					Course Code: D2518701
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
THEORY OF ELASTICITY					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the Generalized Hooke's law for an isotropic material.	1	3	6
	b).	The displacement components in a strained body are as follows: $u= 0.01xy + 0.02y^2$, $v = 0.02x^2 + 0.01z^3y$, $w = 0.01xy^2 + 0.05z^2$. Determine the strain matrix at the point P (3, 2, -5).	1	3	6
		OR			
2.	**a).**	Derive differential equations of equilibrium for rectangular plate.	1	3	6
	b).	Derive expressions for compatibility for a two-dimensional problem.	1	3	6
		UNIT-2			
3.	**a).**	Explain Saint Venant's principle ?	2	3	4
	b).	Formulate the governing differential equation using polynomial solutions.	2	3	8
		OR			
4.		Explain the application of fourier series for two dimensional problems?	2	3	12
		UNIT-3			
5.		Derive the compatibility equations in polar coordinate system for two-dimensional state of stress.	3	3	12
		OR			
6.	**a).**	Define strain components in polar coordinates and explain their relationship with displacement components.	3	3	6
	b).	Define and derive the expression for the stress concentration factor (SCF) in a plate with a circular hole under tension.	3	3	6
		UNIT-4			
7.	**a).**	Explain the concept of a stress ellipsoid and its significance in three-dimensional stress analysis.	4	4	6
	b).	Solve for the stress components in a three-dimensional elastic solid subjected to body forces.	4	4	6
		OR			
8.		Explain briefly about	4	3	12
		(a) Principle of superposition.			
		(b) Uniqueness of solution			

		(c) Reciprocal theorem			
		UNIT-5			
9.	**a).**	Explain about twisting of rectangular bars.	5	3	5
	b).	Derive the expression for shear stress distribution in a prismatic bar with an elliptical cross-section under torsion.	5	3	7
		OR			
10.	**a).**	Explain the analogy of torsion	5	3	6
	b).	Explain with an example solution of torsional problems by energy method	5	3	6

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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		Course Code: D2518702			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		STRUCTURAL DYNAMICS			
		STRUCTURAL ENGINEERING			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Apply the principles of dynamics to determine the natural frequency and natural period of a vertical cable system carrying a load.	1	3	5
	b).	Apply stiffness and energy methods to calculate the natural frequency of a cantilever beam carrying a point mass.	1	3	7
		OR			
2.	**a).**	Apply the concept of degree of freedom and classify damping in structural systems with suitable examples.	1	3	6
	b).	Apply the logarithmic decrement method to evaluate damping in a vibrating system.	1	3	6
		UNIT-2			
3.	**a).**	Analyze the response of an SDOF system under undamped free vibration and derive expressions for displacement and frequency.	2	4	7
	b).	Analyze a damped SDOF system subjected to free vibration and determine the viscous damping coefficient from given amplitude data.	2	4	5
		OR			
4.	**a).**	Analyze an SDOF system to evaluate damping ratio, damped frequency, logarithmic decrement, and successive amplitude ratios.	2	4	5
	b).	Analyze the forced vibration response of an SDOF system subjected to harmonic excitation and derive its steady-state solution.	2	4	7
		UNIT-3			
5.	**a).**	Analyze and derive the equations of motion for a two-degree-of-freedom system and determine its natural frequencies.	3	4	12
		OR			
6.	**a).**	Apply and explain the orthogonality principle of normal modes with suitable examples.	3	4	5
	b).	Analyze a cantilever beam modeled with lumped masses and determine its natural frequencies and mode shapes.	3	4	7
		UNIT-4			
7.	**a).**	Apply the Stodola iterative method to approximate natural frequencies	4	3	5

		of a multi-storey frame.			
	b).	Apply the mode superposition method to evaluate the response of a multi-degree freedom system under dynamic loading.	4	3	7
		OR			
8.	**a).**	Apply methods to determine natural frequencies and sketch mode shapes of a simply supported beam.	4	3	7
	b).	Apply the Holzer method to analyze torsional vibrations in shaft systems.	4	3	5
		UNIT-5			
9.	**a).**	Analyze the seismic response of a lumped SDOF elastic system under translational ground excitation using response spectrum analysis.	5	4	12
		OR			
10.	**a).**	Evaluate the response of a generalized coordinate SDOF elastic system subjected to earthquake excitation using the seismic coefficient method.	5	4	12

