SRM VALLIAMMAI ENGINEERING COLLEGE
(Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

VII SEMESTER

1903807 – INDUSTRIAL STRUCTURES

B.E CIVIL ENGINEERING

Regulation – 2019

Academic Year 2022 – 23

Prepared by

Mr.G.R.Iyappan, Assistant Professor

B.E. CIVIL ENGINEERING

Vision

To produce competent and quality engineers by imparting knowledge, excellence and global perspectives in Civil Engineering to our students and to make them ethically strong professional engineers to build our nation.

Mission

M1: To produce outstanding graduates with high technical knowledge to serve the nation.

M2: To impart value based education.

M3: To provide solution to the challenges in the field of Civil Engineering.

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DEPARTMENT OFCIVIL ENGINEERING

QUESTION BANK

SUBJECT : 1903807 – INDUSTRIAL STRUCTURES

SEM / YEAR: VII/ IV

UNIT-I - PLANNING

Classification of industries and industrial structures – Site Planning and Selection – Exterior and interior Layout for Industries and buildings - Guidelines from factories act.

PART-A

Q.No	Questions	BT Level	Competence
1.	Discuss about classification of industrial structures.	BT-2	Understand
2.	List the factors that govern the site selection for an industrial building.	BT-1	Remember
3.	List the major components of an industrial building.	BT-3	Application
4.	Discover how industries are classified based on Source of Raw Material?	BT-3	Application
5.	Explain about fixed or position layout.	BT-2	Understand
6.	State the Important Factors for Installation of a Plant.	BT-1	Remember
7.	Write about the basic requirement for a good plant layout.	BT-1	Remember
8.	Classify the different types of structural systems.	BT-2	Understand
9.	Paraphrase the Merits of a Good Plant Layout.	BT-2	Understand
10.	What do you mean by plant layout?	BT-1	Remember
11.	Explain about "Powers of Inspectors" as per The Factories Act, 1948.	BT-2	Understand
12.	List out top 10 criteria for site selection.	BT-1	Remember
13.	Enlist the chapters in Factory act 1948.	BT-1	Remember
14.	Classify the industries based on the ownership and investment.	BT-2	Understand
15.	Describe the principles of plant layout.	BT-1	Remember
16.	Discover how industries are classified based on Ownership?	BT-3	Application
17.	What are the factors to be considered while selecting the site requirements?	BT-1	Remember
18.	Enlist the points to be considered for safety in industries as per The	BT-1	Remember

