

VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK



VIII SEMESTER

CE6015 –TALL BUILDINGS

Regulation – 2013

Academic Year 2017 – 18

Prepared by

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SUBJECT : CE6015/TALL BUILDINGS

SEM / YEAR : VIII/IV

<u>UNIT 1- DESIGN CRITERIA AND MATERIALS</u>			
Development of High Rise Structures - General Planning Considerations – Design philosophies - Materials used for Construction - High Strength Concrete - High Performance Concrete - Self Compacting Concrete - Glass - High Strength Steel.			
PART – A			
Q. No	Questions	BT Level	Competence
1.	Define the term “Tall Building”	BT-1	Remember
2.	Why tall buildings?	BT-1	Remember
3.	What are the different classifications of tall building?	BT-1	Remember
4.	Describe about development of High Rise Structure.	BT-1	Remember
5.	What are the different materials used for construction?	BT-1	Remember
6.	Write the applications of Self Compacting Concrete.	BT-1	Remember
7.	Discuss the various performance required for a building.	BT-2	Understand
8.	Discuss about High Performance Concrete	BT-2	Understand
9.	Distinguish between High Performance Concrete and High Strength Concrete.	BT-2	Understand
10.	Discuss about High Strength Steel	BT-2	Understand
11.	Classify the three periods of development of tall buildings from the history.	BT-3	Application
12.	Show the applications of High Strength Steel.	BT-3	Application
13.	Show the advantages of High Strength Steel.	BT-3	Application
14.	Explain about High Strength Concrete.	BT-4	Analyse
15.	Compare static and dynamic load.	BT-4	Analyse
16.	Explain the planning considerations.	BT-4	Analyse
17.	Generalize the applications of High Performance Concrete and state its advantages.	BT-5	Evaluate
18.	Prepare a notes on Self Compacting Concrete	BT-5	Evaluate

19.	Mention the materials used in High Performance Concrete	BT-6	Create
20.	State the advantages of Self Compacting Concrete	BT-6	Create
PART –B			
1.	i. What are the various design philosophies? (8) ii. Describe the evolution of one from the other with proper consideration of their merits and demerits. (8)	BT-1	Remember
2.	Explain the various tall buildings present all over the world along its specifications.	BT-1	Remember
3.	i. Describe the characteristic and uses of fiber reinforced concrete. (9) ii. What are the advantages of light weight concrete? (7)	BT-1	Remember
4.	Describe Self-Compacting Concrete and state its applications.	BT-1	Remember
5.	Differentiate High Performance Concrete from High Strength Concrete. Explain briefly.	BT-2	Understand
6.	i. Discuss about High Strength Concrete and its applications. (9) ii. Summarize its advantages and disadvantages of High Strength Concrete. (7)	BT-2	Understand
7.	i. Discuss about High Performance Concrete and its applications. (9) ii. Summarize its advantages and disadvantages of High Performance Concrete. (7)	BT-2	Understand
8.	Show the applications of the following. i. High Strength Concrete (4) ii. High Performance Concrete (4) iii. Self-Compacting Concrete (4) iv. High Strength Steel. (4)	BT-3	Application
9.	Discover the general planning considerations for tall building.	BT-3	Application
10.	i. Show the various materials used in High Strength Concrete. (8) ii. Classify the different materials used in High Performance Concrete. (8)	BT-3	Application
11.	Explain High Strength Steel and mention its advantages and disadvantages of High Strength Steel.	BT-4	Analyse
12.	Explain the various materials used for the construction of buildings.	BT-4	Analyse
13.	Write a brief notes on the development of high rise structures.	BT-5	Evaluate
14.	Summarize a short note on glasses and its application in construction. Mention its advantages and disadvantages.	BT-6	Create

UNIT II- LOADINGS

Gravity loading – Dead Load – Live load- Live load reduction technique – Impact load-Construction load - Sequential Loading-Lateral Loading-Wind load- Earthquake Load-Combination of Loads.

