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## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: M.Tech. ( Structural Engineering) Semester – I  
Subject (Course): Advanced Concrete Structures Max. Marks : 100  
Course Code : MSEG - 716. Duration : 3 Hrs  
No. of page/s: 02

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### Instruction:

- (i) Solve all question from section A&C and any four from section B
- (ii) Assume suitable data if necessary
- (iii) Draw neat sketches whenever required

### Section A

- Q1. a Discuss the Capacity based design concept . 05  
b. Differentiate the behavior of shallow & deep beam 05
- Q2.a How concrete and steel behave under cyclic loading. 05  
b. State the advantage of redistribution concept in design. 05

### Section B

- Q3 a. Discuss the behavior of circular slab. 05  
b. An unbraced column ,300mm x 400 mm in section , is unbraced in both the principle directions. The column ends are fixed, and the column has unsupported length of 3.9 m. The column carries an ultimate axial load of 800 kN and ultimate moments of 80 kNm and 40 kNm about the major axis bisecting the depth, at its ends. Assuming M20 grade concrete, Fe415 steel and effective cover of 60mm. Determine the area of main steel. 15
- Q4. Attempt any two (10x2=20)
- a) A rectangular beam, 300 mm wide and 450 mm deep is reinforced with 3 Nos of 12 mm dia. bars at top and 3 Nos 16 mm dia. bars at bottom ,each provided at an

- effective cover of 40 mm. Assuming M25 grade of concrete and steel of Fe415 grade. Determine the resistance of the beam in pure torsion.
- b) Design a deep beam 300 mm wide and 4 m deep, simply supported over a clear span of 8 m. The beam carries a live load of 120 kN/m at the service state and is supported on walls of 600 mm thick on each side. Use M25 concrete and steel of Fe500.
  - c) A continuous beam ABC, fixed at end supports. The clear distance between supports is 5m with support width 300mm. Design the beam for the live load of 30 kN/m. (No need to calculate absolute value of BM)

### Section C

- Q5.** A single story community hall of 30 X 8 m is provided near a temple. The structural arrangement is a portal frame at spacing of 6m. To keep the roof slab thickness 125 mm, a secondary beam is provided to get the slab panel of 4x6m. The parapet wall of 0.9 m height is also provided at the periphery of hall. The thickness of wall is 150 mm. Design the end portal frame, which is hinged at base, for the loads transfer from slab, beam and parapet wall. The load transfer from slab is 18 kN/m and from beam is 36 kN. (Design of foundation is not required). Using M25 concrete and Fe 500 steel. **20**
- Q6.** Derive the design constant at critical stage of limit state of collapse of the beam of trapezoidal section of depth 750 mm with top and bottom width 600 and 300 mm respectively. Use M20 + Fe 415 materials. **20**
- or**
- Q7.** A roof of a hall measures 24m x 30 m and consists of 16 panels. Design any panel as flat or grid slab. The live load of 5 kN/m<sup>2</sup>. Use M20 & Fe 500 steel. **20**