SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Sem Exam July 2023

21/7/23

Program: M.Tech – Structural Engineering
Duration: 3 hr

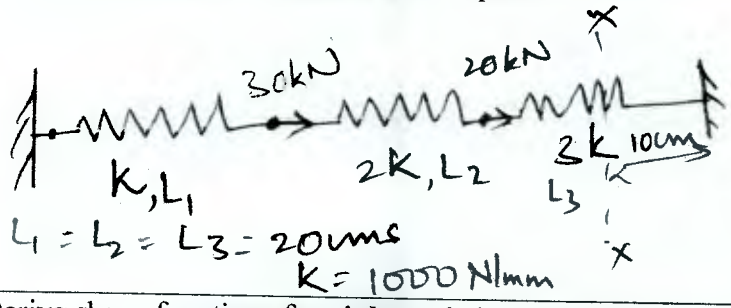
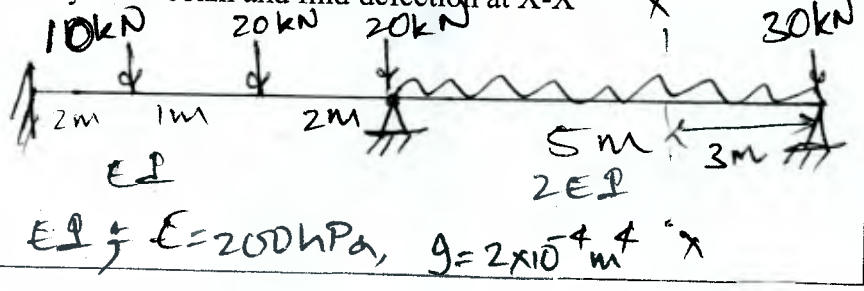
Course Code: PC-MST201
Maximum Points: 100

Course Name: Finite Element Analysis
Semester: II

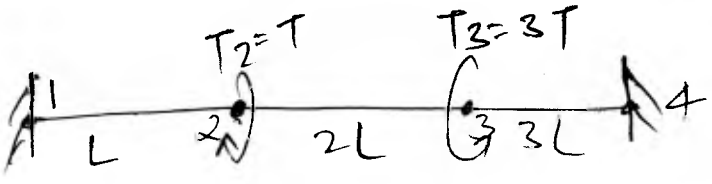
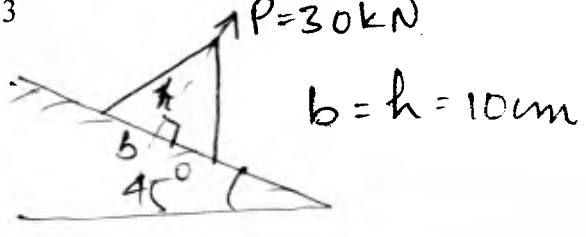
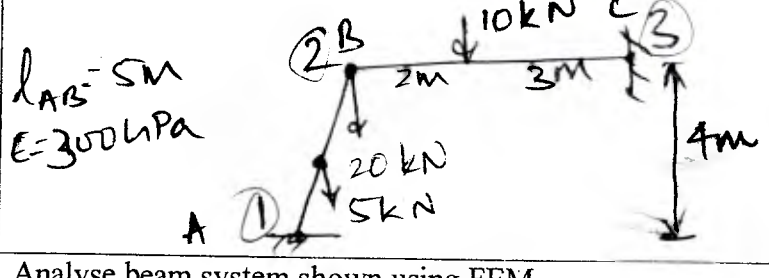
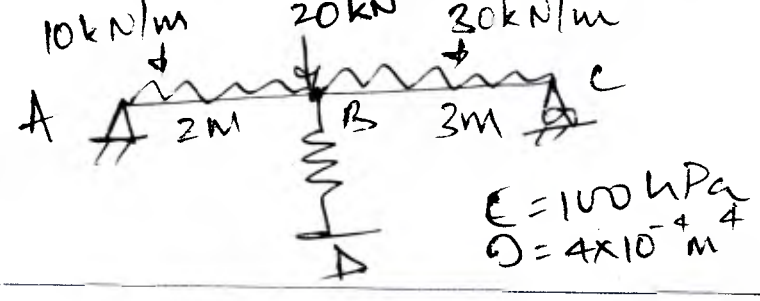
F.Y.M.Tech (Structural engg.) Sem-II