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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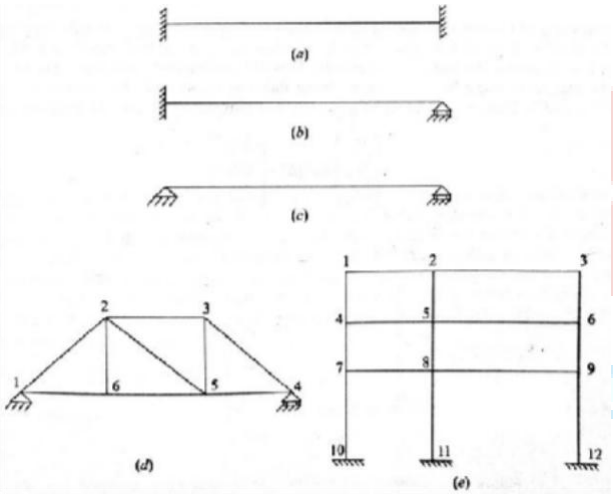
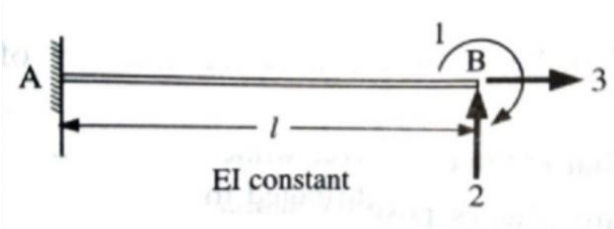
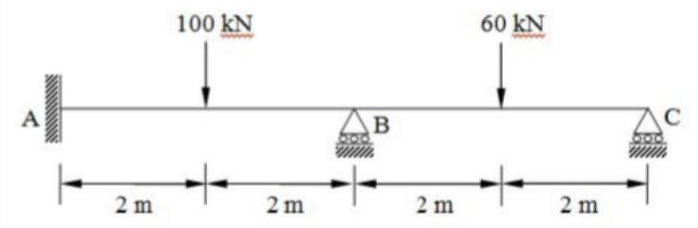
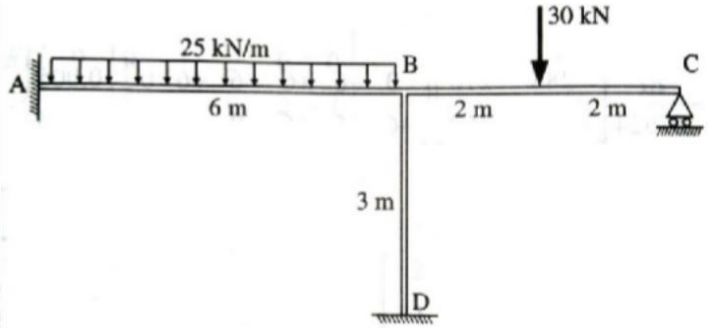
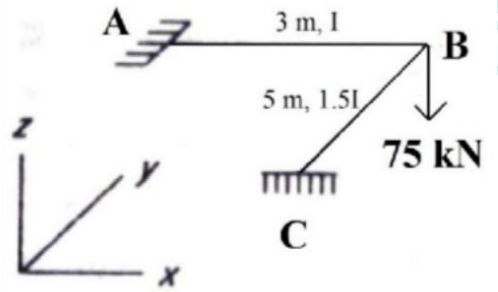
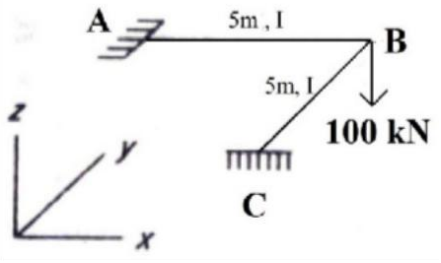
		Course Code: D2518703			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		MATRIX ANALYSIS OF STRUCTURE			
		(For Structural Engineering)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1			
1.	**a).**	Explain the degree of static indeterminacy and kinematic Indeterminacy of a structure.	**1**	**2**	**4**
	b).	Calculate the degree of Static and Kinematic indeterminacy of the following structures shown in **Fig. 1**  **Fig. 1**	**1**	**2**	**8**
		OR			
2.	**a).**	Explain the relation between the flexibility matrix method and the stiffness matrix method.	**1**	**2**	**4**
	b).	Develop a stiffness matrix for the beam shown in Fig. 2 with reference to the coordinates shown.  **Fig. 2**	**1**	**2**	**8**
		UNIT-2			
3.	**a).**	Solve the continuous beam as shown in Figure 3 by using the stiffness	**2**	**3**	**12**

		matrix method. Take EI is constant throughout the structure. Draw the bending moment and diagrams			
		 **Fig. 3**			
		OR			
4.	**a).**	Solve the portal frame shown in **Fig. 4** by using the stiffness matrix method. And draw a shear force and bending moment diagrams.  **Fig. 4**	**2**	**3**	**12**
		UNIT-3			
5.	**a).**	Solve the grid structure as shown in Fig. 1. Using the structure approach of the stiffness matrix method. Take GJ = 0.5EI  **Fig. 5**	**3**	**3**	**12**
		OR			
6.	**a).**	Solve the grid structure as shown in Fig. 6, using the structure approach of the stiffness matrix method. Take GJ = 0.4EI  **Fig. 6**	**3**	**3**	**12**

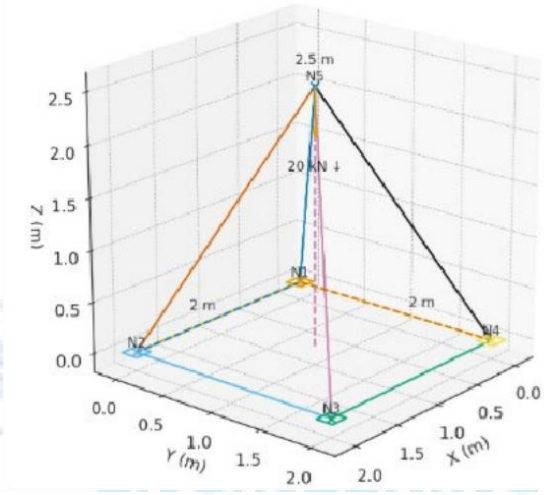
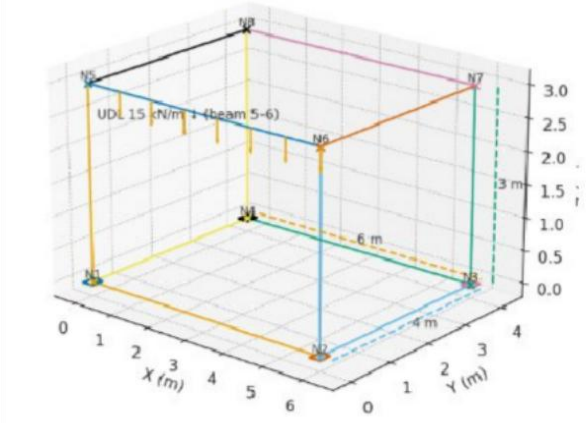
		UNIT-4			
7.	**a).**	Discuss the importance of sub-structuring.	4	2	5
	b).	Explain the static condensation technique with an example.	4	2	7
		OR			
8.	**a).**	Discuss the bandwidth of a stiffness matrix with an example.	4	2	6
	b).	Explain a beam on the elastic foundation using a stiffness matrix.	4	2	6
		UNIT-5			
9.		Analyse a 3D pin-jointed space truss has three members forming a triangular pyramid (tetrahedron) with a square base of side 2 m and apex height 2.5 m. All members are made of steel with E = 200 GPa and A = 500 mm². The base is fixed at all four joints, and a vertical load of 20 kN is applied downward at the apex.  **Fig. 7**	5	3	12
		OR			
10.	**a).**	a rectangular space frame with a span of 6 m in the X-direction, a width of 4 m in the Y-direction, and a height of 3 m in the Z-direction. The frame is made of prismatic members with E = 210 GPa, I = 8×10^6 mm⁴, and A = 3000 mm². Joints at the base are fixed, while the top plane joints are free. A uniformly distributed load of 15 kN/m acts along one of the beams in the X-direction at the top.  	5	3	12