PART – A

Q. No	Questions	BT Level	Competence
1.	Define Gravity Load.	BT-1	Remember
2.	What is the effect of Gravity loading on tall buildings?	BT-1	Remember
3.	How will you calculate the dead load and live load in a building?	BT-1	Remember
4.	List the various live load reduction techniques.	BT-1	Remember
5.	Define Impact Load and Construction Load.	BT-1	Remember
6.	Summarize about Sequential Loading and Lateral Loading.	BT-2	Understand
7.	What is the effect of wind loading on Tall building?	BT-1	Remember
8.	Discuss Wind tunnel test. Mention its types.	BT-2	Understand
9.	Generalize circulation of world winds	BT-5	Evaluate
10.	Write the equation of mean wind speed.	BT-2	Understand
11.	Discuss building drifting?	BT-2	Understand
12.	Illustrate earthquake loading	BT-3	Application
13.	Show the two approaches used to estimate the seismic loading?	BT-3	Application
14.	Discover the criteria's which are considered for the construction of new structures subjected to earthquake ground motions	BT-3	Application
15.	Explain damping. Mention its types.	BT-6	Create
16.	Prepare a general principles adopted for the design of earthquake resistant buildings?	BT-5	Evaluate
17.	Classify the different combination of loading which considers in design of tall buildings.	BT-4	Analyze
18.	Compare static and dynamic analysis?	BT-4	Analyze
19.	Explain the Gust Factor method	BT-4	Analyze
20.	Summarize modal analysis. State its advantages and disadvantages.	BT-6	Create

PART– B

1.	Describe the method of calculating gravity loading, wind load and dead load. Give examples in each case.	BT-2	Understand
2.	i. Show gravity loading on tall building (7) ii. Classify the three methods of live load reduction along with their examples. (9)	BT-3	Application

3.	Define live load reduction? How can it be incorporated in analysis?	BT-1	Remember
4.	Describe the Live load reduction technique on tall building.	BT-2	Understand
5.	Write short notes on i. Impact load (5) ii. Construction load (6) iii. Lateral Loading (5)	BT-1	Remember
6.	Discuss the following terms i. Sustained load? (8) ii. Extraordinary load? (8)	BT-1	Remember
7.	Describe the method of calculating earthquake load and sequential loading? Give examples for each.	BT-2	Understand
8.	Discuss on loading in tall building with emphasis on earth quake loading and wind loading.	BT-4	Analyze
9.	Illustrate the behavior of tall building during earthquake.	BT-3	Application
10.	Discover the philosophy of earthquake design.	BT-3	Application
11.	Identify the load combinations of Earthquake in X and Y direction.	BT-1	Remember
12.	Explain the procedure for equivalent lateral force and modal analysis.	BT-4	Analyze
13.	i. Generalize about the static pressure distribution on a building. (8) ii. Design static pressure distribution on a building. (8)	BT-5	Evaluate
14.	Summarize the following i. Working stress design (5) ii. Limit state design (6) iii. Plastic design (5)	BT-6	Create

UNIT 3- BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS

Factors affecting growth, height and structural form - High rise behavior of various structural systems - Rigid frames, braced frames, In-filled frames - shear walls, coupled shear walls, wall-frames, tubular structures - cores, outrigger- braced and hybrid mega systems.

PART –A

Q. No	Questions	BT Level	Competence
1.	List the factors which affect the growth, height and structural form of structures.	BT-1	Remember
2.	What is meant by flat-plate structures?	BT-1	Remember

3.	What is meant by Hybrid structure?	BT-1	Remember
4.	What are the important aspects in shear wall design?	BT-1	Remember
5.	What are the various framed-tube systems?	BT-1	Remember
6.	Why tube systems need to be braced?	BT-1	Remember
7.	Differentiate the rigid frame and In-filled frame.	BT-2	Understand
8.	Difference between shear wall and coupled shear wall.	BT-2	Understand
9.	Discuss passive system.	BT-2	Understand
10.	Discuss the behavior of symmetric wall frames.	BT-2	Understand
11.	Classify the various structural systems.	BT-3	Application
12.	Show the behavior of braced frame structures.	BT-3	Application
13.	Examine the significance of shear walls.	BT-3	Application
14.	Explain i. Outrigger-Braced structure. ii. Suspended structure.	BT-4	Analyze
15.	Explain about Bundled-Tube structures	BT-4	Analyze
16.	Define wall-frame structures.	BT-4	Analyze
17.	Design the Space structures with a neat sketch.	BT-5	Evaluate
18.	Sketch and design a typical tubular system.	BT-5	Evaluate
19.	Summarize the following i. Core structures ii. Space structure	BT-6	Create
20.	Summarize the Hybrid mega structures	BT-6	Create
PART –B			
1.	What are the various factors which affect the growth, height and structural foam?	BT-1	Remember
2.	i. What are the various structural forms? (4) ii. Explain about any five structural forms. with a neat sketch. (12)	BT-1	Remember
3.	What is shear wall? Explain the behavior of shear walls	BT-1	Remember
4.	What is meant by Framed-Tube Structures? Explain its types.	BT-1	Remember
5.	Discuss the following:- i. Rigid-Frame structure (5) ii. In filled-Frame structure (6) iii. Braced-Frame structure (5)	BT-2	Understand
6.	Differentiate the behavior of shear wall structures with that of braced frame structure.	BT-2	Understand
7.	Discuss the following i. Tube-in Tube structures (8)	BT-2	Understand

