

Name:	 UPES <small>UNIVERSITY WITH A PURPOSE</small>
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Advanced Concrete Structures
Program: M.Tech Structural Engineering
Course Code: CIVL 7005

Semester: I
Duration : 03 hrs.
Max. Marks: 100

Instructions: This is open book examination . Students are allowed to bring hard copy of notes, codes, books and other reference material and use them in examination. Any data required and not provided should be assumed suitably and clearly stated.

SECTION A
(Scan and upload) (5Q x 4M=20 marks)

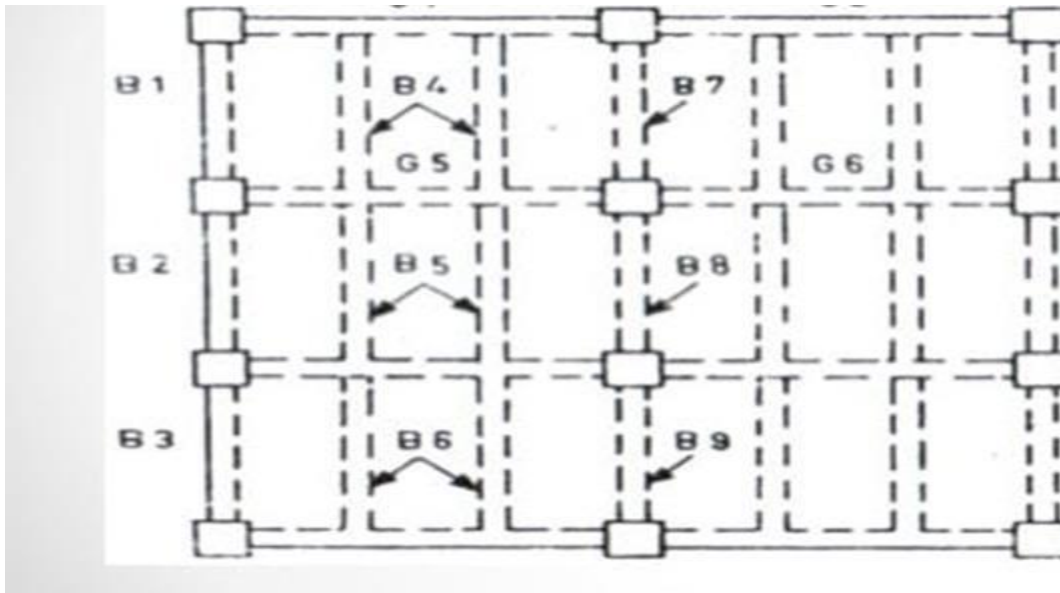
S. No.		Marks	CO
Q 1	What is a smart strand and what is the use of smart strands in prestressed girders.	4	CO1
Q 2	In precast prestressed solid slabs, the prestressing wires can be provided at any convenient spacing, but the same is not possible in case of hollow slabs. Do you agree with this statement . Give reason in support of your answer.	4	CO1
Q 3	A steel wire strand in post tensioned concrete beam can be provided inside a plastic duct or a duct made of steel. During the post tensioning process , which duct is likely to show less losses and why.	4	CO1
Q 4	What is the difference between a concentric bracing and an eccentric bracing. Why is eccentric bracing preferred over a concentric bracing.	4	CO2
Q 5	Consider following types of columns in a concrete building frame: a. A column in middle of frame, b. A column in side middle of frame, c. A column in side end of frame. Which column out of these three is likely to have maximum tensile stress and why.	4	CO2

SECTION B
(Scan and upload) (4Q x 10M=40 marks)

Q 6	Shown below is the first floor plan of a three storey framed residential complex. Same plan exists on all floors. Assume prestressing wires of 8mm diameter having 1500 UTS and M40 grade concrete are available. All other necessary may be assumed and clearly stated.	10	CO1
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Assuming one side of plan as 18m and other side as 15m, suggest suitable spacing between the columns and beams in the plan shown below. Further, assuming precast pretensioned construction,

- Select a precast floor slab either in 'G 5' or in 'G 6' in the plan and design mid section of slab. Sketch all details clearly.
- Select any one beam from 'B 1' to 'B 9' in the plan and design mid section of beam. Sketch all details clearly.