		Fig. 8			

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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		Course Code: D25187A2			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		DESIGN OF REINFORCED CONCRETE FOUNDATIONS			
		STRUCTURAL ENGINEERING			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	**CO**	**KL**	**M**
1.		Design a square footing for a rectangular column, 300 mm × 500 mm, reinforced with 6-25ϕ bars, and carrying a service load of 1250 kN. Assume soil with an allowable pressure of 200 kN/m^2 at a depth of 1.25 m below ground. Assume Fe 415 grade steel for both column and footing and M 20 grade concrete for the footing and M 25 grade concrete for the column.	1	4	12
		(OR)			
2.		Design a rectangular footing with a spatial restriction of 2.5 m on one of the plan dimensions for a rectangular column, 300 mm × 500 mm, reinforced with 6-25ϕ bars, and carrying a service load of 1250 kN. Assume soil with an allowable pressure of 200 kN/m^2 at a depth of 1.25 m below ground. Assume Fe 415 grade steel for both column and footing and M 20 grade concrete for the footing and M 25 grade concrete for the column.	1	4	12
		UNIT-2			
3.	**a).**	Explain the types of foundations of partitions walls in ground floors.	2	4	**2**
	b).	Design a plain concrete footing for column 300 mm × 300 mm, carrying an axial load of 330 kN (under service loads, due to dead and live loads). Assume an allowable soil bearing pressure of 360 kN/m^2 at a depth of 1.25 m below ground. Assume Fe 415 grade steel and M 20 grade concrete.	2	6	10
		(OR)			
4.	**a).**	Explain the different methods of analysis of continuous strip footing for un symmetric loading.	2	4	**2**
	b).	Design a slab-beam type strip footing for columns C1, C2, C3 and C4 spaced at 4.0 m centre to centre and the characteristic column loads are 800 kN, 1200 kN, 900 kN and 800 kN respectively. Width of the footing is restricted to 2.0 m which necessitates the combined footing. The column sizes are 300 mm × 300 mm each. The allowable soil bearing pressure of 150 kN/m^2.Assume Fe 415 grade steel and M 20 grade concrete.	2	5	10

		UNIT-3			
5.	**a).**	Explain about the rigid and Flexible Foundations.	3	2	**6**
	b).	Explain about the deflection requirements of beams and slabs in rafts.	3	4	**6**
		(OR)			
6.	**a).**	Explain the different types of raft foundation.	3	4	**2**
	b).	Design a flat slab raft with edge beam for a layout of column loads by Direct Design Method. Assume the safe bearing capacity from settlement considerations as 50kN/m^2.Assume columns are 300 x 300 mm enlarged to 600 x 600 mm as capital	3	4	10
		UNIT-4			
7.	**a).**	Discuss about the estimation of settlement of piles in detail	4	2	**2**
	b).	A bored pile of total length 13.2 m is with enlarged base has a shaft diameter of	4	4	10
		600 mm and in the last 1.2m, it is enlarged to 1200 mm diameter. If the SPT (*N)* value of clay in which the shaft is installed is 13 and that of the enlarged portion is 15, estimate the settlement at the ultimate load of the pile.			
		OR			
8.	**a).**	Explain about the conventional analysis of annular rafts.	4	2	**2**
	b).	The load from a circular water tank supported by six columns rests on a ring beam, which in turn, rests on an annular raft. Assuming the mean radius of the centres of column line is 8m and the total load from the tank is 30,000kN. Design the ring beam.	4	4	10
		UNIT-5			
9.	**a).**	Explain about the significance of under-reamed piles for expansive soils.	5	2	**2**
	b).	The main brick wall of a room of a residential building is 225 mm thick and has a loading of 40kN/m at the foundation level. Another cross wall of the same thickness joins it and transmits a concentrated load of 35 kN. Design a layout of under reamed piles and grade beam for the foundation of the main wall	5	4	10
		OR			
10.	**a).**	Discuss about the significance of Earth pressure on rigid walls	5	2	**2**
	b).	Design a cantilever retaining wall with level backfill to retain 4 m of earth (φ=30º) of unit weight of 19 kN/m^2	5	4	**10**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

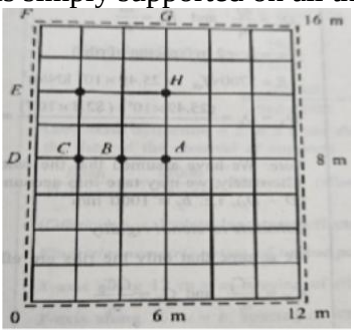
SRKR ENGINEERING COLLEGE AUTONOMOUS Estd. 1980

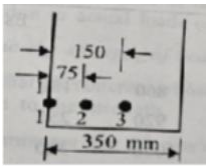
		Course Code: D25187B1			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
REPAIR AND REHABILITATION OF STRUCTURES					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	List out various Non-destructive testing methods and explain any one of them with neat sketches	1	2	12
		OR			
2.	**a).**	Explain the purpose of using admixtures.	1	2	6
	b).	Explain the concrete behavior under corrosion.	1	2	6
		UNIT-2			
3.	**a).**	What are various stress reduction techniques. Explain with neat sketches.	2	2	12
		OR			
4.	**a).**	Explain any one column strengthening technique with neat sketch.	2	2	6
	b).	Explain any one beam strengthening technique with neat sketch.	2	2	6
		UNIT-3			
5.	**a).**	Differentiate between AFRP, CRFP and GFRP.	3	2	8
	b).	List out the fundamental debonding mechanisms.	3	2	4
		OR			
6.	**a).**	Explain the techniques for strengthening of floor of structures with neat sketches.	3	2	12
		UNIT-4			
7.	**a).**	What is fibre reinforced concrete? Explain its properties	4	2	12
		OR			
8.	**a).**	Explain the properties and reaction mechanism in fly ash concrete	4	2	12
		UNIT-5			
9.	**a).**	Explain the properties of high performance concrete in detail.	5	2	12
		OR			
10.	**a).**	Explain the properties of self consolidating concrete in detail.	5	2	12