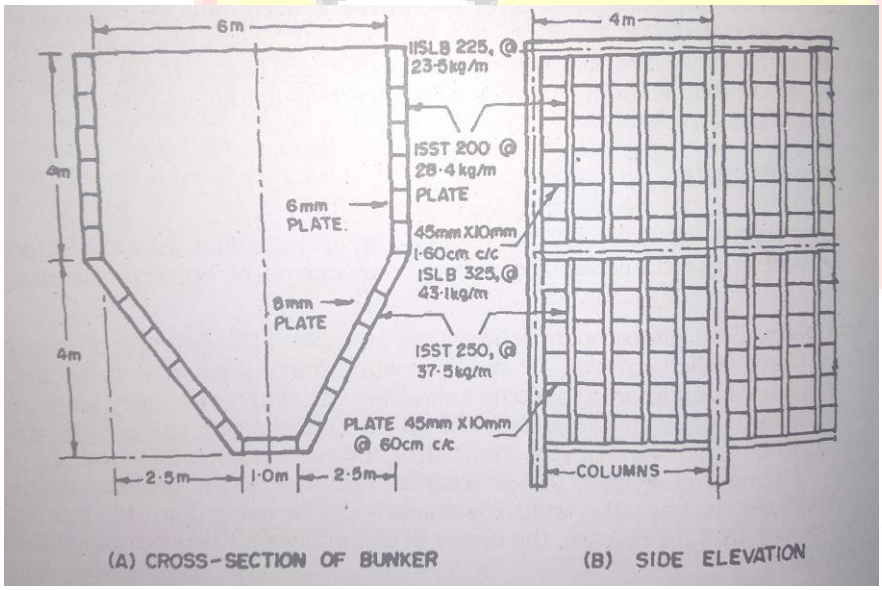
	Factories Act, 1948.		
19.	Compare the merits and demerits of Combination Layout.	BT-2	Understand
20.	Discover some Special provisions given by Factories Act, 1948.	BT-1	Remember
21.	Classify the various types of layouts.	BT-2	Understand
22.	Differentiate line and process layout.	BT-2	Understand
23.	Write about Process or Functional Layout	BT-1	Remember
24.	List out merits of good plant Layout.	BT-1	Remember
25.	Sketch a typical layout of a steel industry and mark its salient features.	BT-1	Remember
	PART-B		
1.	What are the general requirements of industry?	BT-1	Remember
2.	Discuss the various components of industrial building.	BT-2	Understand
3.	Interpret the various safety measures to be maintained in industries.	BT-3	Application
4.	Explain in detail about the objective and importance of plant layout.	BT-1	Remember
5.	Summarize the Guidelines from factories act on “Safety” & “Welfare”.	BT-1	Remember
6.	a) Explain the classification of industries based on NSSO & NBC. b) Explain the applications of product and process layout	BT-4	Analyze
7.	Describe in detail about a) Important Factors for Installation of a Plant b) Basic requirement for good plant layout	BT-3	Application
8.	Describe short notes on a) Product layout b) Process layout	BT-1	Remember
9.	Describe the concept of Industrialization in Building Construction.	BT-2	Understand
10.	Explain the points to be considered for safety in industries as per The Factories Act, 1948.	BT-4	Analyze
11.	Categorize and explain various types of industries related to civil Engineering.	BT-2	Understand
12.	Outline the guidelines from factories act on annual leave with wages and working hours of adults.	BT-4	Analyze
13.	Outline any 10 Factory guidelines as per Factory Act, 1948.	BT-3	Application
14.	Describe the following a) Location layout b) Group layout	BT-1	Remember
15.	Explain in details about various safety measures to be maintained in	BT-2	Understand

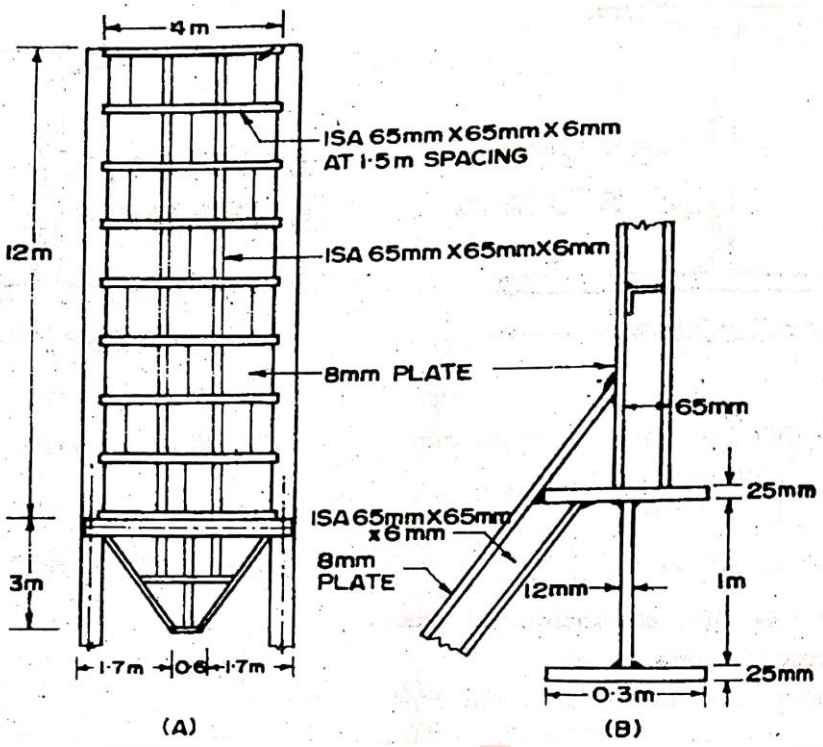
	cement industries.		
16.	Draw and Explain a typical layout plan for a cement manufacturing industry.	BT-1	Remember
17.	Sketch and explain a typical plan for automobile industry.	BT-3	Apply
	PART-C		
1.	Summarize the important guidelines of Factories Act, 1948.	BT-3	Application
2.	Classify and discuss on various types of industrial building.	BT-2	Understand
3.	Explain in detail about the different types of layout.	BT-1	Create
4.	Draw and Explain a typical layout plan for a steel manufacturing industry.	BT-1	Remember
5.	Classify and discuss industrial structures according to national sample survey organization of India.	BT-2	Understand
	UNIT-II FUNCTIONAL REQUIREMENTS Lighting – Ventilation – Noise and Vibration control – Fire safety		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1.	Define Ventilation.	BT-1	Remember
2.	Summarize characteristics of good lighting.	BT-2	Understand
3.	Define Daylight Factor.	BT-1	Remember
4.	Show the principles of day lighting design.	BT-3	Application
5.	Produce the formula for room index.	BT-3	Application
6.	Enlist the types of light sources?	BT-1	Remember
7.	Paraphrase the merits and demerits of different types of light sources.	BT-2	Understand
8.	Define the terms Frequency & Amplitude.	BT-1	Remember
9.	Enlist the Four E's of Fire safety.	BT-1	Remember
10.	Explain about Cross ventilation.	BT-3	Application
11.	List the various ill effects of noise pollution.	BT-1	Remember
12.	Identify the precautions regarding the use of portable electric light.	BT-1	Remember
13.	Discuss about control of heat in ventilation point of view.	BT-2	Understand
14.	Report the various fire extinguishing agents used.	BT-2	Understand
15.	Estimate how industries are protected against vibrations?	BT-2	Understand