Q 7

In continuation of Q. 6

Select a uniaxially loaded column in the plan and design it.

Or

Select a biaxially loaded column in the plan and design it.

Length of column may be assumed as 3.5m on each floor. Sketch all details clearly.

10

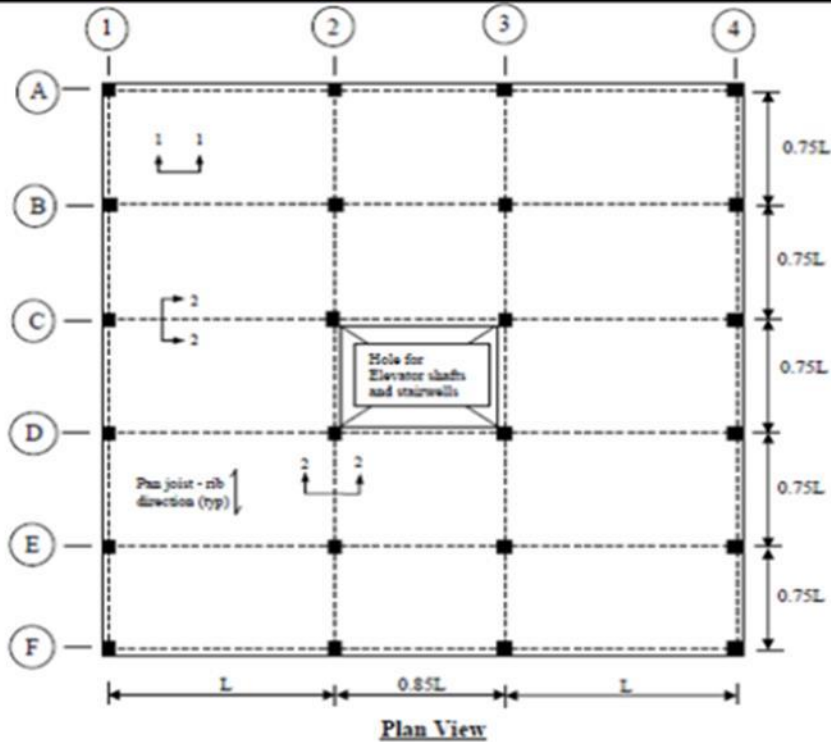
CO1

Q 8

Locate two good positions and two poor positions of shear walls in plan shown below and show these in plan.

10

CO2



Q 9 What is soft storey in multistoreyed frames. Show in a sketch. What is the disadvantage of a soft storey and how it can be strengthened?

10

CO2

SECTION-C
(Scan and upload)

(2Q x 20M=40 marks)

Q 10 A precast counterfort retaining wall 8m high is provided for highway. The earth is level at the top. The wall is made up of precast prestressed slabs filled in between counterfort beams, that are placed at 2.5m c/c.

- Following soil data may be used:
- Density of soil = $w=18 \text{ KN/m}^3$
- Angle of repose = 30 degrees
- Loss of prestress = 15%

Estimate the prestressing force that has to be applied by the jack on the prestressed slabs of the wall. Assume that no anchors are provided.

OR

Assuming that anchors are to be provided to carry half the earth pressure, design a set of two anchors for the retaining wall. Assume that wires of 8mm diameter having 1500 UTS are available for anchors. Show in a figure how these anchors should be placed.

20

CO3

Q 11 A cylindrical grain storage bin is to be constructed in a food processing factory to store 235 tons of paddy level with top. The diameter of bin can not exceed 5 m. Select if a silo or bunker can be used and design it using prestressing wires of 3mm having UTS of 1800MPa and M40 grade concrete. Sketch all details clearly.

20

CO-3