MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2023

SUBJECT: PROGRAMME ELECTIVE IV- Precast Technology [CIE 4054]

Date of Exam:

Time of Exam:

Max. Marks: 50

Instructions to Candidates:

✤ Answer ALL the questions & missing data may be suitably assumed

1A.	Explain the Conceptual Differences between Cast in situ and precast Construction	(04)	CO1	2
1B.	Explain the load Transfer mechanism in braced and unbraced precast frames with figures.	(06)	CO3	2
2A.	Figure shows a symmetrical frame with central bay of 8m and side bay of 6m. The height of all the floors for the upper floors is 3.2m while the ground floor is 5m. Determine, using sub structuring techniques, the bending moments in the beam X and columns Y and Z identified in Figure. The beam–column connections are pinned, and the foundation is rigid. The distance from the edge of the column to the center of the beam end reaction is 100 mm. Characteristic beam loading is $g_k = 37 \text{ kN/m}$ and $q_k = 28 \text{ kN/m}$. Adopt the partial safety factor of 1.5 for Dead load and live load. The cross sectional dimensions of all the elements is 400mm x 400mm. $x = \frac{1}{2} 1$	(07)	CO3	4
2B .	Differentiate Connections and Joints	(03)	CO3	2

3A.	Calculate M_{ST} for the 218mm deep Class 2 prestressed hollow core unit shown in Figure. All the dimensions are mentioned imm. Take initial prestressing force as 70 per cent of characteristic strength of the 'standard' 7-wire helical strand. Manufacturer's data gives relaxation of 2.5 per cent. Geometric and material data given by the manufacturer are a£ follogs: Area = 135×10^3 mm ² ; I = 678×10^6 mm ⁴ ; yt = 99 mm; f _{cu} = 50 N/mm ² ; P _c = 30 kN/mm ² ; f _{ci} = 85 N/mm ² ; P _{ci} = 27 kN/mm ² ; f _{pu} = 1750 N/mm ² ; P _{ps} = 195 kN/mm ² ; Aps = 94.2 mm ² per strand; cover to 12.5 mm diameter strand = 40 mm. Calculate stresses at the top or bottom extreme fibers of the unit?	(07)	CO2	4
3B.	Why is High strength concrete used in precast elements?	(03)	CO5	2
4 A.	Explain the distribution of horizontal loading in a shear wall	(02)	CO4	2
4 B	Describe the three stages of a precast column design.	(03)	CO2	3
4C.	What is infilled shear wall? Explain the load transfer and sway mechanism in the infill walls	(05)	CO4	3
5A.	Describe the load transfer at joints with the help of stress contours	(05)	CO5	3
5B.	Explain the structural features of moment resisting connections.	(05)	CO3	2