16.	What are the sound absorbing materials?	BT-1	Remember
17.	Generalize the causes for fire in Industrial Buildings.	BT-2	Understand
18.	Indicate any four preventive measures against fire in industries	BT-3	Application
19.	Explain the various classification of Fire.	BT-2	Understand
20.	Show how protection against noise can be done in industrial buildings?	BT-3	Application
21.	Give the Pros and Cons of Natural ventilation over Mechanical Ventilation	BT-1	Remember
22.	How can noise originating from mechanical vibrations be controlled?	BT-1	Remember
23.	Write the sources of noise in Industries.	BT-1	Remember
24.	Enlist the types of fire extinguishers.	BT-1	Remember
25.	List the types of fire hazards.	BT-2	Understand
	PART-B		
1.	What are the principles of day lighting design as per SP: 32 – 1986?	BT-1	Remember
2.	Outline the characteristics of good lighting as per SP:32 – 1986 in detail.	BT-4	Analyze
3.	Explain how the noise exposure causes ill effects on human.	BT 4	Analyzing
4.	How could noise control measures achieved by noise pollution control act.	BT 4	Analyzing
5.	Show the classification of lightning? Relate what are the points to be considered for providing natural lighting and ventilation?	BT-3	Application
6.	Outline the effective fire safety planning for industrial building.	BT-1	Remember
7.	What are the methods of providing Ventilation?	BT-1	Remember
8.	Explain the safety measures to be used to minimize noise and vibration in industries.	BT-2	Understand
9.	Summarize the various provisions relating to hazardous processes as per factory act	BT-2	Understand
10.	Discuss in detail about the heat or ignition sources.	BT-2	Understand
11.	Point out the various fire extinguishing agents and extinguishers in detail.	BT-4	Analyse
12.	Show in detail about the general considerations and provisions for acoustics in building.	BT-3	Application
13.	Enlist and discuss about the sources of noise in industries.	BT-1	Remember
14.	Illustrate the control measure for Industrial Noise and Vibration Control.	BT-2	Understand