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25187B2			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		ADVANCED REINFORCED CONCRETE DESIGN			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-I	**CO**	**KL**	**M**
1.	**a).**	Distinguish between short-term and long-term deflection.	**1**	**2**	**2**
	b).	Calculate the short-term deflection due to dead and live loads and long-term shrinkage, assuming $\boldsymbol{\varepsilon_{cs}}$= 0.0004 and creep, assuming $\boldsymbol{\theta}$= 1.6 deflection due to permanent load of cantilever beam of span 4.0 m and is designed for a bending moment of 200 kNm (at support) under service loads of which 60 per cent is due to permanent (dead) load. The width and overall depth of beam are 300 mm and 600 mm respectively and reinforced with 3-28 ϕ in tension zone (Top) and 3-20 ϕ in compression zone and clear cover of 40 mm. The loading is uniformly distributed on the span. Assume M 20 concrete and Fe 415 steel.	**1**	**4**	**10**
		OR			
2.	**a).**	What are the major factors which influence crack-widths in flexural members?	**1**	**2**	**2**
	b).	Calculate the maximum probable crack-width for the one way slab has been designed for a simply supported span of 4.0 m with an overall depth of 170 mm and clear cover of 20 mm, using M 20 concrete and Fe 415 steel. The dead loads are taken as 5.0 kN/m^2 and the live loads as 2.0 kN/m^2 . The longitudinal bars are designed as 10 mm ϕ@150 mm c/c.	**1**	**4**	**10**
		UNIT-II			
3.	**a).**	Explain why redistribution of moments is permitted in indeterminate R.C. structures.	**2**	**2**	**2**
	b).	Determine the ordinates of the bending moment diagram at every one-eighth point of beam AB of span 20 m with a uniformly-distributed load of 30 kN/m if the fixed moment at A is 1000 kNm and that at B is 500 kNm.	**2**	**4**	**10**
		OR			
4.		A reinforced rectangular grid floor is 12 mby 16 m with the centre -to -centre spacing of ribs at 2 m both ways, as shown in Fig.1 Determine the bending moments and shears at the salient points. Assume slab thickness is approximately 1/20 th span, total load including weight is 6.5 kN/m^{2,} fck	**2**	**4**	**12**

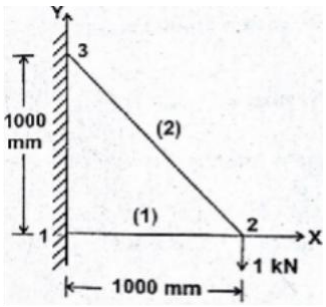
		=20 N/mm^2 and it is simply supported on all the four sides.  Fig.1			
		UNIT-III			
5.		Design an interior panel of a flat slab with panel size 6 m × 6 m supported	**3**	**4**	**12**
		by columns of size 500 × 500 mm. Provide suitable drop. Take live load as 4 kN/ mm^2. Use M 20 concrete and Fe 415 steel.			
		OR			
6.		A flat slab system consists of 5 m × 6 m panels and is without drop and column head. It has to a live load of 4 kN/m^2 and finish load of 1 4 kN/m^2. It is to be designed using M 20 grade concrete and Fe 415 steel. The size of the columns supporting the system is 500 × 500 mm and floor to floor height is 4.5 m. Calculate design moments in interior and exterior panels at column and middle strips in both directions.	**3**	**4**	**12**
		UNIT-4			
7.	**a).**	Derive the expressions for calculating stresses at a critical depth 'h' from top in a typical chimney for the following cases: (a) The average stress in the middle of shell due to vertical load wind pressure. (b) The stresses in steel due to temperature difference on the two faces of chimney (c) Combined effect of temperature stresses, self-weight and wind load on (i) Leeward side. (ii) Windward side.	**4**	**4**	**12**
		OR			
8.	**a).**	Design a R.C chimney using M 25 concrete and Fe-415 steel for the following requirement and check the stresses at a depth 50 m below the Top. Diameter of chimney (i) External 4.3m (ii) Internal 4.0 m Air gap – 100 mm, thickness of fire brick lining – 100 mm, temperature difference -80^{o}C, coefficient of thermal expansion- 11×10^{-6}/C. Assume missing data suitably.	**4**	**4**	**12**

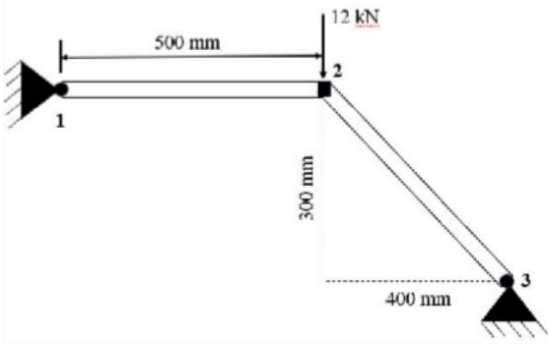
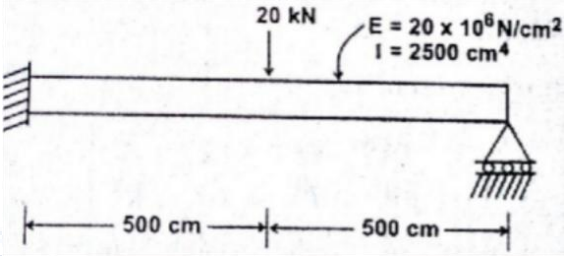
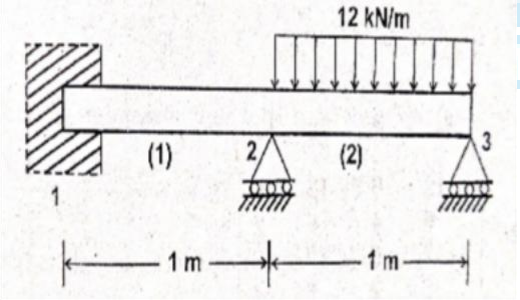
		UNIT-5			
9.	**a).**	Estimate the loss in bending strength of a beam with the following dimensions Fig.2 and subjected to a standard fire. The beam is 600×350 mm in size with 6 nos. of 16 mm rods placed in one row with a side and bottom clear cover to main steel of 40 mm. Assume M20 concrete and Fe 415 steel.  Fig.2	**5**	**4**	**12**
		OR			
10.	**a).**	Explain the **ISO 834 standard fire curve** and discuss how it is used to classify the fire resistance rating of reinforced concrete structural members. In your answer, include the grading system and the significance of standard heating conditions.	**5**	**3**	**6**
	b).	Describe the **effect of high temperatures on the mechanical properties of concrete and reinforcing steel**, and explain how these changes influence the **ultimate bending moment capacity** of reinforced concrete beams during fire exposure. Include relevant structural detailing considerations used to enhance fire resistance.	**5**	**3**	**6**