Notes:

1. **Attempt any five questions.**
2. **Assume appropriate data wherever required.**

Q. No.	Questions	Points	CO	BL	Module No.
1a	For the spring assemblage shown below, calculate reaction forces. Also calculate displacement at point X-X 	12	1,2	3	4
1b	Derive shape functions for **eight** noded rectangular element using Lagrangian Interpolation function.	08	1	3	2
2a	Solve the following differential equation using Galerkins Method Least Square Method Point Collocation Method $\Phi'' - \Phi = x$ Use Boundary Conditions $\Phi(x=0)=0$ and $\Phi(x=1)=1$	15	1	3	1
2b	Derive shape function for three noded line element.	05	1	2	4
3	Analyse the beam and find defection at X-X 	20	1,2	3	5

End Sem Exam July 2023

4a	Write short notes on shape functions and their uses in finite element analysis.	05	1	2	3
4b	A circular shaft is subjected to torques T2 and T3 as shown in the diagram. By employing one-dimension torsion elements compute angular rotations at nodes 2 and 3 and reactive torque at nodes 1 and 4 	15	1,2	3	3
5a	Derive the shape function for a CST element starting from the first principle.	8	1,2	3	3
5b	Two –dimensional model of an anchor plate of a communication towers guy cable is shown in the fig. The anchor consists of a triangular steel plate ,which is subjected to a force of 30kN.Analyse the anchor plate. Thickness of plate is 7mm.E= 175GPa and v= 0.3 	12	1,2	3	4
5c	Similarity & differences between the plane stress and plain strain elements.	05	1,2	2	
6	Analyse the plane frame shown in the fig using FEM. Consider E=300GPa ,I =10-4 m4 and A=0.01 m2 	20	1,2	3	5
7	Analyse beam system shown using FEM. 	20	1,2	3	5

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

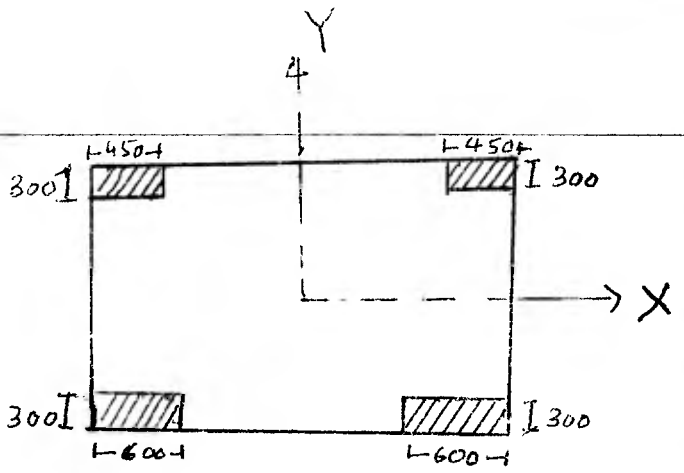
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai - 400058.
End Semester Examination
July - 2023

Max. Marks: 100
Class: M.Tech. Semester: II Program: CivilEngg.
Name of the Course: Earthquake Engineering

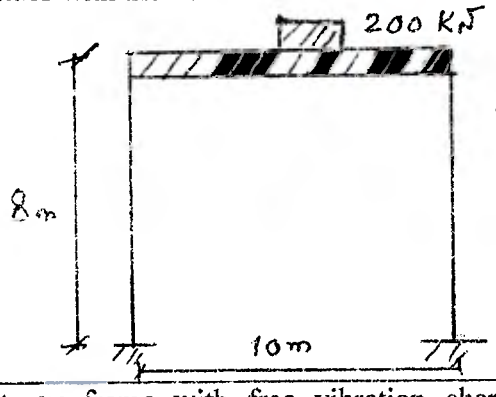
Instructions: F.Y.M.Tech (Structural engg.) Sem-II