<table>
<tr><td>15.</td><td>Explain noise control methodologies</td><td>BT 4</td><td>Analyzing</td></tr>
<tr><td>16.</td><td>How could noise control measures achieved by noise pollution control act.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>17.</td><td>Explain the Noise assessment and Evaluation associated with noise pollution studies?</td><td>BT 4</td><td>Analyzing</td></tr>
<tr><td colspan="4">PART-C</td></tr>
<tr><td>1.</td><td>Assume a drop forge shop 60 m long x 30 m wide x 10 m roof height at the monitor above the inlet openings. The cubic content of the shop space is 19500 m^3. The desired summer temperature rise for this height of the building may be assumed as 5°C and prevailing winds assumed to be 14 km/h perpendicular to the longer sides of the building, that is, across the monitor. If the internal sensible heat and the solar heat gain into the building in the afternoon is assumed to 780800 W.
Find:
a) The area of openings at the inlets (windows/louversz) and outlets (at the monitor)
b) The rate of air flow through the building.</td><td>BT-5</td><td>Evaluate</td></tr>
<tr><td>2.</td><td>Determine the fenestration percent for the following condition in both Poor & Good Maintenance
<table>
<tr><th>Lux</th><th>Bay condition</th><th>Bay width (m)</th><th>Sill height (m)</th></tr>
<tr><td>250</td><td>2-Bay</td><td>4</td><td>6.5</td></tr>
<tr><td>200</td><td>4-Bay</td><td>4</td><td>5</td></tr>
<tr><td>300</td><td>6-Bay</td><td>7</td><td>8</td></tr>
<tr><td>200</td><td>8-Bay</td><td>10</td><td>6.5</td></tr>
<tr><td>150</td><td>6-Bay</td><td>7</td><td>5</td></tr>
</table></td><td>BT-2</td><td>Understand</td></tr>
<tr><td>3.</td><td>With help of case study, explain the various ignition sources in industries.</td><td>BT-3</td><td>Application</td></tr>
<tr><td>4.</td><td>Explain about the Provisions of Natural Ventilation as per IS code.</td><td>BT-1</td><td>Remember</td></tr>
<tr><td>5.</td><td>List out various types of fire extinguisher explain in details.</td><td>BT-1</td><td>Remember</td></tr>
<tr><td colspan="4"><u>UNIT-III - DESIGN OF STEEL STRUCTURES</u>
Pre-engineered and Mill buildings – Transmission Lines Towers – plate girders. Bunkers and Silos – pipe/cable racks- Chimney.</td></tr>
<tr><td colspan="4">PART-A</td></tr>
<tr><td>Q.No</td><td>Questions</td><td>BT Level</td><td>Competence</td></tr>
</table>

1.	Define sag in towers.	BT-1	Remember
2.	Define the term: wind span and Weight span	BT-1	Remember
3.	List the types of towers recommended as per the codal provisions.	BT-1	Remember
4.	Sketch the flow and segregation patterns in bins.	BT-2	Understand
5.	Draw a neat sketch of a single diagonal braced tower.	BT-2	Understand
6.	List out the components of bunkers.	BT-1	Remember
7.	List out the advantages of pre-engineered buildings.	BT-1	Remember
8.	What are the forces acting on steel chimney?	BT-1	Remember
9.	What are the factors involving in selection of base dimensions of chimneys?	BT-1	Remember
10.	Classify various types of chimneys.	BT-2	Understand
11.	Discuss about Stayed Chimney.	BT-3	Application
12.	Differentiate bunkers and silos.	BT-3	Application
13.	Write the formula for calculating the inside diameter of the chimney.	BT-1	Remember
14.	Explain about self-supporting chimney.	BT-2	Understand
15.	Show some structural sub systems in pre-engineered buildings.	BT-3	Application
16.	Enlist the components of plate girder.	BT-1	Remember
17.	Tell about Structural Steel Pipe Racks.	BT-1	Remember
18.	Recall the three types of loads caused by a stored material in a bin structure.	BT-1	Remember
19.	Write the formula for Draft losses due to sudden change of sections.	BT-1	Remember
20.	Discuss about the Failure of silos.	BT-1	Remember
21.	Explain the economic considerations in Bunker design.	BT-2	Understand
22.	Give any two structural design recommendations for bunkers.	BT-1	Remember
23.	Give any two structural design recommendations for Silos.	BT-1	Remember
24.	Draw a typical detail of steel bunker.	BT-3	Application
25.	Enlist the forces acting on transmission line towers.	BT-2	Understand
PART-B			
1.	Explain the following a) Self-supporting tower	BT-3	Application

