

Roll No.

**ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)**  
**B.E. / B.Tech / B.Arch (Full Time) - END-SEMESTER EXAMINATIONS, NOV-DEC 2024**  
**CIVIL ENGINEERING**  
**V Semester**  
**CE5020 PREFABRICATED STRUCTURES**  
**(Regulation 2019)**

Time: 3 hours

Max. Marks: 100

CO1	Understand the principles of modular coordination	
CO2	Know the construction of roof and floors	
CO3	Design for stripping forces	
CO4	Identify the different types of connections between structural members	
CO5	Understand the concept of progressive collapse	

**BL – Bloom's Taxonomy Levels**

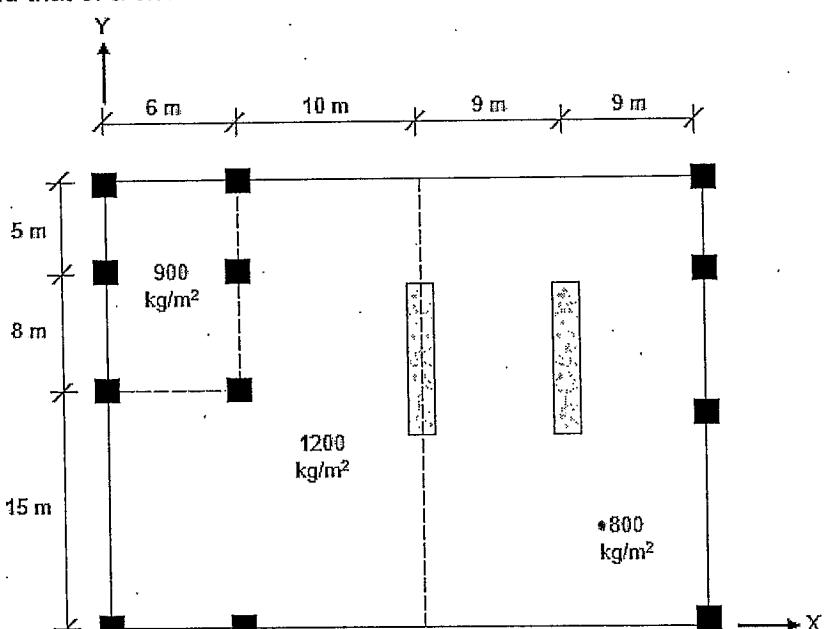
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

**PART - A (10 x 2 = 20 Marks)**

Q. No.	Questions	Marks	CO	BL
1	What is modular grid? Mention its types.	2	1	L2
2	Write a short note on disuniting of prefabricated components.	2	1	L2
3	Define large panel prefabricated system. How its structural scheme is classified?	2	2	L2
4	Write a note on any two types of wet casting.	2	2	L2
5	List the stresses induced in a precast panel during its manufacturing and erection.	2	3	L2
6	What is a draft in precast elements? How is it provided?	2	3	L2
7	Mention any four requirements of a structural joint in a prefabricated structure.	2	4	L2
8	What are key elements in a prefabricated system?	2	4	L2
9	What is the sequence of weakness in a fully tied solution?	2	5	L2
10	What happens during a diaphragm action?	2	5	L2

**PART - B (5 x 13 = 65 Marks)**

Q. No.	Questions	Marks	CO	BL
11 (a)	Explain in detail, the different stages of loading to which a prefabricated component or structure is subjected to.	13	1	L3
<b>OR</b>				
11 (b)	Describe the layout of a factory where prefabricated components are manufactured.	13	1	L3

12 (a)	<p>Consider a 3-bay (in both x and y), 3-storied reinforced concrete school building. Each bay is of span 5 m and storey height is 4 m. The building is located in Chandigarh. The soil condition is soft. The RC frames are filled with brick masonry in all the floors (full-brick thick; unit weight = 18 kN/m<sup>3</sup>). The column dimensions are 300 × 450 mm (columns need not be deducted during wall load calculation; consider walls and columns separately for load calculation). The floor slab is 200 mm thick. The live load on floors and roof shall be considered as 3 kN/m<sup>2</sup>. The frames are designed as special moment-resisting ones. Determine the design seismic load on the structure by static analysis method.</p>	13	2	L4
<b>OR</b>				
12 (b)	<p>Find the eccentricity between the centres of mass and stiffness of the following structure shown in Fig. Q. 12(b) (plan is given). The stiffnesses of each frame parallel to x- and y-directions are, 3k and .5k respectively, and that of a shear wall is 8k.</p> 	13	2	L4
Fig. Q. 12(b)				
13 (a)	<p>A 300 mm × 300 mm column supports a 300 mm wide precast beam on a single-sided reinforced concrete corbel. The beam has pre-tensioning strands extending to the end of the beam. The gap between the end of the beam and column, inclusive of all tolerances is 20 mm. A neoprene bearing pad is used to take end rotations due to flexure. Given that the ultimate end-reaction from the beam is 200 kN, determine the size and reinforcement of the corbel. Consider:</p> <p><math>f_{cu} = 50 \text{ N/mm}^2</math>  <math>f_y = 460 \text{ N/mm}^2</math> (for top steel)  <math>f_y = 250 \text{ N/mm}^2</math> (for mild steel stirrups)  Cover to all steel = 30 mm  Size of bearing pad: 200 mm × 120 mm × 10 mm  Assume any other essential data.</p>	13	3	L4

**OR**

13 (b)	Write a detailed note on the principles and conditions involved in handling stresses without cracking and with controlled cracking, in the context of prefabricated construction.	13	3	L4
14 (a)	Describe the beam-to-column connections in a prefabricated system with suitable illustrations.	13	4	L4

**OR**

14 (b)	Explain in detail about the expansion joints and the jointing materials used in prefabricated construction.	13	4	L4
15 (a)	What is progressive collapse of a structure, in the context of prefabricated structures? Explain any one method in detail, to mitigate the same.	13	5	L4

**OR**

15 (b)	How an abnormal effect such as an earthquake is dealt with, in the design of prefabricated structures? What special provisions are provided for the same?	13	5	L4
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**PART - C (1 x 15 = 15 Marks)**  
(Q. No.16 is compulsory)

Q. No.	Questions	Marks	CO	BL
16.	Explain in detail, the principles involved in the prefabricated design and construction.	15	1	L5