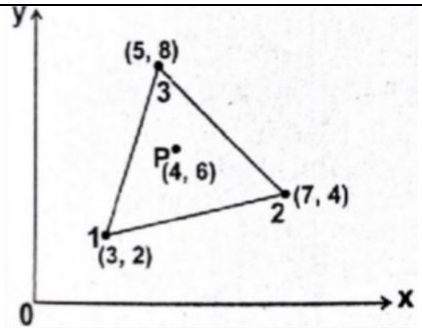
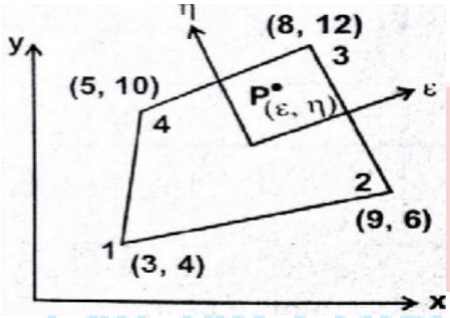
CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

SRKR ENGINEERING COLLEGE AUTONOMOUS Estd. 1980

				Course Code:D2528701	
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING			
		STRUCTURAL ENGINEERING			
Time: 3 Hrs.				**Max. Marks: 60 M**	
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain about Rayleigh-Ritz method.	1	2	2
	b).	Determine the deflection at the centre of a simply supported beam of span 'L', subjected to a uniformly distributed load of w/unit length throughout its length by using the Rayleigh-Ritz method.	1	3	10
		OR			
2.	**a).**	Explain about Weighted residual methods.	1	2	2
	b).	Solve the differential equation for a physical problem expressed as $\frac{d^2y}{dx^2} + 100 = 0,\ 0 \le x \le 10$ with boundary conditions as y(0) = 0 and y(10) = 0 by using i) Pont collocation method, ii) Sub-domain collocation method, iii) Least squares method and iv) Galarkin's method.	1	3	10
		UNIT-2			
3.	**a).**	A truss structure is subjected to a load of 1 kN as shown in **Fig. 1**. Determine the nodal displacements and forces if the element stiffness of the truss is 10 kN/mm.  **Fig. 1**	**2**	3	12
		OR			
4.	**a).**	For the truss shown in **Fig. 2**, calculate the displacements at node 2 and the stresses in the elements. Take the young's modulus (E) 70 MPa, and cross cross-sectional area (A) of each member is 200 mm^2	**2**	3	12

		 **Fig. 2**			
		UNIT-3			
5.	**a).**	A beam, fixed at one end and supported by a roller at the other end, has a 20 kN concentrated load applied at the center of the beam, as shown in **Fig. 3**. Determine the deflection under the load and also construct the shear force and bending moment diagrams for the beam.  **Fig. 3**	**3**	3	12
		OR			
6.	**a).**	For the beam loaded as shown in **Fig. 4**, calculate the slopes at nodes 2 and 3 and the vertical displacement at the mid span of the UDL.  **Fig. 4**	**3**	3	12
		UNIT-4			
7.	**a).**	Distinguish between CST and LST elements.	**4**	**2**	**5**
	b).	Explain plane stress and plane strain in CST elements.	**4**	**2**	**7**
		OR			
8.	**a).**	Determine the shape functions at the interior point ‘P’ for the triangular element shown in **Fig. 5**.	**4**	**2**	**14**

		 **Fig. 5**			
		UNIT-5			
9.	**a).**	Explain Iso-parametric, super-parametric and sub-parametric elements.	5	2	5
	b).	Develop shape functions for a four-noded quadrilateral iso-parametric element.	5	2	7
		OR			
10.	**a).**	Determine the Cartesian coordinates of the point 'P' which has local coordinates ε= 0.8 and η= 0.6 as shown in **Fig. 6**.  **Fig. 6**	5	2	14
	b).				

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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					Course Code: D2528702
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		EARTHQUAKE RESISTANT DESGIN			
		STRUCTURAL ENGINEERING			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	What is plate tectonic theory of origin of earthquakes and explain associated type of movement at the plate boundaries	1	2	7
	b).	How are earthquakes classified based on different aspects	1	2	5
		OR			
2.	**a).**	Explain the characteristics of different types of seismic waves	1	2	6
	b).	Explain the concept of elastic rebound theory with a neat sketch	1	2	6
		UNIT-2			
3.	**a).**	What are plan configurations and explain torsional irregularity, Re-entrant corners and Non parallel lateral force system	2	3	12
		OR			
4.	**a).**	Explain the limitations in adoption of in-fill wall with example in a moment resisting frame.	2	3	6
	b).	Explain Storey drift, Importance factor and damping ratio	2	3	6
		UNIT-3			
5.	**a).**	Explain concept of strong column and weak beam	3	4	6
	b).	Sketch the detailing of beams and column as per IS 13920	3	4	6
		OR			
6.	**a).**	The following details are available for a multi-storey moment resisting building. Compute the lateral forces developed at various levels using IS Code 1893-2002. Number of stories =8, Constant β=1.2. Basic horizontal seismic coefficient α=0.055. Importance Factor I=1.0. Performance Factor K=1.0. load at each i_{th} floor W_i =500 KN. Height of each i_{th} floor H_i =3.3m	3	4	12
		UNIT-4			
7.	**a).**	Explain the behaviour of pre-stressed concrete, Reinforced concrete elements under cyclic loading	4	4	12
		OR			
8.	**a).**	Explain the base isolation and advantage of adoption of base isolation in buildings	4	4	7

	b).	Define seismic dampers and explain different types of dampers	4	4	5
		UNIT-5			
9.	**a).**	What are factors that are affecting building damages due to earthquake	5	3	6
	b).	Explain Seismic retrofitting method with a sketch by an addition of shear wall	5	3	6
		OR			
10.	**a).**	Discuss various types of damages in RC buildings subjected to earthquake forces	5	3	6
	b).	Discuss damages to structural elements under seismic excitations	5	3	6

