Code : 011726

B.Tech 7th Semester Examination, 2016

Design of Concrete Structure-II

Time : 3 hours *Full Marks : 70*

Instructions :

*(i) There are **Nine** Questions in this Paper.*

*(ii) Attempt **Five** questions in all.*

*(iii) **Question No. 1 is Compulsory.***

(iv) The marks are indicated in the right-hand margin.

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1. Choose the correct answer of the following: (any seven) 2×7=14

(a) The bending moment at the edges of a square vertical bunker due to a lateral pressure 'p' per unit area is:

(i) $pl^2/12$

(ii) $pl^2/10$

(iii) $pl^2/16$

(iv) $pl^2/11$

(b) Minimum percentage are of HYSD reinforcement in a 150 mm thick water tank wall is:

(i) 0.16

(ii) 0.20

(iii) 0.23

(iv) 0.24

(c) For a prestressed concrete bridge beam, a minimum cle spacing of the cable or group of cables should be:

(i) 25 mm

(ii) 25 mm or 6 mm plus the largest size of the aggrega

(iii) 40 mm

(iv) 50 mm

(d) For a two-hinged arch, if one of the supports settles dov vertically, then the horizontal thrust:

(i) is increased

(ii) is decreased

(iii) remains unchanged

(iv) becomes zero

(e) For a symmetrical two hinged parabolic arch, if one of supports settles horizontally, then the horizontal thrust:

(i) is increased

(ii) is decreased

(iii) remains unchanged

(iv) becomes zero

(f) Influence line for horizontal thrust in a two hinged arcl

(i) parabolic

(ii) cubic

(iii) triangular

(iv) rectangle

(g) A symmetrical parabolic arch of span 20 m and rise 5 m is hinged at the springing. It supports a uniformly distributed load of 20 tonnes per metre run of the span. The horizontal thrust in tonnes at each of the springing is:

(i) 8

(ii) 16

(iii) 20

(iv) zero

(h) A two hinged semi-circular arch of radius R carries a concentrated load W at the crown. The horizontal thrust is:

(i) $W/2\pi$

(ii) W/π

(iii) $2W/3\pi$

(iv) $4W/3\pi$

(i) The load factors for live load dead are taken respectively as:

(i) 1.5 and 2.2

(ii) 2.2 and 1.5

(iii) 1.5 and 1.5

(iv) 2.2 and 2.2

(j) For RCC bridges, the smallest span beyond whic the impact factor is same for class A or B or A and 70R loading (wheeled vehicles) is:

(i) 9 m

(ii) 12 m

(iii) 40 m

(iv) 45 m

2. A reinforced concrete shell having a semi-circul directrix is freely supported between the transvers separated by a distance of 35 m. If the radius a thickness of shell are 10 m and 60 mm respective calculate the membrane forces at the crown and edg due to its own self weight and a snow load of 1 kN/ Also calculate the maximum compressive stress concrete and the maximum tension in the edge memb

3. A reinforced concrete shell with a circular directrix the following dimensions.

Distance between the traverses = 30 m

Radius of the shell = 8 m Thickness of shell = 60

Semi-central angle=60°

If the water proofing course and occasional live load is 1 kN/m² of roof surface calculate.

(b) The maximum compressive stress in the shell

(b) Maximum bending moment and tension in the longitudinal edge of the shell. 14

4. The substitute frame of a multi-storeyed building having 3 bays has a continuous beam ABCD with AB=4.0 m BC=2.5 m, and CD=4.0 m. The beams are spaced at 3 m intervals. Thickness for floor slab=120 mm. Live load (office floor) = 4 kN/m². Floor finish=0.6 kN/m². Size of beams=250 mm by 400 mm. Size of columns= 250 mm by 400 mm. Height between floors= 4 m . Analyse the substitute frame and estimate the maximum design moments in the beams and columns. 14

5. A four bay multi-storeyed frame has the following detail. Continuous beam ABCDE with AB=BC=CD=DE=4 m. Height between floors = 4 m. Size of beams = 300 mm by 500 mm. Size of columns=300 mm by 400 mm. Thickness of floor slabs=150 mm. Floor finish=1 kN/ m². Live load= 2 kN/m². Estimate the maximum design moments in the beams and columns. 14

6. A four storey multi-storey building frame has four equal bays of 4 m each and the height between floors is 4 m. The wind loads acting at roof level and various floor levels are, HI= 5 kN, H2=10 kN, H3=10 kN and H4=10 kN. 9

The columns have the same cross section. Estimate the moments in the columns and beams using.

(a) Portal method

(b) Cantilever method 14

7. A square water tank 4 m by 4 m by 4 m is to he supported by a 4 column tower of height 4 m. The columns have independent footing and their base may be considered as hinged. If the dead weight of the tank is 400 kN and weight of water in the tank is 640 kN, design the supporting tower allowing for a wind load of 1.5 k-N/m². Adopt M-20 grade concrete and Fe-415 grade for steel. 14

8. A rectangular water tank 3 in by 4 m with a tank depth of 3 m is supported on a four column tower 6 m in height, braced at the mid height. Assuming the dead weight to tank to be 300 kN and the weight of water as 400 kN, design the columns and braces of the supporting tower. Assume the columns as fixed at the base. Intensity

of wind pressure is 1.5kN/m^2. Adopt M-200 concrete mix and Fe-415 grade tor steel. 14

9. A road bridge deck consists of a reinforced concrete slab continuous over the beams spaced at 2 m centres and cross girders spaced at 5 m centres. Thickness of the wearing coat is 100 aim. Type of loading I.R.C. Class AA or A whichever gives the worst effect. Adopt M-20 grade concrete and Fe-415 grade for steel. Design the deck slab and sketch the details of reinforcements. 14

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