete beam of effective span 6m carries an uniformly distributed load of 20KN/m (inclusive of self weight) throughout its span. The width and effective depth are 300mm and 680mm respectively. It is reinforced with 3 bars 20mm diameter in the tension zone. Determine the actual stresses in concrete and steel if  $m=18.7$ . (6)

OR

- IV. a. Derive an expression for the neutral axis, lever arm and moment of resistance of a singly reinforced balanced rectangular section if  $\sigma_{cbc}=7N/mm^2$  &  $\sigma_{st}=230N/mm^2$  (8)
- b. A rectangular reinforced concrete beam of concrete grade M20 is 300mm wide is 550mm effective depth. It is provided with 4 numbers of 20mm diameter Fe 250 grade steel rods as tension reinforcement. Determine the moment of resistance of the beam. (7)

UNIT-II

- V. a. Describe Hoyer system of pre tensioning. (7)
- b. What are the advantages of Pre stressed concrete over Reinforced cement concrete? (8)

OR

- VI a. Explain the basic principles in the analysis of pre stressed concrete structures. (8)
- b. Explain Post tensioning. (7)

UNIT - III

- VII. a. Explain the loss stress due to shrinkage of concrete. (3)
- b. A pre stressed concrete beam of rectangular section carries a uniformly distributed load 20KN/m excluding its self weight over an effective span of 10m. Design the beam if it is provided with pre stressing force of uniform eccentricity. The permissible compressive stress in concrete is  $15N/mm^2$  & the permissible stress in tendons is  $1080N/mm^2$ . (12)

OR

- VIII. a. List the various losses in pre stress. (7)
- b. A pre stressed concrete beam 350mm X 550mm in section has a span of 5m and is subjected to uniformly distributed load of 12KN/m including the self weight of the beam. The pre stressing tendons are located along the longitudinal centroidal axis provide an effective pre stressing force of 750KN. Determine the extreme fibre stresses in concrete at the mid span section and Sketch the stress diagram. (8)

UNIT – IV

- IX. a. Explain cavity wall and veneered wall. (6)
- b. Write a note on 1. slenderness ratio 2. Stress reduction factor  
3. shape modification factor. (9)

OR

- X. a. A solid load bearing masonry wall in a building is 3m height and carries an Axial load of 40KN/m at base inclusive of self weight of wall. Design the wall. The wall is fully restrained at top & bottom. The length of wall 4m. Take stiffening coefficient as 1. Use modular bricks. The effective length of wall equal to length of wall. (15)



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