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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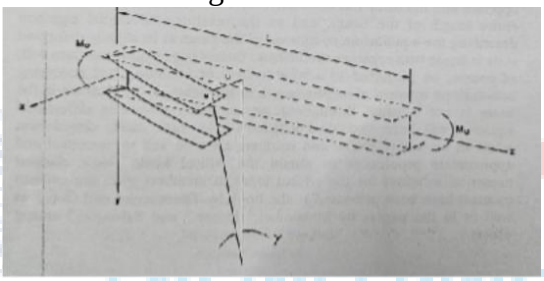
		Course Code: D2528703			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
STABILITY OF STRUCTURES					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Develop the basic differential equation of a beam-column subjected to general lateral loadings.	1	4	4
	b).	A beam column is subjected to compressive force at the ends in addition to moments at the two ends which produce zero slopes at the two ends. Develop an expression for 1) the deflection curve 2) Maximum deflection, 3) Maximum moment.	1	4	8
		OR			
2.	**a).**	Develop expression for the maximum deflection and maximum moment of a beam column whose ends are built in and that is loaded with a concentrated load at midspan.	1	4	6
	b).	Develop expression for the maximum deflection and maximum moment of a beam column whose ends are simply supported and that is load uniformly distributed load at midspan.	1	4	6
		UNIT-2			
3.	**a).**	Determine the crippling load of a column with one end fixed and the other hinged by using higher order differential equation.	2	4	6
	b).	Obtain an expression for the mid height deflection of an initially bent column with ends hinged.	2	4	6
		OR			
4.	**a).**	Write down the effect of shear force on critical load	2	4	6
	b).	A portal frame fixed at base has its lengths of members (L) and flexural rigidity (EI) the same for all its three members. Using natural equilibrium method, find the buckling load for the frame for symmetric buckling mode.	2	4	6
		UNIT-3			
5.	**a).**	What is inelastic buckling of columns? Explain about Tangent modulus theory.	3	4	6
	b).	What is double modulus theory? A column of rectangular cross section, hinged at ends is acted up on by an axial load ‘P’. Using the double modulus theory deduce an expression for buckling load.	3	4	6
		OR			

6.		Critical Load of a Cantilever Column Loaded at the Tip Figure 6.15a shows a cantilever column loaded by an axial force P at the tip. We now want to obtain an approximate solution of the critical load using the Rayleigh-Ritz method. Assume the deflection shape of the cantilever column to be $Y= c\ x^2$	3	4	12
		UNIT-4			
7.		Derive the expression for warping displacements in thin-walled open cross sections of rectangular element.	4	4	12
		OR			
8.		Non-uniform torsional buckling of thin-walled members of open cross-section of I section.	**4**	**4**	**12**
		UNIT-5			
9.		Derive the critical stress expression of lateral buckling of the rectangular beam in pure bending.	**5**	**4**	**12**
		OR			
10.	`	Simply Supported I-Section under pure bending. A simply supported I-beam subjected to a pair of equal and opposite end moments applied about the x axis is shown in Fig. 	**5**	**4**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25287A1			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
ADVANCED STEEL DESIGN					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Explain the failures of Bolted joints.	**1**	**2**	**2**
	b).	Two flats (Fe 410 Grade Steel), each 210~mm\times8 mm, are to be jointed using 20 mm diameter, 4.6 grade bolts, to form a lap joint. The joint is supposed to transfer a factored load of 250 kN. Design the joint and determine suitable pitch for the bolts.	**1**	**3**	**10**
		OR			
2.	**a).**	Explain the failures of welded connections.	**1**	**2**	**2**
	b).	A single-bolted double-cover butt joint is used to connect two plates which are 8 mm thick. Assuming 16 mm diameter bolts of grade 4.6 and cover plates to be 6 mm thick, calculate the strength and efficiency of the joint, if 4 bolts are provided in the bolt line at a pitch of 45 mm. Also, determine the efficiency of the joint if two lines of bolts with two bolts in each line have been arranged to result in a double-bolted double-cover butt joint.	**1**	**3**	**10**
		UNIT-2			
3.	**a).**	Derive the moment curvature relationship for a rectangular section subjected to flexure.	**2**	**2**	**4**
	b).	A two-span continuous beam having span AB=6 m and BC=8 m is subjected to central concentrated loads of 60 kN and 80 kN respectively. If the beam is simply supported at the ends calculate plastic moment required for the beam.	**2**	**3**	**8**
		OR			
4.	**a).**	State the following theorems of plastic collapse: (1) static theorem (2) kinematic theorem and (3) uniqueness theorem.	**2**	**2**	**4**
	b).	A fixed base rectangular portal frame is of height and span ‘L’. The columns each have full plastic moment ‘2MP’, and the beam has full plastic moment ‘MP’. One of the columns is subjected to a uniformly distributed horizontal load ‘w’ per unit run. Find the value of ‘w_u’ which would cause collapse. Sketch BMD.	**2**	**3**	**8**
		UNIT-3			
5.		Design a bolted bracket connection to support an end reac-tion of 400 kN because of the factored loads supported by the beam. The eccentricity of the end reaction is as shown in Fig.1. The steel used is of grade Fe 410. Use bolts of grade 4.6. The thickness of bracket plate may	**3**	**3**	**12**