	b) Guyed towers c) Monopole		
2.	Explain the step by step procedure for design of Intermediate stiffeners in a plate girder		
3.	Explain the step by step procedure for design of vertical stiffeners in a plate girder.	BT-2	Understand
4.	Discuss about JANSSEN'S Theory for the design of bunkers and silos.	BT-3	Application
5.	Design a welded plate girder (with Thick web plate) of 20m span to support a UDL (live load) of 70kN/m over the span with yield stress of steel as 250 N/mm^2. Use IS 800-2007 and steel tables.	BT-1	Remember
6.	Design a welded plate girder (with Thin web plate of 8 mm) of 18m span to support a UDL (live load) of 60kN/m over the span with yield stress of steel as 250 N/mm^2. Use IS 800-2007 and steel tables.	BT-2	Understand
7.	Explain in detail about the tower configurations in T.L Towers.	BT-1	Remember
8.	Differentiate and discuss about the pre-engineered building with that of conventional building.	BT-4	Analyse
9.	A rectangular steel bunker of 12m length and 6m width supported on 8 columns to store coal of bulk density 8kN/m^3 and angle of internal friction as 35^0. Calculate the vertical, horizontal and busting forces on the bunker. Use IS: 9178 (Part 1 & 2):1979.  	BT-5	Evaluate
10.	a) Predict the important factors to be considered in choosing steel chimney for design b) Report the factors influencing base dimensions of chimney	BT-2	Understand
11.	a) Record the properties for the suitable brick that is used for chimney.	BT-2	Understand

	b) Identify the formulae for the Draft losses in combustion chamber.		
12.	Describe about a bunker and its components with neat sketch.	BT-2	Understand
13.	A self-supporting steel chimney is 80 m high and 3 m diameter at top. Identify the thickness of plate required at 10 m and 20 m from top. Assume wind pressure as 1.5 kN/m^2. Use IS 6533 (Part 1 & 2): 1989.	BT-1	Remember
14.	Explain the difference between bunkers and silos in various aspects.	BT-3	Application
15.	Explain the various components of pre-engineered building.	BT-2	Understand
16.	Compare conventional steel building and Pre-Engineered Building.	BT-4	Analyse
17.	List out the design procedure for Pre-Engineered Building.	BT-2	Understand
	PART-C		
1.	Explain in detail about transmission line tower with neat sketch.	BT-5	Evaluate
2.	Design a circular steel silo of 12m height and 4m internal diameter to store cement's bulk density of 15.50 kN/m^3 with angle of internal friction 25^o. The dimension of the silo is shown below with stiffeners.  Use IS: 9178:1979. & Steel Tables.	BT-2	Understand
3.	Analyze the concept of AIRY'S Theory for the design of bunkers and silos.	BT-4	Analyse
4.	Discuss the criteria for design of steel bins as per IS: 9178:1979.	BT-2	Understand
5.	Show in details about the behavior of components in gantry girder.	BT-2	Understand

UNIT-IV DESIGN OF R.C. STRUCTURES

Corbels, Brackets and Nibs - Silos and bunkers –Chimney –Cooling Towers (Principles only)

Q.No	Questions	BT Level	Competence
1.	Define Bin.	BT-1	Remember
2.	Give a short note on silos.	BT-1	Remember
3.	Write the formula for calculating the thickness of bin walls.	BT-1	Remember
4.	What are the loading conditions while designing a bunker?	BT-1	Remember
5.	Summarize the factors influencing in selection of height of chimney.	BT-2	Understand
6.	What are all the stresses acting in concrete chimneys?	BT-1	Remember
7.	Give the formula for height of the stack in chimneys.	BT-1	Remember
8.	Draw the pressure variation along bin depth.	BT-3	Application
9.	Justify the purpose of providing lining in chimneys.	BT-3	Application
10.	Explain the Factors Increasing the Bin Loads.	BT-2	Understand
11.	Define Corbel.	BT-1	Remember
12.	Distinguish between corbel and nibs.	BT-3	Application
13.	Enlist the parameters which influence the design of bunkers.	BT-2	Understand
14.	What are the Mechanical draft towers available in airflow arrangements?	BT-1	Remember
15.	Under what circumstances bin walls shall be examined for stability?	BT-2	Understand
16.	Discuss about brackets in RCC structures.	BT-2	Understand
17.	What are the parameter measured during the performance evaluation of cooling towers?	BT-1	Remember
18.	Write the design consideration for brickwork in chimneys.	BT-1	Remember
19.	How does a cooling tower works?	BT-1	Remember
20.	What is the minimum requirement of vertical and horizontal reinforcement of bins?	BT-1	Remember
21.	What are the several important factors that govern the operation of cooling tower?	BT-1	Remember
22.	Sketch the distribution of corbel reinforcements.	BT-3	Application
23.	Sketch a typical cooling tower model and name the components.	BT-3	Application
24.	Write the Cooling Tower Design Consideration in practice.	BT-3	Application
25.	List the types of cooling towers.	BT-3	Application

