SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

VII SEMESTER

Regulation 2019

1903703- STRUCTURAL DYNAMICS

Academic Year 2022 – 2023 (ODD Sem)

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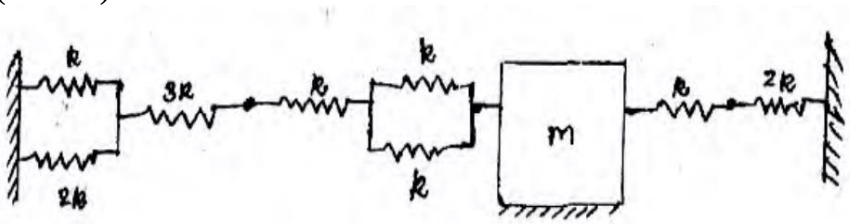
DEPARTMENT OF CIVIL ENGINEERING

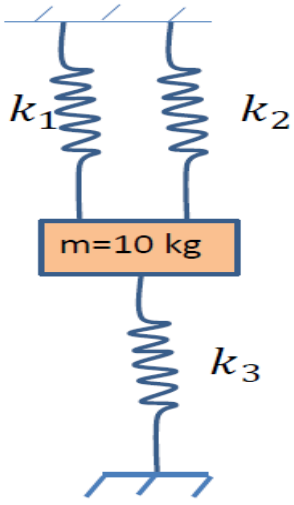
QUESTION BANK

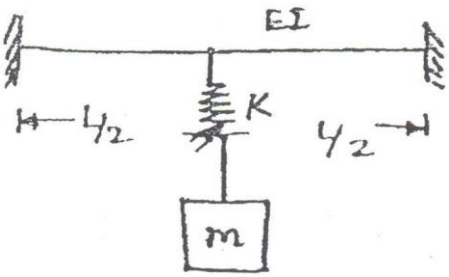
SUBJECT : 1903703 -STRUCTURAL DYNAMICS

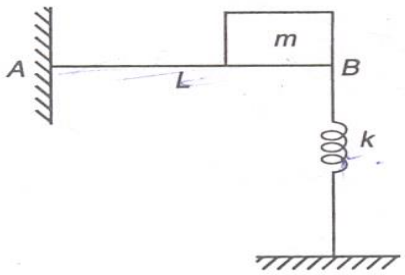
SEM / YEAR: VII/IV

UNIT I - SINGLE DEGREE OF FREEDOM SYSTEM			
Definition of degree of freedom – Idealization of structure as Single Degree of Freedom (SDOF)system – Formulation of equation of motion for various SDOF system – D' Alemberts Principles– Effect of damping – Free and forced vibration of damped and undamped structures – Transmissibility - Response to harmonic forces and periodic forces..			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Define Degree of freedom and its types.	BT-1	Remember
2.	Define logarithmic decrement method.	BT-1	Remember
3.	What is idealization.	BT-1	Remember
4.	Explain Source of vibration in various Structure .	BT-2	Remember
5.	What do you understand by deterministic analysis?	BT-1	Remember
6.	What is meant by frequency response curve for damped system?	BT-1	Remember
7.	Outline D-Alembert's principle of dynamic equilibrium.	BT-2	Understand
8.	Classify the types of vibration.	BT-2	Understand
9.	List the types of Damping	BT-2	Understand
10.	Explain frequency ratio.	BT-2	Understand
11.	Illustrate about Non- Deterministic Analysis	BT-2	Understand
12.	Write down the equation of motion of a structure in SDOF system for free and forced vibrations.	BT-3	Application
13.	Select magnification factor.	BT-3	Application
14.	Differentiate over damped and under damped system	BT-3	Application
15.	Identify the consequences of vibration	BT-3	Application
16.	Draw the free body diagram of SDOF	BT-2	Analyse
17.	Write the mathematical equation for equivalent stiffness for springs in parallel and springs in series.	BT-3	Analyse
18.	What is natural frequency.	BT-1	Analyse
19.	Explain Transient Vibration	BT-2	Analyse
20.	Write down the fourier series for periodic loading	BT-5	Evaluate
21.	Differentiate static and dynamic loading.	BT-5	Evaluate
22.	Explain Frequency and Time period	BT-2	Evaluate
23.	Summarize the amplitude of vibration.	BT-2	Create
24.	Define simple Harmonic motion.	BT-1	Create
25.	Classify the types External Excitation	BT-2	Create

