

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Programme Name: B.Tech. Civil Engineering	Semester : VI
Course Name : Design of Concrete Structure I	Time : 03 hrs
Course Code : CIVL 3031	Max. Marks : 100
Nos. of page(s) : 3	

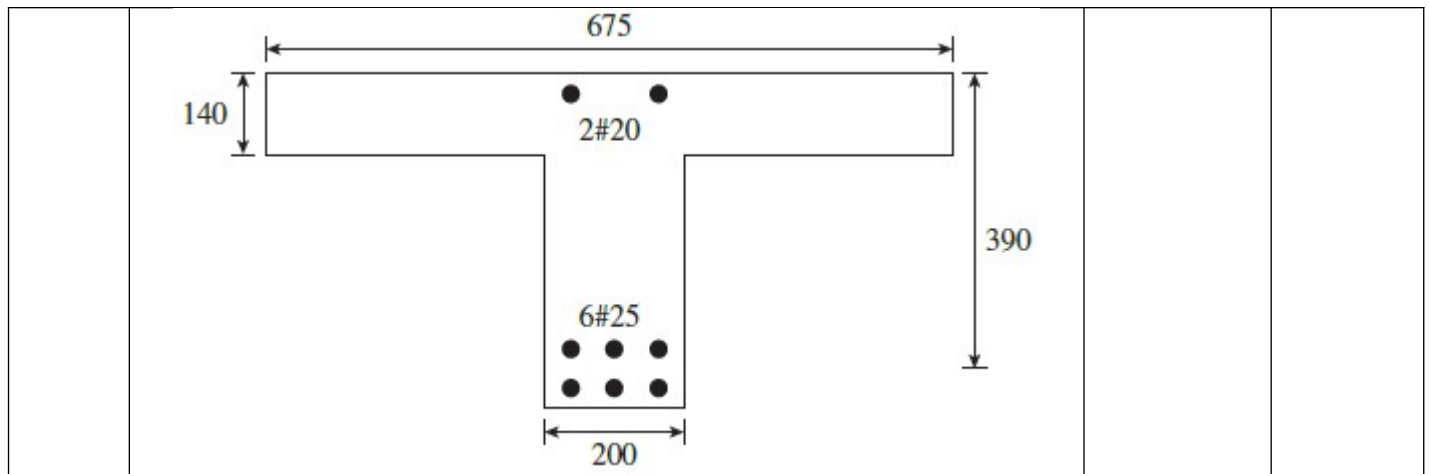
Instructions: **Answer all questions of Section A, B & C**
IS 456 & SP 16 are allowed to use in the exam.

SECTION A

S. No.		Marks	CO
Q 1	Reinforced concrete slabs are generally safe in shear and do not require shear reinforcement. Why?	4	CO2
Q 2	What are factors affecting loads on staircases.	4	CO3
Q 3	Explain the limit state philosophy as detailed in the current IS code.	4	CO1
Q 4	Name any four factors that may affect the compressive strength of concrete.	4	CO1
Q 5	What is a 'theoretical bar cut-off point? Why the code does disallows curtailment of flexural tension reinforcement at this point.	4	CO1

SECTION B

Q 6	Design a rectangular slab panel of size 4 m by 5.5 m, which is continuous over two adjacent edges and simply supported on the other two edges. Assume that the slab supports an imposed load of 3 kN/m ² and a floor finish of 1 kN/m ² . The slab is subjected to moderate exposure and is made of M20 concrete and Fe 415 steel.	5 + 5	CO2 CO4
Q 7	Design a short rectangular column subjected to a factored load of 1400 kN and a factored moment of 90 kNm applied in minor axis. Adopt M25 concrete and Fe 415 grade steel and assume mild environment. <p style="text-align: center;">OR</p> Design a short circular column using the above parameters.	5 + 5	CO2 CO4
Q 8	Calculate the ultimate moment of resistance of a T-beam with the following dimensions: Df = 140 mm, bw = 200 mm, bf = 675 mm, d = 390 mm, d' = 25 mm, and Ast = 6#25 diameter bars and Asc = 2#20. Assume Fe 415 steel and M30 concrete. All dimensions are in mm.	10	CO1



Q 9 Design a waist slab-type dog-legged staircase for a building, given the following data:

- (a) Height between floors = 3 m
- (b) Riser, $R = 150$ mm; tread, $T = 250$ mm
- (c) Width of flight and landing width = 1.25 m
- (d) Imposed load = 4.0 kN/m^2
- (e) Floor finishes = 0.6 kN/m^2

Assume that the stair is to be supported on 230 mm width beams at the outer edges of the landing, parallel to the risers Figure. Use M20 concrete and Fe 415 steel. Assume mild exposure.

5+5

**CO3
CO4**

SECTION-C

Q 10	Design a reinforced concrete continuous beam of rectangular section to support a dead load of 8 kN/m and service live load of 15 kN/m over 4 spans of 8 m each. Assume the ends are simply supported, adopt M20 grade concrete and Fe 415 steel.	10+10	CO2 CO4
Q 11	Design a sloped square footing for a circular column of size 500 mm diameter and subjected to an unfactored load of 1200 kN . Assume SBC	10+10	CO3 CO4

of 200 kN/m² and use M20 concrete and Fe 415 steel.

OR

Design the foundation using all similar properties for a Rectangular column of 400mm x 400mm.