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PART-B			
1.	Develop a corbel design for a 350mm square column to support an ultimate vertical load of 600kN with its line of action 200mm from the face of the column. Use M 20 grade concrete and Fe 415 grade steel.	BT-2	Understand
2.	Design a continuous nib (beam support) projecting from an RCC wall to support a prefabricated slab unit transmitting a service shear force of 15kN/m, given that the following data Projection of nib = 200mm and A_v = 100mm M 30 and Fe 415 grade of materials.	BT-2	Understand
3.	Estimate a corbel to support a factored load of 400 kN at a distance of 200mm from the face of the column. The dimension of the column is 300mm x 400mm. Use M 20 and Fe 415 steel.	BT-4	Analyse
4.	Reproduce the design of a RCC corbel to carry a factored load of 500 kN at a distance 200 mm from the face of a 300 x 300 RCC Column. Use M30 concrete and Fe 415 steel.	BT-3	Application
5.	Design the side walls of a circular bunker of capacity of 300 kN of coal having a unit weight of 8 kN/m^3. The stored coal is to be surcharged at an angle of repose which is 25˚ for coal. Design the side walls. Adopt M 20 grade of concrete and Fe 415 steel. Use IS 4995 – 1974.	BT-4	Analyse
6.	Write down design criteria for the design of silos as IS code.	BT-1	Remember
7.	Discuss about different types of cooling towers.	BT-2	Understand
8.	Outline the design criteria for the design of RCC Chimney as per IS code.	BT-1	Remember
9.	A concrete chimney of height 80m with external diameter of shaft being 4m at top and 5m at bottom is required in a place where wind intensity is 1.5kN/m^2. Thickness of fire lining is 10 cm. temperature differences between inside and outside of the shaft is 75^0C. Permissible bearing pressure on soil at site is 150kN/m^2. Adopt M25 and Fe415 and design the base of the chimney.	BT-1	Remember
10.	Outline the Procedure for Design of Bunkers.	BT-1	Remember
11.	Discuss the factors affecting Cooling Tower Performance.	BT-2	Understand
12.	A rectangular cylindrical bunker is to be designed to store 300 kN of coal having a unit weight of 8 kN/m^3. The stored coal is to be surcharged at an angle of repose which is 25˚ for coal. Design the side walls. Adopt M 20 grade of concrete and Fe 415 steel.	BT-4	Analyse

13.	Compare and contrast about cross flow & counter flow in cooling towers.	BT-4	Analyze
14.	Explain the components of cooling tower in detail.	BT-3	Application
15.	Design a RC corbel to carry load of 350 kN acting at a distance of 250 mm from the face to face of a column of size 300 x 450 mm. the corbel is provided on the 300 mm face, sketch the reinforcement details.	BT-2	Understand
16.	Explain in detail about Strut and tie method of analysis for concrete structures.	BT-2	Understand
17.	Summarize the step by step procedure for Design of Corbels using IS code.	BT-2	Understand
	PART-C		
1.	Write the step by step design procedure for CORBEL and NIBS.	BT-6	Create
2.	Outline the design procedure for bunkers as per IS: 9178:1979.	BT-5	Evaluate
3.	Explain in detail about Cooling towers with neat sketch.	BT-4	Analyze
4.	Explain the design criteria for design of reinforced concrete bins for storage of granular and powdery materials as per IS: 4995 (Part II) – 1974.	BT-3	Application
5.	Outline the design criteria for the design of RCC SILO and Bunkers as per IS code.	BT-2	Understand
	UNIT-5 - PREFABRICATION Principles of prefabrication and pre cast construction – Prestressed precast roof trusses - Floor slabs - Wall panels- Handling and erection stresses –joints in precast structures.		
1.	Classify the methods for Production of prefabricated components.	BT-2	Understand
2.	Write the need for prefabrication.	BT-3	Application
3.	Explain the types of Prefabrication.	BT-2	Understand
4.	Distinguish between site prefabrication and plant prefabrication	BT-2	Understand
5.	Define Prefabrication.	BT-1	Remember
6.	What are the different types of joints?	BT-1	Remember
7.	Define Long Wall System.	BT-1	Remember
8.	State the Principles of prefabrication.	BT-1	Remember

