

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2018

Paper Code: ETCE-212

Subject: Design of Concrete Structures

(Batch 2013 Onwards)

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q no.1 which is compulsory.
Use of IS:456:2000 is permitted. Make necessary assumptions, if required, and clearly state them.

- Q1 Attempt **any five** from below:- (5x5=25)
- State the assumptions made in limit state of flexure.
 - What are the factors of Governing Concrete Mix Design?
 - What do you understand by characteristics strength of concrete?
 - What is the creep and shrinkage of concrete? How does water-cement ratio effects creep and shrinkage of concrete.
 - Differentiate between Nominal concrete mix and Design concrete mix with suitable examples.
 - Write a short note on "Problems associated with transportation, pumping and placing of concrete".
- Q2 (a) Determine the percentage of tension reinforcement for a balanced design in a singly reinforced rectangular beam. (4.5)
- (b) Determine the anchorage length of bars for a 300 mm X 500 mm beam, reinforced with 3-25 mm dia. bars as tension reinforcement and 2-12 mm dia. bars as compression reinforcement being simply supported at 300 mm thick brick masonry. The beam is subjected to an Ultimate Shear of 320 KN at the centre of support. Consider M20 grade of concrete and Fe415 grade of steel. (8)
- Q3 (a) Explain behavior of beams without shear reinforcement. (4.5)
- (b) Design a rectangular beam section of 300 mm X 500 mm, subjected to Ultimate Moment of 180 KN-m. Use suitable grades of steel and concrete. (8)
- Q4 (a) Write a short note on behavior of column under uniaxial and biaxial bending. (2.5)
- (b) Design a circular column of 500 mm in dia. with spiral reinforcement for below mentioned data: (10)
- Ultimate axial load : 3500 KN.
 - Unsupported length of column between fixed ends : 3.4m
 - Concrete Grade : M 20
 - Steel Grade : Fe 415
- Q5 (a) Differentiate between one way and two way slabs. Also draw load distribution patterns/diagram for both. (3.5)
- (b) A rectangular beam of section 300 X 500 mm is reinforced with 5 bars of 20mm dia. at bottom. The beam has a clear span of 5.5m and supported on 230mm wide brick masonry at both ends. Design shear and end anchorage for the beam if it is subjected to a uniformly distributed load of 12 KN/m. Consider M25 concrete and Fe 415 Grade of steel. (9)

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- Q6 Design slab for 2.8m X 6m room with 300mm thickness of walls. The slab will be finished with 800 mm thick cement concrete floor topping. Take live load of 4 kN/m², Concrete Grade M25 and Steel Grade Fe 415. Check the slab in deflection and shear. **(12.5)**
- Q7 Design an isolated footing for a column section 300 X 500mm in size and subjected to an axial load of 1600 KN. Consider following in design: **(12.5)**
- (i) Unit weight of soil : 20 kN/m³
 - (ii) Angle of repose : 30 degree
 - (iii) Allowable bearing capacity of soil : 170 KN/m²
 - (iv) Concrete Grade : M 25
 - (v) Steel Grade : Fe 500
- Q8 Analyze T-beam section of 300 mm width of web, 1500 mm width of flange, 100mm thickness of flange and 600 mm effective depth to determine the ultimate moment of resistance for 4-25 mm dia. of steel in tension and 2-14 mm dia. of steel in compression. Take Concrete Grade M 20 and Steel Grade Fe 415. **(12.5)**

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