Q.No	PART - B Questions	BT Level	Competence
1.	A damped free vibration test is conducted to determine the dynamic properties of a one story building. The mass of the building is 10000 kg initial displacement of the building is 0.702 cm. Maximum displacements on the first cycle is 0.53cm and period of this displacement cycle is 1.7s. Estimate the Undamped frequency, Logarithmic decrement, damping ratio, damping coefficient, Damped frequency and the amplitude after 6 cycles.	BT-4	Create
2.	(i) Develop the equation of motion for viscous damping. (7marks) (ii) Determine the natural frequency of the system shown in fig. (6marks) 	BT-3	Application
3.	A machine foundation weighs 60 KN. The spring constant is 11000KN/m and dash pot constant (C) = 200 KN-s/m. Explain i) Whether the system is over damped, under damped or critically damped. ii) Determine Logarithmic decrement iii) Determine Ratio of two successive amplitudes	BT-2	Understand
4.	A single degree of freedom system having a mass of 2.5kg is set into motion with a viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz, and measure of the amplitude of vibration shows two successive amplitude to be 6mm and 5.5mm. Estimate the viscous damping co-efficient.	BT-5	Evaluate
5.	A vibrating system consists of a mass of 5kg, spring of stiffness 120 N/m and a damper with a damping co-efficient of 5 N-s/m. Examine Damping factor, Natural frequency of the system, Logarithmic decrement, The ratio of two successive amplitude, The number of cycles after which the initial amplitude reduces to 25%	BT-4	Analyse
6.	Examine whether the log – decrement is also given by the equation $\int = 1/n \log (U_0/ U_n)$ represents the amplitude after n cycles have elapsed.	BT-4	Analyse
7.	Derive the equation of motion for SDOF system free vibration and find the solution for a) Under damped system b) Over damped system c) Critically damped system.	BT-1	Remember
8.	A machine of mass one tonne is acted upon by an external force of 2450 N at a frequency of 1500 rpm. To reduce the effects of vibration, isolator of rubber having a static deflection of 2mm under the machine load and an estimated damping factor = 0.2 are used. Determine	BT-3	Application

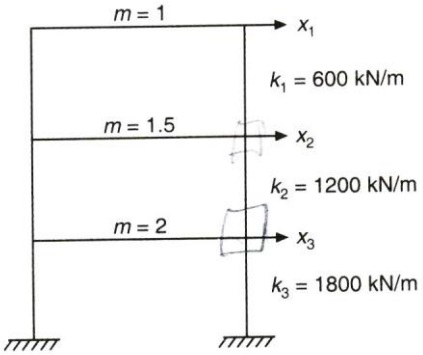
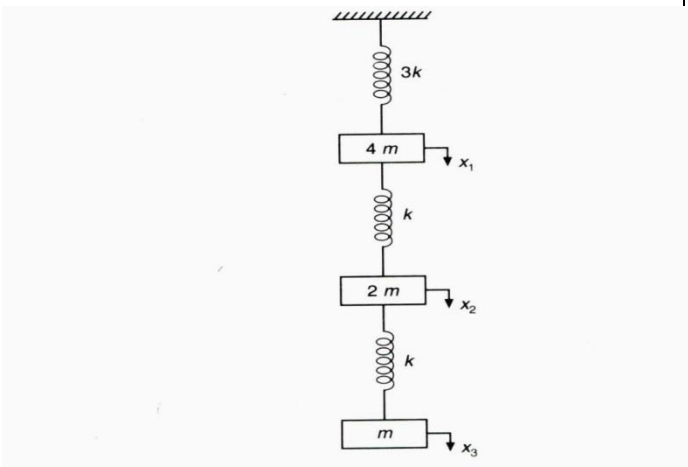
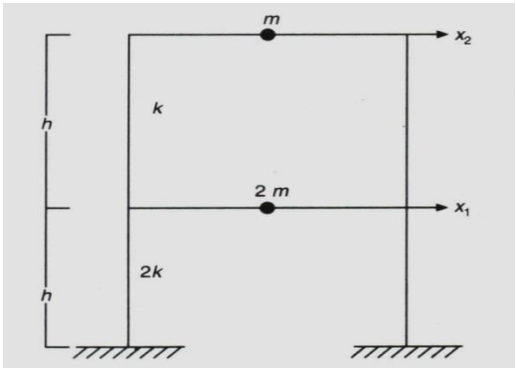
	1. The force transmitted to the foundation 2. The amplitude of vibration of the machine		
9.	Derive the solutions for the equation of motion for an undamped free vibration of SDOF system	BT-1	Remember
10.	A block of weight 900 N (moving between vertical guides) is supported by a spring of stiffness 10^6N/m. the block is given an initial displacement of 50 mm with a velocity of 300 mm/sec, determine the period of vibration, natural frequency, amplitude of motion, maximum velocity and maximum acceleration of the block. Assuming a damping of 20% and show the logarithmic decrement and the damping coefficient of the system.	BT-2	Understand
11.	A machine of 200 kg mass is supported on four parallel springs of total stiffness 750 N/m has an unbalanced rotating component which result in a disturbing force of 350 N at a frequency of 2121 rpm. If damping ratio is 0.2, Examine; (i) amplitude of motion due to the unbalance (ii) Transmissibility. (iii)Transmitted force.	BT-4	Analyse
12.	A weight attached to a spring of stiffness 530 N/m undergoes viscous damping when the weight was displaced and released. The period of vibration was found to be 1.8 seconds. The ratio of consecutive amplitude was found to be 4/1.0. Determine the amplitude and phase angle when a force of 200 cos3t N acts on the system.	BT-5	Evaluate
13.	Derive the solution for undamped harmonic excitation of a SDOF system.	BT-1	Remember
14.	An SDOF system consists of a mass of 20 kg, a spring of stiffness 2200 N/m and a dash pot with a damping co-efficient of 60 N-s/m is subjected to a harmonic excitation of F=(200 sin 5t) N. show the complete solution of the equation of motion.	BT-1	Remember
15.	Find the natural frequency of the system as shown in Figure. Take $k1=k2=2000\ N/m$, $k3=3000Nm$ and m= 10 kg. 		
16.	A mass of 2 kg is suspended by a spring having a stiffness at 700 N/m. The mass is displaced downward from its equilibrium	BT-3	Appliccation