	ii. Bundled-Tube structures (8)		
8.	Show with an example the equivalent stiffness method of analysis of a shear wall building?	BT-3	Application
9.	Show the behavior of the following i. Outrigger-Braced structures (8) ii. Suspended structures (8)	BT-3	Application
10.	Show the concept of the following i. Core structures (8) ii. Space structures (8)	BT-3	Application
11.	Explain the utility of box systems and composite floor system in the tall building.	BT-4	Analyze
12.	Explain braced frame by approximate method?	BT-4	Analyze
13.	Write a short note on the following i. Bearing wall structures (8) ii. Shear core structures (8)	BT-5	Evaluate
14.	Summarize the Hybrid mega structures with a neat sketch.	BT-6	Create

UNIT 4- ANALYSIS AND DESIGN

Modeling for approximate analysis - Accurate analysis and reduction techniques-
Analysis of buildings as total structural system- Considering overall integrity and major
subsystem interaction- Analysis for member forces- drift and twist- computerized
general three dimensional analysis

PART – A

Q. No	Questions	BT Level	Competence
1.	How to calculate the member forces?	BT-1	Remember
2.	Define the term drift and twist.	BT-1	Remember
3.	Define lumping. Mention its types.	BT-1	Remember
4.	How to computerized general three dimensional analysis	BT-1	Remember
5.	What are factors influencing fire resistance?	BT-1	Remember
6.	What is the role of reinforcement in column stresses due to creep and shrinkage?	BT-1	Remember
7.	Summarize the term creep and shrinkage.	BT-2	Understand
8.	Discuss the 3D frame by computer methods.	BT-2	Understand
9.	Discuss on Hybrid approach of analysis. When this type of analysis will be adopted?	BT-2	Understand
10.	Describe the various assumptions to analyze the high-rise building.	BT-2	Understand
11.	Classify the different methods of modeling for approximate analysis?	BT-3	Application

12.	Classify the different reduction techniques used to simplify the model for analysis?	BT-3	Application
13.	Show the different effects of soil-structure interaction?	BT-3	Application
14.	Explain the differential movement in tall buildings.	BT-4	Analyze
15.	Explain the category of interior structures	BT-4	Analyze
16.	Explain the category of exterior structures	BT-4	Analyze
17.	Generalize the most commonly used structural system.	BT-5	Evaluate
18.	Generalize the sub systems and components.	BT-5	Evaluate
19.	Summarize the moment of inertia of twisted forms.	BT-6	Create
20.	Summarize the drift limitations for various types of structures.	BT-6	Create
<u>PART B</u>			
1.	How do you go about the approximate analysis of wall frame structures and shear wall structures.	BT-1	Remember
2.	What are the various factors which affects the creep and shrinkage movements in concrete? Describe it briefly.	BT-1	Remember
3.	Show how you would carry out analysis of structures as an Integral unit.	BT-1	Remember
4.	With the help of a case study, list the procedure of design for differential movement.	BT-1	Remember
5.	Discuss about the behavior of symmetric wall frames and its advantages for horizontal interaction in design of wall frames?	BT-2	Understand
6.	Discuss about Accurate analysis and reduction techniques	BT-2	Understand
7.	Discuss about Analysis of buildings as total structural system	BT-2	Understand
8.	Illustrate the study of high rise residential building in Indian cities (a case study –Pune city)	BT-3	Application
9.	Illustrate the study of high rise residential building in Indian cities (a case study –Chennai city)	BT-3	Application
10.	Show how would you design for temperature loads in case of a 40 storey building having a total height of 200m and temperature change in steel column as $\Delta=40$ deg and $a=0.5 \times 10^{-6}$.	BT-3	Application
11.	Explain about the modeling for approximate analysis.	BT-4	Analyse
12.	Infer the analysis for member forces, drift and twist on buildings.	BT-4	Analyse
13.	i. Generalize the steps for the analysis of structural actions in temperature effects. (8) ii. Generalize the effects of differential movements. (8)	BT-5	Evaluate
14.	Summarize the computerized general three dimensional analysis	BT-6	Create