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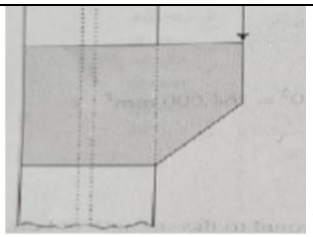
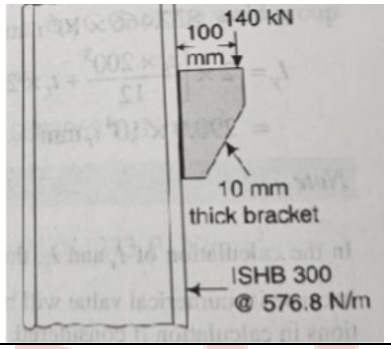
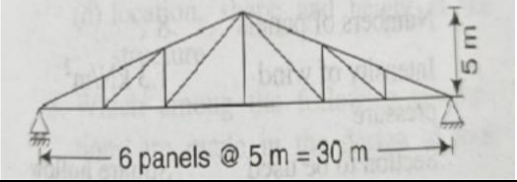
		be taken as 10 mm. The column section is ISHB 150 @ 300.19 N/m.			
		 Fig.1			
		OR			
6.	**a).**	A bracket plate 10 mm thick is used to transmit a reaction of 140 kN at an eccentricity of 100 mm from the column flange as shown in Fig.2. Design the weld. 	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Design an I-section purlin, for an industrial building situated in the outskirts of Allahabad, to support a galvanised corrugated iron sheet me for the following data: Spacing of the truss c/c=6.0 m Span of truss = 12.0 m Slope of truss = 30° Spacing of purlins c/c=1.5 m Intensity of wind pressure =2 kN/m^2 Weight of galvanised sheets =130 kN/m^2 Grade of steel = Fe 410.	**4**	**4**	**12**
		OR			
8.	**a).**	Design a tubular roof truss as shown in Fig. The design wind pressure is 1200 N/m². the trusses are covered with AC sheets and the centre-to-centre spacing of trusses in 6 m. 	**4**	**4**	**12**
		UNIT-5			
9.		The effective span of a through type truss girder highway through two lane bridge is 64 m. The reinforced concrete slab is 250 mm thick inclusive of the wearing coat. The foot paths are provided on either side of the carriageway. The spacing between centre to centre of truss girder is 13 m. Suggest a suitable truss girder for the bridge. Design the central	**5**	**4**	**12**

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		top chord member, the central bottom chord member. the vertical and diagonal member of the central panel. Design the joint,			
		where the central bottom chord, vertical and diagonal members. The highway bridge is to carry IRC class A standard loading.			
		OR			
10.		The effective span of a through type Pratt truss girder railway bridge for a single broad gauge track is 50 m. Pratt truss girder consists of 10 panels © 5 m. The height of girder between c.g. to c.g. of chords is 6 m. The spacing between main truss girders is 7 m. The rail level is 800 mm above the c.g. of bottom chord. The chord members are 600 mm deep x 644 mm wide. The inner web members are 600 mm deep x 260 wide. The end posts are 600 mm deep x 644 mm wide. Determine the increase or decrease of forces in the central chord member of the leeward truss girder in the following cases: (a) Overturning effect due to wind, when the bridge is unloaded. (b) Lateral effects of top chord and bottom chord bracings, when the bridge is unloaded. (c) Overturning effect due to wind, when the bridge is loaded. (d) Lateral effects of top chord and bottom chord bracings, when the bridge is loaded.	**5**	**4**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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				Course Code: D25287B0	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
THEORY OF PLATES AND SHELLS					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Derive the differential equation governing the plate.	**1**	**3**	**6**
	b).	Sate various assumptions involved in the derivation.	**1**	**3**	**6**
		OR			
2.	**a).**	Using the Navier solution obtain general equation for a rectangular plate subjected to hydrostatic pressure	**1**	**3**	**6**
	b).	Obtain the modified equation in case of a plate subjected to in plane forces.	**1**	**3**	**6**
		UNIT-2			
3.		Derive expressions for deflection, shear force and bending moment for a circular plate with simply supported boundary conditions subjected to uniformly distributed loading.	**2**	**3**	**12**
		OR			
4.		Analyze a circular plate of radius ‘a’ supported throughout along its outer edge and subjected to uniform moment M.	**2**	**3**	**12**
		UNIT-3			
5.		Derive the Equations of Equilibrium of shells.	**3**	**3**	**12**
		OR			
6.		Explain the Principles of membrane theory and bending theory.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Derive Schorer’s differential equation	**4**	**3**	**6**
	b).	Give solutions to Schorer’s differential equations	**4**	**3**	**6**
		OR			
8.	**a).**	Classify shells into long and short shells as per various theories?	**4**	**3**	**6**
	b).	Write boundary conditions for simply supported cylindrical shells with	**4**	**3**	**6**

		the edge conditions. i) Single shell without edge beam ii) single shell with edge beam.			
		UNIT-5			
9.	**a).**	Write the comparison between beam and arch action.	**5**	**2**	**5**
	b).	Explain the analysis and design of elliptic paraboloid.	**5**	**3**	**7**
		OR			
10.		Explain the design procedure of Conoidal and Hyperbolic paraboloid shapes by membrane theory.	**5**	**3**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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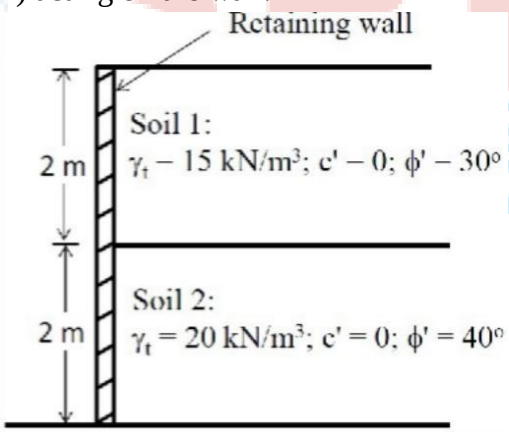
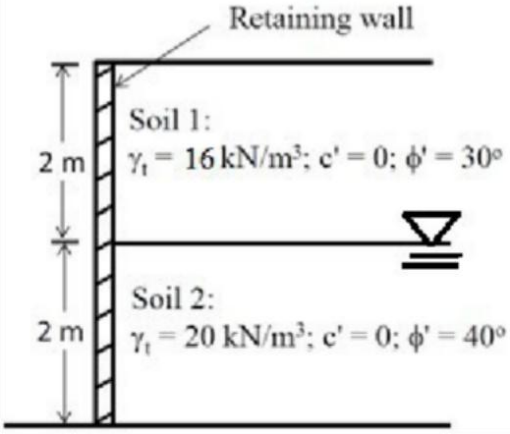
					Course Code: M25ST1210
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		EARTH RETAINING STRUCTURES			
		STRUCTURAL ENGINEERING			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Explain the differences between Rankine's and Coulomb's theories of earth pressure	**1**	**2**	**5**
	b).	Two different soil types (Soil 1 and Soil 2) are used as backfill behind a retaining wall as shown in the figure, where γ_t is the total unit weight, and c' and ø' are effective cohesion and effective angle of shearing resistance. Determine the resultant active earth force per unit length (in kN/m) acting on the wall. 	**1**	**3**	**7**
		OR			
2.	**a).**	Explain Culmann's Method for determining active earth pressure in cohesionless soil.	**1**	**2**	**5**
	b).	Two different soil types (Soil 1 and Soil 2) are used as backfill behind a retaining wall as shown in the figure, where γ_t is the total unit weight, and c' and ø' are effective cohesion and effective angle of shearing resistance. The water table is at depth of 2m below ground level. Determine the resultant active earth force per unit length (in kN/m) acting on the wall.	**1**	**3**	**7**