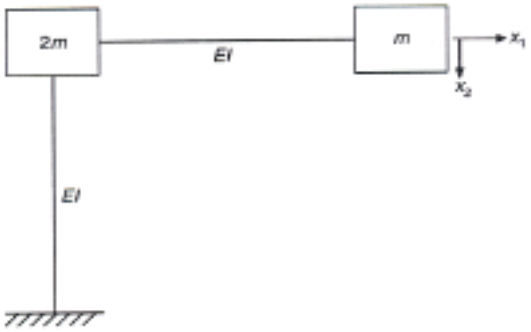
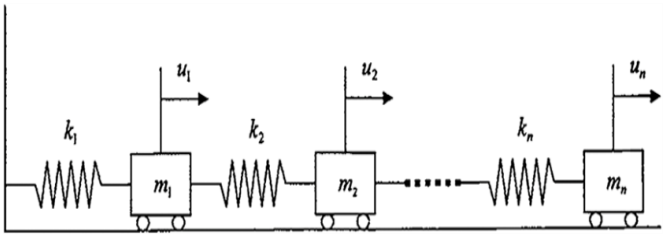
	position by a distance of 0.02 m. Estimate equation of motion, normal frequency, the response of the system and total energy.		
17.	A mass 'm' is suspended from a beam shown in figure. The beam is of negligible mass and has a uniform flexural rigidity 'EI'. Examine the natural frequency of the system 	BT-1	Remember

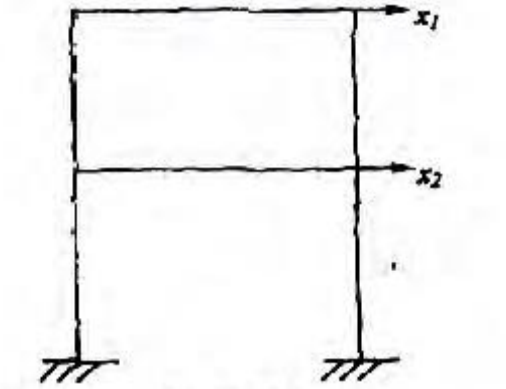
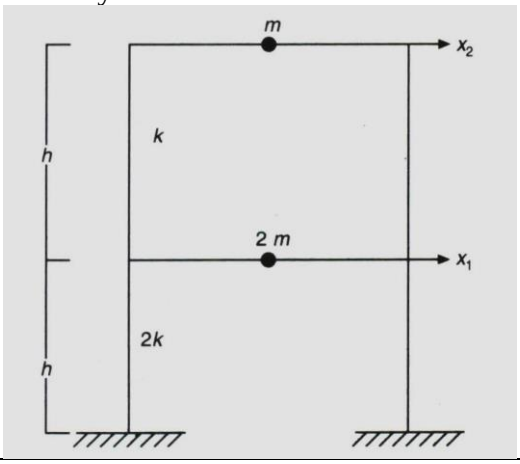
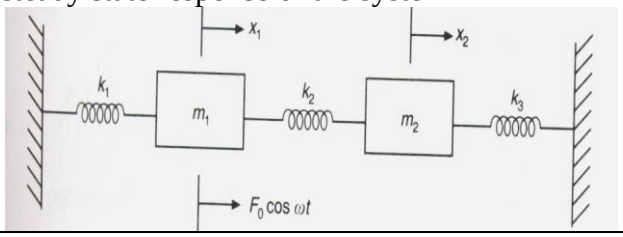
Q.No	PART - C Questions	BT Level	Competence
1.	A cantilever beam AB of length L is attached to a spring k and a mass M as shown in figure (a) Form the equation of motion; and (b) Find an expression for the frequency of motion. 	BT-1	Remember
2.	(i) A vibrating system consisting of a weight of 200 N and spring stiffness of 8000 N/m is viscously damped so that two consecutive amplitudes measured are 150 mm and 8021 mm respectively. Determine the logarithmic decrement and the co-efficient of damping. (ii) Describe vibration decay method of determining the damping in a structure.	BT-2	Understand
3.	A 20 kg mass attached to the lower end of a spring, whose upper end is fixed, vibrates with a natural period of 0.6 s. Determine the natural period when a 3 kg mass is attached to the mid-point of the same spring with the upper and the lower ends fixed.	BT-5	Evaluate
4.	A vibrating system consisting of a weight of 1000kN and a spring stiffness of 80kN/m is viscously damped so that the ratio of two consecutives amplitude is 1 to 0.85. Determine: (i) Logarithmic decrement (ii) natural frequency (iii) damping ratio (iv)damping coefficient and (v)damped natural frequency	BT-3	Application
5.	Describe the mathematical modeling of an SDOF system	BT2	Understand