UNIT 5- STABILITY OF TALL BUILDINGS

Overall buckling analysis of frames- Wall-frames- Approximate methods- Second order effects of gravity of loading- P-Delta analysis, Simultaneous first-order and P-Delta analysis - Translational, Torsional instability - out of plumb effects, stiffness of member in stability - effect of foundation rotation.

PART – A

Q. No	Questions	BT Level	Competence
1.	What do you mean by deep beam?	BT-1	Remember
2.	Define stability.	BT-1	Remember
3.	What is the role of stiffness of members in stability of structures?	BT-1	Remember
4.	Define space structures.	BT-1	Remember
5.	What is the application of P-delta analysis?	BT-1	Remember
6.	What is the uses of first order equation	BT-1	Remember
7.	Describe the out-of-plumb effects.	BT-2	Understand
8.	Discuss about second order effects of gravity loading.	BT-2	Understand
9.	Discuss the effect of foundation rotation.	BT-2	Understand
10.	Describe the load transfer mechanism in a suspended structural system?	BT-2	Understand
11.	Show the significance of P-Delta analysis.	BT-3	Application
12.	Illustrate the effects of P-delta analysis .	BT-3	Application
13.	Show the recommendations given in the stiffness of member during the stability calculations?	BT-3	Application
14.	Explain torsion instability.	BT-4	Analyze
15.	Explain buckling.	BT-4	Analyze
16.	Explain states of equilibrium.	BT-4	Analyze
17.	Generalize about symmetric wall frames	BT-5	Evaluate
18.	Prepare a notes on space frame	BT-5	Evaluate
19.	Explain about pneumatic high rise building	BT-6	Create
20.	Summarize about high rise suspension system	BT-6	Create

PART B

1.	How will you determine stresses in a frame arising from out of plumb construction? Describe it.	BT-1	Remember
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2.	List the effects of foundation rotation on the stability of structures.	BT-1	Remember
3.	Describe the overall buckling analysis of frames	BT-1	Remember
4.	Describe about the wall frames.	BT-1	Remember
5.	Discuss the following : i. Deep Beam Systems (8) ii. High rise suspension system. (8)	BT-2	Understand
6.	Discuss about the recent developments in tall structures.	BT-2	Understand
7.	Discuss the simultaneous first-order and P-Delta analysis.	BT-2	Understand
8.	Show the translational- torsional instability.	BT-3	Application
9.	Explain about P-Delta effect and its application.	BT-3	Application
10.	i. Classify the various method of accommodating elastic instability of frames. (9) ii. Illustrate how would you form the force displacement matrix in this case? (7)	BT-3	Application
11.	Explain the following : i. Pneumatic high rise building. (8) ii. Space frame in high rise buildings. (8)	BT-4	Analyse
12.	Explain about buckling of frames briefly.	BT-4	Analyse
13.	Explain about approximate methods of buckling	BT-5	Evaluate
14.	Explain briefly second order effect of gravity loading	BT-6	Create

BT – ALLOTMENT

S.No	Subject		BT1	BT2	BT3	BT4	BT5	BT6	Total Question
1	Unit-1	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	3	2	1	1	14
2	Unit-2	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	3	2	1	1	14
3	Unit-3	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	3	2	1	1	14
4	Unit-4	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	3	2	1	1	14
5	Unit-5	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	3	2	1	1	14

TOTAL NUMBER OF QUESTIONS

PART-A	100
PART-B	70
TOTAL	170