					
		UNIT-2			
3.	**a).**	Briefly explain different types of failures of retaining walls.	**2**	**2**	**5**
	b).	A cantilever retaining wall is to be constructed to retain a backfill of height 6m, having c = 0, Ø = 33^0 and γ = 18 kN/m^3. The bearing capacity of the foundation soil is 250 kN/m^2. Check the stability of retaining wall.	**2**	**3**	**7**
		OR			
4.	**a).**	Explain different types of retaining walls and their general proportions for the design.	**2**	**2**	**5**
	b).	A counterfort retaining wall is to be constructed to retain a backfill of height 10m, having c = 0, Ø = 43^0 and γ = 20 kN/m^3. The bearing capacity of the foundation soil is 300 kN/m^2. Check the stability of retaining wall.	**2**	**3**	**7**
		UNIT-3			
5.	**a).**	Explain various types of fills used in reinforced earth structures?	**3**	**2**	**6**
	b).	Explain the various theories of reinforced earth?	**3**	**2**	**6**
		OR			
6.		Check for the stability of a reinforced earth retaining wall of 6 m height, having 0.5 m embedment into foundation soil. The width of the wall is 3.5 m. The properties of the backfill are ø = 32^0, γ = 18.5 kN/m^3 and properties of fill material are ø = 33^0, γ = 19 kN/m^3. The wall is reinforced with GRP strips of 8 cm width and the reinforcement is placed with horizontal and vertical spacing of 0.5 m and 0.8 m respectively. The strip has a tensile strength of 45 kN and interfacial friction angle of 32^0. Take coefficient of friction at the base of the wall as 0.4.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Explain various types of anchoring systems used in anchored sheet pile	**4**	**2**	**5**

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		walls?			
	b).	An anchored bulkhead retains cohesion less backfill up to a height of 6.0 m above the dredge line. The average properties of soil, both above and below dredge line are as follows: γ = 18.5 kN/m^3, γ_{sat} = 20 kN/m^3, Ø = 28^0. The positions of water table and anchor rod are 3 m and 2m below ground level respectively. Determine the depth of embedment of the bulkhead and the force in the anchor rod by the equivalent beam method. Take i/H = 0.07.	**4**	**3**	**7**
		OR			
8.		Derive the expression for depth of embedment for sheet pile in cohesionless soils with neat sketch of earth pressure diagram?	**4**	**2**	**12**
		UNIT-5			
9.	**a).**	What is a Braced cut? When is it preferred? Mention various components of Braced cut.	**5**	**2**	**5**
	b).	It is required to construct a braced excavation up to a depth of 5 m in stiff clay having a unit weight of 19kN/m^3 and an unconfined compressive strength of 140 kN/m^2. Bracing systems consisting of struts and Wales are to be installed at 1.2 m, 3 m and 4.5 m below ground level. Determine the strut forces and maximum bending moment in the Wales?	**5**	**3**	**7**
		OR			
10.	**a).**	Explain various types of coffer dams with neat sketches?	**5**	**2**	**5**
	b).	A braced excavation is to be carried out up to a depth of 6 m in stiff clay having a unit weight of 20 kN/m^3 and an unconfined compressive strength of 150 kN/m^2. Bracing systems consisting of struts and Wales are to be installed at 1.3 m, 3 m and 4.6 m below ground level. Determine the strut forces and maximum bending moment in the Wales?	**5**	**3**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

					Course Code: D2538701
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
II M.Tech. I Semester MODEL QUESTION PAPER					
RESEARCH METHODOLOGY AND IPR					
STRUCTURAL ENGINEERING					
Time: 3 Hrs.					**Max. Marks: 60M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
			CO	KL	M
UNIT-1					
1.	**a).**	Write briefly about good Research criteria.	1	2	6
	b).	What are the errors in selecting a research problem?	1	2	6
OR					
2.	**a).**	Describe briefly the Research process with a neat sketch.	1	2	6
	b).	Describe the scope and objectives of research problems in academic and industrial contexts.	1	3	6
UNIT-2					
3.	**a).**	Write briefly about Effective Literature studies approaches.	2	2	6
	b).	Explain about Research ethics.	2	2	6
OR					
4.	**a).**	Write briefly about Effective technical writing.	2	3	6
	b).	Explain about the Format of research proposal.	2	3	6
UNIT-3					
5.	**a).**	Write about the various steps in acquisition of trademarks rights.	3	2	6
	b).	Discuss research ethics and its role in maintaining academic integrity.	3	3	6
OR					
6.	**a).**	Write briefly about International cooperation on Intellectual Property.	3	2	6
	b).	Explain the procedure for grants of patents.	3	2	6
UNIT-4					
7.	**a).**	Explain about patent information and databases.	4	2	6
	b).	Define Intellectual Property Rights (IPR) and explain patents, designs, trademarks, and copyrights.	4	2	6
OR					
8.	**a).**	Write briefly about scope of patent rights.	4	2	6
	b).	Write briefly about Licensing and transfer of technology.	4	2	6
UNIT-5					
9.	**a).**	Write briefly about Administration in the patent system.	5	2	6
	b).	Explain the scope of patent rights, licensing, and technology transfer.	5	3	6
OR					

10.	**a).**	Write briefly about New developments in IPR.	5	2	6
	b).	Explain IPR case studies involving IITs and their significance in technology commercialization	5	3	6

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

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