UNIT II - MULTIPLE DEGREE OF FREEDOM SYSTEM			
Formulation of equation of motion for multi degree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors –Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	List out the assumptions made in the concept of shear building.	BT-1	Remember
2.	Calculate the frequency and period time for a spring of stiffness 20kN/m supports a mass of 4 kg.	BT-4	Analyse
3.	Compare orthogonality and normality principles.	BT-5	Evaluate
4.	Formulate the equation of motion for a damped two degrees of freedom system.	BT-6	Create
5.	Define Eigen vectors and Eigen values.	BT-1	Remember
6.	Write the concept of shear building in two degrees of freedom system.	BT-3	Application
7.	What is meant by coupled and decoupling of equation?	BT-1	Remember
8.	What is fundamental frequency and fundamental mode shape?	BT-1	Remember
9.	How frequency is affected in the free vibration of a shear frame?	BT-1	Remember
10.	Define Dunkerley's method.	BT-1	Remember
11.	Create the characteristic equation for free vibration of undamped system.	BT-6	Create
12.	Irradiate the methods available for vibration control.	BT-2	Understand
13.	Simplify mode shape?		
14.	Analyze transitional ground motion?	BT-4	Analyse
15.	Enumerate dynamic equilibrium?	BT-3	Application
16.	Select a note on free vibration analysis.	BT-3	Application
17.	Generate the short notes on matrix deflation technique	BT-5	Evaluate
18.	Outline Rayleigh's method.	BT-2	Understand
19.	Illustrate model analysis?	BT-2	Understand
20.	Explain Static Condensation approach.	BT-2	Understand
21.	Create the equation of motion for an undamped two degrees of freedom system.	BT-6	Create
22.	Show the equation of motion for Multi-degree of freedom systems	BT-2	Understand
23.	Identify resonant frequency.	BT-3	Application
24.	Examine impulsive force?	BT-4	Analyse
25.	Explain modal super position method.	BT-5	Evaluate

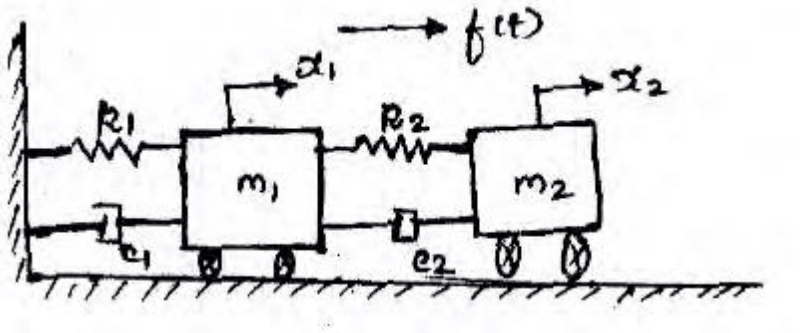
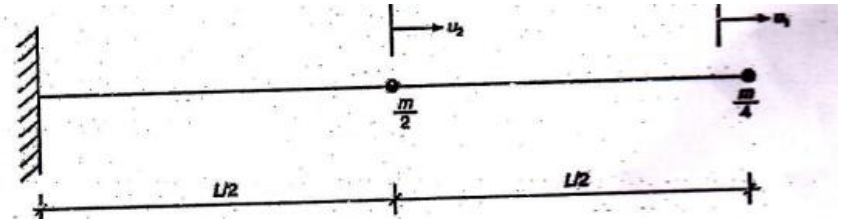
Q.No	**(PART - B) Questions**	**BT Level**	**Competence**

1.	Show the orthogonality and normality principle of mode shapes.	BT-1	Remember
2.	Determine the natural frequency and draw the mode shape for the shear building. 	BT-5	Evaluate
3.	Select the equation of motion of a two degree of freedom system for free vibration.	BT-1	Remember
4.	Analyze the natural frequency and mode of the system. 	BT-4	Analyse
5.	Solve the natural frequency and mode of vibration of the system 	BT-6	Create