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly

Question No		Max. Marks	Course outcome	Module No.
Q1 (a)	Answer the followings: (i) What is seismic zone factor? Explain briefly its significance (ii) Briefly explain the Plate Tectonic Theory of an earthquake occurrence	2 4		
Q1 (b)	The plan of one story building is as shown in figure. The structure consists of a roof idealized as a rigid diaphragm, supported on four corner columns as shown in figure. The roof weight is uniformly distributed and has magnitude 200 kg/m^2. The plan dimensions are b= 30 m d=20m. Height of the building is 6m. (i) Derive the stiffness matrix and determine the natural frequencies and modes shapes of vibrations of the structure (ii)As a special case, if all columns are of the same size, 300 mm x 600 mm, and if the system is subjected to the ground motion only in X direction, the response spectrum of which is shown in figure1. Determine the design value of lateral deformation, base shear and bending moment for the system.	8 6	2 2,3	



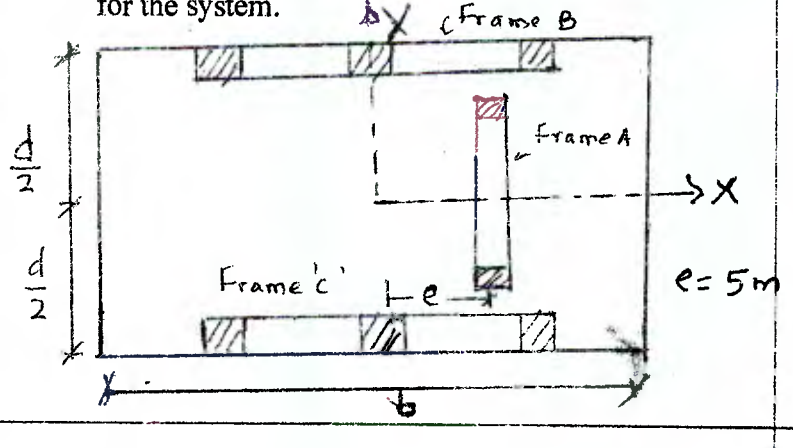
Q2 (a)	(i) A single-storey frame with a rigid girder as shown in the figure below is to be designed for ground motion, the response spectrum of which is shown in Figure 1. Determine the design value of lateral deformation and bending moments in the columns	**3**	**2,3**	**1,4**
	(ii) If the columns of the frame are hinged at the base, determine the design values of lateral deformation and bending moments in columns. Comment on the influence of base fixity on the design deformation and bending moments.	**3**	**2,3**	**1,4**
	(iii)If the beam cross-section is much smaller than that of columns, so the beam stiffness can be neglected, and columns are fixed at the bottom, determine the design values of lateral deformation and bending moments in columns. Compare the design values with the case i above	**4**	**2,3**	**1,4**
Q2 (b)	A two-storey frame with free vibration characteristics as given below is subjected to a ground motion defined by $u_g(t) = u_{g0} \sin \omega t$ where $ug_0 = 0.2g$ and $\omega = 15$ rad/sec. Calculate the maximum displacements of each story. Assume damping ratio $\xi = 5\%$.	**10**	**2,3**	**4**



C/S of column 300 mm × 300 mm

E = 20,000 Mpa.

Floor No.	Mass (t)	Mode No.	ω, rad/sec	Mode shapes	
				Φ_{i1}	Φ_{i2}
1	85	1	9.714	1.0	1.235
2	60	2	30.58	1.0	-1.149

Q3 (a)	What is response spectrum? Briefly explain the characteristics of response spectrum.	**4**	**3**	**3**
Q3 (b)	The plan of one storey building is as shown in figure. The structure consists of a roof idealized as a rigid diaphragm, supported on three frames A, B, and C as shown. The roof weight is uniformly distributed and has magnitude 200 Kg/m^2. The lateral stiffness are K_y = 25000 KN/m for frame A and K_x =25000 KN/m for frames B and K_x = 30,000 for frame C The plan dimensions are b= 30 m d=25m. The height of building is 8m.			
	(i) In general how many degrees of freedom for this system? Identify those dof.	**1**	**3**	**1**
	(ii) Calculate the stiffness matrix and write the equation of motion if the system is subjected to ground motion $u_{gx}(t)$ in x direction only.	**10**	**1,3**	**1,4**
	(iii) If Kx = 25,000KN/m for both frames B & C, and e= 0 and the system is subjected to the ground motion only in X direction, the response spectrum of which is shown in figure1. Determine the design value of lateral deformation, base shear and bending moment for the system. 	**5**	**3**	**1,4**
Q4 (a)	For a residential RCC special moment resisting building frame the seismic weights on floors are W_1 =2079.1 KN, W_2= 2863.9 KN and W_3= 1294.3 KN. The ground story height is 4.0m and first and second story height is 3.2m. The building is founded on hard soil and situated in zone IV. Determine the distribution of lateral forces and story shear by using equivalent static method. Use the response spectra given in figure 2	**8**	**4**	**5**