9.	How are precast floors classified?	BT-1	Remember
10.	List out the prefabricated structural units.	BT-1	Remember
11.	Write short note on cross walls.	BT-1	Remember
12.	Classify the precast concrete walls	BT-2	Understand
13.	Give classification of wall panels	BT-2	Understand
14.	How are roofing members in prefabricates classified?	BT-1	Remember
15.	Enlist the different types of beam and column connections?	BT-2	Understand
16.	Discuss about the ring system.	BT-1	Remember
17.	Point out the recommended lateral load resisting elements in a building.	BT-4	Analyse
18.	Point out the application of Prefabrication.	BT-3	Application
19.	Compare and contrast the advantages & disadvantages of Prefabrication.	BT-1	Remember
20.	Explain the characteristics of materials used for construction of PFS?	BT-3	Application
21.	Explain about Prestressed precast roof trusses.	BT-2	Understand
22.	Is precast concrete expensive? Justify.	BT-4	Analyse
23.	What are the advantages of precast concrete construction?	BT-1	Remember
24.	What are the advantages of prestressed concrete construction?	BT-1	Remember
25.	What is the difference between precast and prestressed concrete?	BT-1	Remember
	PART B		
1.	What are the different types of Structural Systems used in Prefabricated Structures? Explain	BT-2	Understand
2.	Describe in detail about the a) The Principle of Prefabrication (5 Marks) b) The need for Prefabrication (4 Marks) c) Uses of Prefabrication (4 Marks)	BT-4	Analyse
3.	Write short note on a) Prefabrication. (3 marks) b) Materials used in prefabrication. (3 marks) c) Advantages and disadvantages (4 marks) d) Applications of prefabrication. (3 marks)	BT-6	Create
4.	Classify the structure of building based on the load distribution and briefly explain the different types of such prefabricated building.	BT-1	Remember

5.	Discuss the different types of Structural system of prefabrication used in prefabricated structures.	BT-2	Understand
6.	Describe the manufacturing Process of wall panels.	BT-3	Application
7.	Explain the methods of construction of roof and floor slab.	BT-1	Remember
8.	Describe in detail about large panel construction with neat sketch.	BT-3	Application
9.	Describe in detail about exterior and interior wall construction with neat sketches.	BT-5	Evaluate
10.	Explain the various types of Column - Column connection.	BT-1	Remember
11.	Compare between precast components and cast in-situ components.	BT-2	Understand
12.	Explain the various types of beam column connection.	BT-4	Analyse
13.	Explain the production process with a flow chart describing the process	BT-1	Remember
14.	Write the construction Sequence Prestressed precast roof trusses.	BT-3	Application
15.	List the various equipments used in the erection of prefabricated system and explain any two in detail.	BT-1	Remember
16.	Write case study on the need for prefabrication with an example	BT-2	Understand
17.	Examine, the concept of deflection control and lateral load resistance of prefabricated structures?	BT-1	Remember
	PART-C		
1.	Discuss the process of production, transportation and erection of prefabrication	BT-2	Understand
2.	Evaluate the joint Techniques and materials used in details and explain the design of joints.	BT-3	Application
3.	Describe different types of wall panels based on the materials.	BT-1	Remember
4.	With the help of case study explain about Prestressed precast roof trusses.	BT-3	Application
5.	Discuss, how the material selection impacts the design efficiency of a Precast element.	BT-1	Remember