6.	Determine the normal modes for the following system and show that the modes are orthogonal $\begin{bmatrix} 2m & 0 \\ 0 & m \end{bmatrix}\begin{bmatrix} \ddot{x}_1 \\ \ddot{x}_2 \end{bmatrix} + \begin{bmatrix} 3k & -k \\ -k & k \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$	BT-5	Evaluate
7.	Define the natural frequencies and mode of vibration of the given System. 	BT-1	Remember
8.	Obtaining the natural frequency and the mode shape for a single bay two storey shear frame with combined stiffness of ground and first floor columns as k =2000 kN/m respectively. Mass of each floor is 2000 kg.	BT-1	Remember
9.	Show the expression for the free vibration of a damped two degree of freedom system.	BT-2	Understand
10.	Explain the concept of shear building and modal superposition method.	BT-2	Understand
11.	A three storey building has seismic weights of 200 kN, 300 kN and 420 kN at I, II and III store's respectively; The corresponding stiffness's are 20000 kN/m, 25000 kN/m and 30000 kN/m. (i) Examine the model frequencies. (ii) Sketch the mode shapes	BT-4	Analyse
12.	Develop the natural frequencies and mode shapes of a system described by the equation of motion given below. 	BT-3	Application
13.	Solve the natural frequency and mode shapes for a single bay two storied RC shear frame shown in Fig	BT-3	Application

	Q.12 (a). Mass of each rigid beam is 20000 kg, combined stiffness of first storey columns is 2 x 10^6 N/m and combined stiffness of second storey columns is 2 x10^6 N/m. 		
14.	Explain some approximate methods for solving MDOF systems.	BT-2	Understand
15.	Predict the natural frequency and mode shapes of a MDF system. The mass and the stiffness matrix of a MDF system is given by $[M]=m\begin{bmatrix}1&0&0\\0&1&0\\0&0&2\end{bmatrix}, [K]=K\begin{bmatrix}2&-1&0\\-1&3&-2\\0&-2&2\end{bmatrix}.$	BT-2	Understand
16.	Solve the natural frequency and mode of vibration of the system 	BT-3	Application
17.	Define steady state response and determine the steady state response of the system 	BT-1	Remember

UNIT III -INTRODUCTION TO EARTHQUAKE ENGINEERING

Q.No	PART-C Questions	BT Level	Competence
1.	i) Determine the natural frequency and mode shapes of the following: The storey masses are M1=5, M2=4, M3=3 and storey stiffness are k1= k2= k3=2. ii) How can you eliminate/reduce unnecessary vibrations in a structure?	BT-5	Evaluate
2.	Show the differential equation of motion in matrix form for the two degree of freedom system with damping as shown in Fig. 	BT-1	Remember
3.	A Cantilever bar is to be modeled by a massless uniform bar to which are attached with two lumped masses representing the mass of original system as K=(2AE/L) and m=ρAL. Determine the natural frequencies and the normal modes of this model. 	BT-2	Understand
4.	Develop the mode shapes and nodal frequencies of a three storey building by modal super position method. The storey masses are M1=360kg, M2=250kg, M3= 150kg and storey stiffness are K1= 3000kN/m, K2= 2000kN/m and K3=1000kN/m.	BT-3	Application
5.	Explain the concept of shear building	**BT 4**	Analyse

Elements of Engineering Seismology – Definitions, Introduction to Seismic hazard, Earthquake phenomenon – Seism tectonics – Seismic Instrumentation – Characteristics of Strong Earthquake motion – Estimation of Earthquake Parameters			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	How do scientists measure the size of earthquakes?	BT-3	Application
2.	Explain volcanic Earthquake.	BT-2	Understand
3.	Define focus and epicenter.	BT-1	Remember
4.	Differentiate between P-waves and S-waves.	BT-2	Understand
5.	Distinguish between Epicenter and Hypocenter.	BT-4	Analyse
6.	Compare Earth quake and Intra plate earthquakes.	BT-4	Analyse
7.	Identify the causes of Earthquake.	BT-3	Application
8.	What is meant by hypocenter?	BT-1	Remember
9.	Define focal depth and Epicentral distance.	BT-1	Remember
10.	Compare: magnitude and intensity of an earthquake.	BT-4	Analyse
11.	Discuss about accelerogram.	BT-6	Create
12.	Classify the types of earthquake.	BT-2	Understand
13.	List out some disastrous earthquakes occurred in past history in India.	BT-1	Remember
14.	Define fault and list its types.	BT-1	Remember
15.	Identify the factors influencing ground motion.	BT-3	Application
16.	How will you develop an Isoseismal map?	BT-3	Application
17.	Summarize the characteristics of earthquake.	BT-2	Understand
18.	How will you evaluate strong ground motion?	BT-5	Evaluate
19.	How will you identify the effect of the surface topography?	BT-5	Evaluate
20.	Define Normal fault.	BT-1	Remember
21.	Explain modified mercalli intensity scale.	BT-2	Understand
22.	Identify the reasons for the occurrence of faults.	BT-3	Application
23.	Distinguish between seismograph and seismogram	BT-4	Analyse
24.	How will you assess the types of seismic waves?	BT-5	Evaluate
25.	Discuss the classification of seismic zones in India.	BT-6	Create