Q4(b) — A three-storey frame has the following free vibration characteristics. The frame is to be designed for the ground motion characterized by the design spectrum given in figure 1 but scaled to a peak ground acceleration of 0.4g. Calculate the design values of lateral deformation of floors. Use response spectrum given in figure2. | 12 | 4 | 5

Storey No.	Mass No.	Mass (t)	ω rad/sec	Mode shapes		
				Φ_{i1}	Φ_{i2}	Φ_{i3}
1	1	36	4.92	0.336	0.759	1.0
2	2	36	13.45	-2.46	-0.804	1.0
3	3	36	18.7	1.58	-1.157	2.58

Q5 (a)	Explain the three requirements of displacement design of structure for earthquake load as per IS 1893-2016.	4	4	5
Q5 (b)	As per IS 1893-2016, how many mode need to be considered in the earthquake force calculation by Response Spectrum Method	2	4	5
Q5 (c)	State the limitation of Equivalent static Method. As per IS 1893-2016, under what conditions the Equivalent static Method is permitted to use to calculate the earthquake forces.	2	4	5

Q5 (d) — Using response spectrum method, calculate the seismic force on each floor of the frame whose pre vibration properties are given below. Use the following additional data: Z=0.36, I =1.2, R=5.0 and ξ = 5%. Assume foundation strata as soft and use response spectrum given in figure 3 | 12 | 4 | 5

Story No.	Mass No.	Mass (t)	ω rad/sec	Mode shapes		
				Φ_{i1}	Φ_{i2}	Φ_{i3}
1	1	160	7.12	1.0	1.260	4.0
2	2	120	15.55	1.0	0.0	-1.0
3	3	80	20.81	1.0	-1.264	4.0

Q 6(a)	What is ductility? Explain the importance of ductility in earthquake resistant structures.	3	4	6
Q 6(b)	Briefly explain the following: (i) When the structure is subjected to torsion ? Briefly explain the IS 1893-2016 provisions for design for torsion. (ii) Briefly explain the plan irregularities as per IS 1893-2016	6	4	5
Q 6(c)	(i) A building having a non-uniform distribution of mass is shown in figure. Locate its center of mass (Figure 3 A)	4	4	5

	(ii) The plan of a simple one-storied building shown in figure 4. All columns have the same dimensions. Obtain the center of stiffness. (Centre of Rigidity).			
Q 6(d)	The first floor plan of a building with shear walls is as shown in figure 5. The plinth level plan is also same. Calculate the fundamental period of the building as per the provision of 7.6 2, of IS 1893-2016 both in X and Y direction. The total height of building is 24 m.	4	4	5
Q 6(e)	For the SMRFs idealized as shear building with rigid girders shown in figure 6, investigate whether the building structure has soft story. The height of first story is 4.5 m and that of remaining is 3.0 m.	2	4	5
Q 7(a)	Explain the provisions of IS 13920-2016, for (i)Columns longitudinal reinforcement, and transverse reinforcement only (splicing requirements need not be answered)	5	4	6
Q 7(b)	For the beam reinforced as shown in figure 7, design for shear reinforcement as per clause 6.3.3 of IS 13920 2016. Grade of concrete is M20, and that of steel is Fe415	10	4	6
Q 7(c)	Explain in brief the different types of bracings that can be used as lateral load resisting systems in steel structures	5	4	7