Q.No	**PART-B Questions**	**BT Level**	**Competence**
1.	Find the natural causes of earthquake and explain it briefly.	BT-1	Remember
2.	i. Explain the seismic waves with neat sketch. ii. Explain about the elastic rebound theory.	BT-2	Understand
3.	Explain in detail about the plate tectonic theory and lithospheric plates.	BT-2	Understand
4.	i. Classify the types of geological faults and explain it briefly. ii.Explain about the classification of earthquake.	BT-2	Understand
5.	i. Differentiate magnitude and intensity. ii. How will you measure magnitude and intensity? Explain the methods briefly.	BT-4	Analyse
6.	Write down the characteristics of strong ground motion with	BT-3	Application

	neat graph.		
7.	How are earthquakes recorded? Explain the Seismograph With neat sketches.	BT-5	Evaluate
8.	What are the major plates that cause seismicity? List out the causes of earthquake occurred by manmade sources and explain it briefly.	BT-1	Remember
9.	On what is the assignment of an earthquake magnitude based? Is magnitude the same as intensity? Explain	BT-1	Remember
10.	List out some of the recent earthquakes occurred and give information on some disastrous earthquakes.	BT-4	Analyse
11	Define focus and epicenter of an earthquake. Name the kinds of body waves and explain it with neat sketch.	BT-1	Remember
12	Analyze how the intensity is measured using MMI scale as per codal provisions.	BT-4	Analyse
13	Write short notes on i. Tsunami ii. Spectral acceleration.	BT-3	Application
14	Discuss about the internal structure of the earth also Explain about the seismogram.	BT-6	Create
15	i. List out the two approaches followed for the prediction of earthquakes and explain it. ii. Name the major plates of the earth.	BT-1	Remember
16	Define Ritcher scale and MMI scale and explain it briefly.	BT-1	Remember
17	Describe about the characteristics of strong ground motion with neat graph.	BT-2	Understand

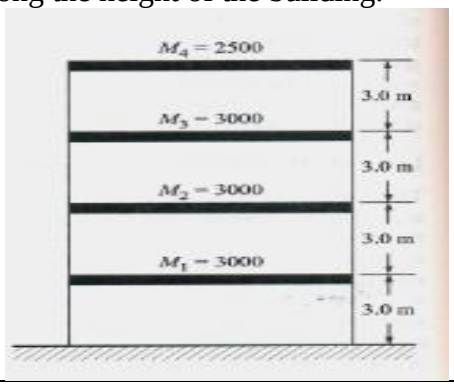
Q.No	PART-C Questions	BT Level	Competence
1.	What causes the apparently solid and rigid earth to move and so produce an earthquake?	BT-2	Understand
2.	Discuss the case study on anyone of the major earthquakes occurred in India.	BT-6	Evaluate
3.	What are the typical characteristics on which an earthquake depends?	BT-1	Remember
4.	Classify the different peak amplitude parameters for a earthquake ground motion.	BT-4	Analyse
5.	On what is the assignment of an earthquake magnitude based? Is magnitude the same as intensity? Explain	BT-4	Analyse

UNIT IV - EARTHQUAKE EFFECTS ON STRUCTURES			
Effect of earthquake on different types of structures – Behaviour of RCC, Steel Structures under earthquake loading – Evaluation of Earthquake forces – IS Code 1893: 2002 – Response Spectra – Lessons learnt from past earthquakes.			
PART– A			
Q.No	**Questions**	**BT**	**Competence**

		Level	
1	Define Soil liquefaction	BT-1	Remember
2	Define Peak acceleration and response spectrum.	BT-1	Remember
3	What is meant by re-entrant corners of irregular buildings.	BT-1	Remember
4	Define the term base shear & storey drift.	BT-1	Remember
5	List out the methods of dynamic analysis.	BT-1	Remember
6	Classify the types of irregularities found on RC buildings during earthquake.	BT-2	Understand
7	What the different direct and indirect effects of earthquakes.	BT-2	Understand
8	Identify the major damages occur in the RC structures during earthquake.	BT-3	Application
9	Summarize about peak ground acceleration (PGA).	BT-2	Understand
10	Explain the termResponsereductionfactor	BT-2	Understand
11	What is soft storey failure.	BT-1	Remember
12	Identify the causes of damage occurred during bhuj earthquake.	BT-3	Application
13	Discuss about P-Delta Effect.	BT-3	Application
14	Compare mass irregularities from plane irregularities.	BT-4	Analyse
15	Analyse the concept of floating column.	BT-4	Analyse
16	Distinguish between rigid diaphragm and flexible diaphragm.	BT-4	Analyse
17	Brief Short Column damages in RC buildings.	BT-5	Evaluate
18	Explain some of the exterior wall damages during earthquake.	BT-5	Evaluate
19	Formulate the expression for time period as per codal provision IS 1893:2002.	BT-6	Create
20	Discuss about the pounding effect in buildings.	BT-6	Create
21	Explain Zero period acceleration	BT-2	Understand
22	Identify the different effects of liquefaction	BT-3	Application
23	Analyze the formulas to be used to find the load factor for plastic design of steel structures	BT-4	Analyse
24	Evaluate the damages due to seismic effects	BT-5	Evaluate
25	Choose the properties of soil based on which its spring constant depends	BT-6	Create

Q.No	PART- B Questions	BT Level	Competence
1	Explain briefly the effect of earthquake on different types of structures.	BT-2	Understand
2	Illustrate about the vertical irregularities that affect the performance of RC buildings during earthquake.	BT-2	Understand
3	What is the concept of Peak acceleration and Design Spectrum describe it with neat sketches.	BT-1	Remember
4	Write the step by step dynamics analysis procedure of RC framed structure as per IS 1893:2002 with suitable assumed data of your choice.	BT-3	Application
5	Elaborate the planning and architectural considerations in RC buildings and also discuss the potential deficiencies of buildings exist in our society.	BT-4	Analyse

6	A four storey reinforced concrete frame building is situated at Chennai. The height between the floors is 3.5 m and total height of building is 14 m. The dead load and live load is lumped at respective floor (M_1= 3000kN, M_2 =3000 kN, M_3= 3000kN M_4= 2500kN. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear distributed lateral force as per IS1893 (PART1): 2002.	BT-4	Analyse
7	Analyse the behavior of prestressed concrete structures under earthquake loading.	BT-4	Analyse
8	List out the effects and methods to reduce soil liquefaction in brief.	BT-1	Remember
9	Explain in detail about the methods of seismic analysis.	BT-2	Understand
10	Define Response spectra. Explain the concept and types of response spectra with neat sketch.	BT-1	Remember
11	A three storied symmetrical RC school building situated at Bhuj with following data: Plan dimension : 7 m Storey height : 3.5 m Total weight of beams in a storey : 130 kN Total weight of slab in a storey : 250 kN Total weight of columns in a storey : 50 kN Total weight of walls in a storey : 530 kN Live load : 130 kN Weight of terrace floor : 655 kN The structure is resting on hand rock. Determine the total base shear and lateral loads at each floor level for 5% of damping using seismic coefficient method.	BT-5	Evaluate
12	List out the step by step procedure to analyze a frame by equivalent static lateral load method.	BT-1	Remember
13	Solve the design lateral forces at each floor level for a two storey RC shear frame of a hospital building for the following data. Use response spectrum method of IS1893-2002. Seismic weight of each floor = 50kN Spacing between columns = 3m c/c Height of each floor = 3m Type of structure = SMRF Location of the building = Coimbatore Type of soil = Rock Combined stiffness of ground floor columns = 2000kN/m Combined stiffness of first floor columns = 1000 kN/m	BT-3	Application

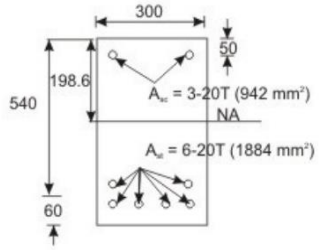
14	A four storey reinforced concrete frame building as shown in fig: is situated at Roorkee. The height between the floors is 3 m and total height of building is 12 m. The dead load and live load is lumped at respective floor. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear as per IS1893 (PART1): 2002. Solve and distribute the base shear along the height of the building.  	BT-6	Create
15.	i. Write short notes on pinching effect. ii. Write short notes on bouchinger effect.	BT-3	Application
16.	Write a step by step procedure to analyze a frame by equivalent dynamic lateral load method.	BT-3	Application
17.	Define the following terms and explain it: i. Smooth spectrum ii. Seismic demand diagrams.	BT-1	Remember

Q.No	PART- C Questions	BT Level	Competence
1.	Identify the seismic damages in RC buildings during Bhuj earthquake.	BT-3	Application
2.	Explain any one code based procedure for seismic analysis.	BT-2	Understand
3.	Analyze the factors affecting response spectra.	BT-4	Analyse
4.	With a help of a case study, Explain briefy the lessons learnt from a recent earthquake happened in India after the year 2004.	BT-5	Evaluate
5.	Examine the plan configuration problems that affect the performance of RC buildings during earthquake.	BT-4	Analyse

UNIT V - CONCEPTS OF EARTHQUAKE RESISTANT DESIGN

Causes of damage – Planning considerations/Architectural concept (IS 4326–1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings – Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral load analysis – Design and detailing (IS 13920:1993)			
PART –A			
Q.No	**Questions**	**BT Level**	**Competence**
1	Define the following terms a) Rotational Ductility b) Curvature Ductility	BT-1	Remember
2	Define the terms DBE, MCE and MMI.	BT-1	Remember
3	Define diaphragm discontinuity.	BT-1	Remember
4	List out the factors affecting ductility.	BT-1	Remember
5	Define ductility ratio.	BT-1	Remember
6	Identify the methods of improving element level Ductility.	BT-3	Application
7	Explain the Structural plan density.	BT-2	Understand
8	Explain two cases of design horizontal earthquake load.	BT-2	Understand
9	Identify the importance of ductility in RC structures.	BT-3	Application
10	Examine the design considerations made in masonry structures.	BT-4	Analyse
11	Illustrate any two provisions for flexural members given in the code IS13920.	BT-2	Understand
12	Write a short note Special confining reinforcement.	BT-3	Application
13	What are the methods available for lateral load analysis of rigidly jointed frames	BT-1	Remember
14	Classify the types of damages occur in masonry building during earthquakes.	BT-2	Understand
15	Distinguish between Weak Storey and Soft Storey.	BT-4	Analyse
16	List the planning considerations made as per IS 4326:1993 for masonry building.	BT-4	Analyse
17	How will you assess the causes of damage in RC and Masonry buildings?	BT-5	Evaluate
18	What do you mean by Lateral load analysis?	BT-5	Evaluate
19	Elaborate the four techniques that mainly contributes to aseismic design of earthquake resistant building.	BT-6	Create
20	Discuss about the strong column-weak beam design concept.	BT-6	Create
21	What do you know about Displacement Ductility	BT-2	Understand
22	Identify the steps involved in the lateral load analysis of masonry building.	BT-3	Application
23	Analyse the reason for high casualty during earthquake	BT-4	Analyse
24	Evaluate the causes of damages due to earthquake	BT-5	Evaluate
25	Formulate the steps to improve global level ductility	BT-6	Create

Q.No	**PART- B Questions**	**BT Level**	**Competence**

1	List out the codal provisions for architectural considerations and structural design considerations as per IS 4326:1993.	BT-4	Analyse
2	Elaborate the design principles involved in design of masonry structure.	BT-6	Create
3	Explain the methods to improve local and global level ductility.	BT-3	Application
4	Explain the principles and practice of earthquake resistant design of R.C.C buildings.	BT-2	Understand
5	Classify the damages and non-damages occurred in masonry buildings during an earthquake with examples.	BT-2	Understand
6	Identify the different methods adopted in introducing ductility into RC structures.	BT-3	Application
7	List the design steps involved in Equivalent static force analysis (Lateral Load Analysis)	BT-4	Analyse
8	What is the effect of ignoring the contribution of masonry infill in the lateral load analysis of a multi-storey frame?	BT-1	Remember
9	Compare and contrast earthquake design of masonry and RC structures.	BT-5	Evaluate
10	i. Explain the factors affecting ductility. ii. Describe the importance of ductility in earthquake resistant design.	BT-2	Understand
11	Why ductility consideration is very important in earthquake resistant design of RC building? Explain the ductile detailing considerations in flexural members as per IS 13920-1993.	BT-1	Remember
12	Analyse the causes of damages occurred in RC building during earthquake.	BT-4	Analyse
13	List out the design principles of earthquake resistant structure as per IS 1893-2002.	BT-1	Remember
14	Explain about the Earthquake design philosophy.	BT-4	Analyse
15	Define the response behavior and explain the ductility demand in multistoried buildings with neat sketch.	BT-1	Remember
16	Write down the procedure for lateral load analysis of masonry buildings.	BT-3	Application
17	Compare the ductility with respect to curvature of the cross-section of the beam of Fig. using (a) M 20 and Fe 250, (b) M20 and Fe 415. 	BT-1	Remember

Q.No	PART- C Questions	BT Level	Competence

1.	Why and where special confining reinforcement is required in an earthquake resistant building? Explain in detail.	BT-1	Remember
2.	Explain in detail the two methods of dynamics analysis for lateral loads.	BT-2	Understand
3.	Classify the different types of shear wall with neat sketches	BT-4	Analyse
4.	Design the special confining reinforcement for the size of column 650mm x 500mm. Let the grade of concrete be M20 and that of steel Fe415.	BT-6	Evaluate
5.	Explain the Natural frequency of building, regular building model, irregular building model	BT-2	Understand

VALLIAMMAI ENGINEERING COLLEGE

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CE6701 -STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

QUESTION BANK

S.no	Unit		BT1	BT2	BT3	BT4	BT5	BT6	Total Question
1	Unit-1	Part-A	6	5	4	4	3	3	25
		Part-B	4	3	2	3	1	1	14
		Part-C	1	1	1	-	1	-	4
2	Unit-2	Part-A	6	5	4	4	3	3	25
		Part-B	4	3	2	3	1	1	14
		Part-C	1	1	1	-	1	-	4
3	Unit-3	Part-A	6	5	4	4	3	3	25
		Part-B	4	3	2	3	1	1	14
		Part-C	1	1	-	1	-	1	4
		Part-A	6	5	4	4	3	3	25

4	**Unit-4**	Part-B	4	3	2	3	1	1	14
		Part-C	-	1	1	1	1	-	4
5	**Unit-5**	Part-A	6	5	4	4	3	3	25
		Part-B	4	3	2	3	1	1	14
		Part-C	1	1	-	1	-	1	4
Cumulative		Part-A	30	25	20	20	15	15	125
		Part-B	20	15	10	15	5	5	70
		Part-C	4	5	3	3	3	2	20

TOTAL NO.OF QUESTIONS IN EACH PART

PART A	**125**
PART B	**70**
PART C	**20**
TOTAL	**215**