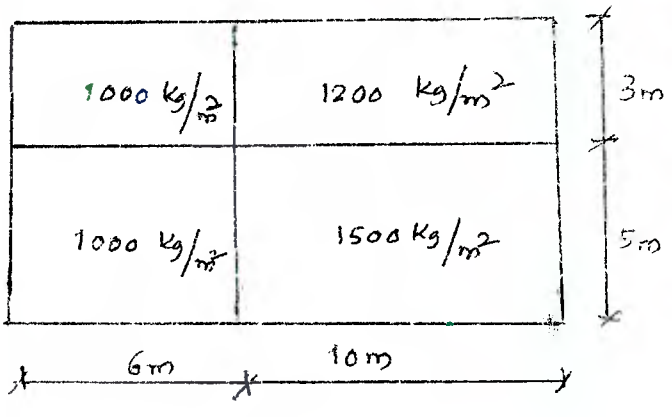


Figure : 3A

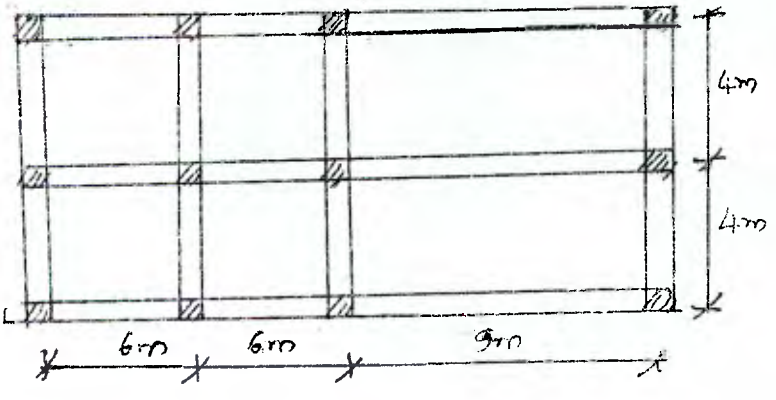
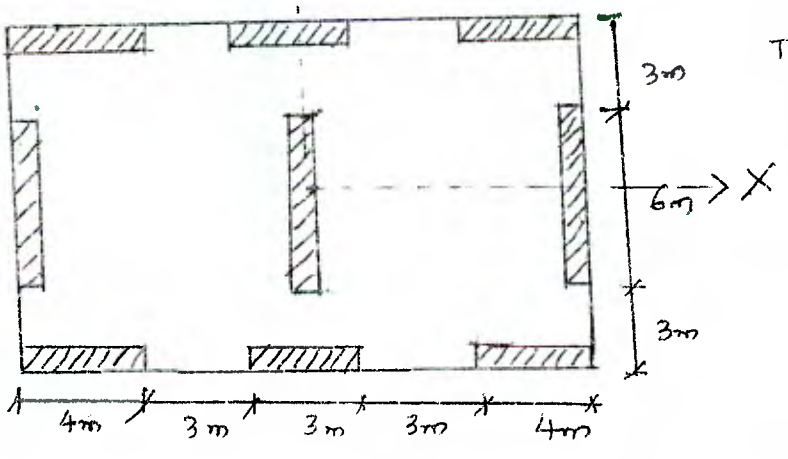


Figure . 4



Thickness of shear wall in x direction = 300 mm and in Y direction 350 mm.

Figure 5

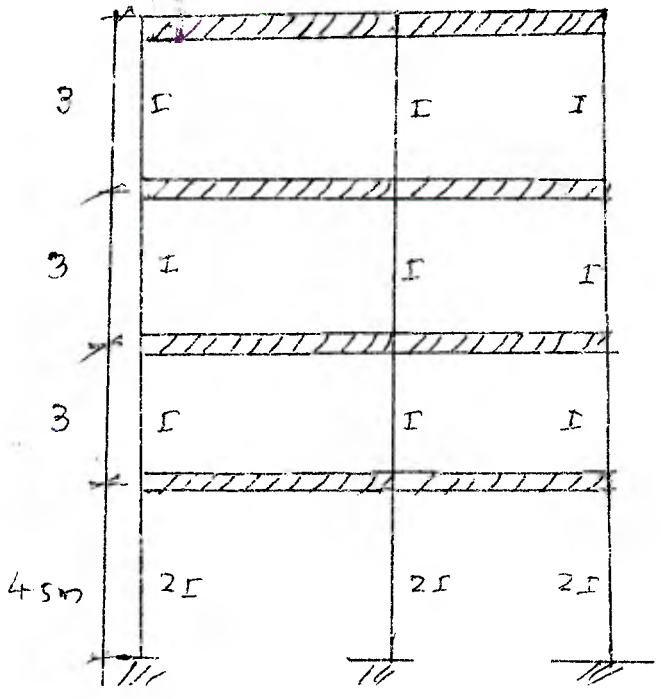


Figure 6

DISPLACEMENT RESPONSE SPECTRA
FOR EL-CENTRO EARTHQUAKE FOR 5% DAMPING PGA = 0.32g

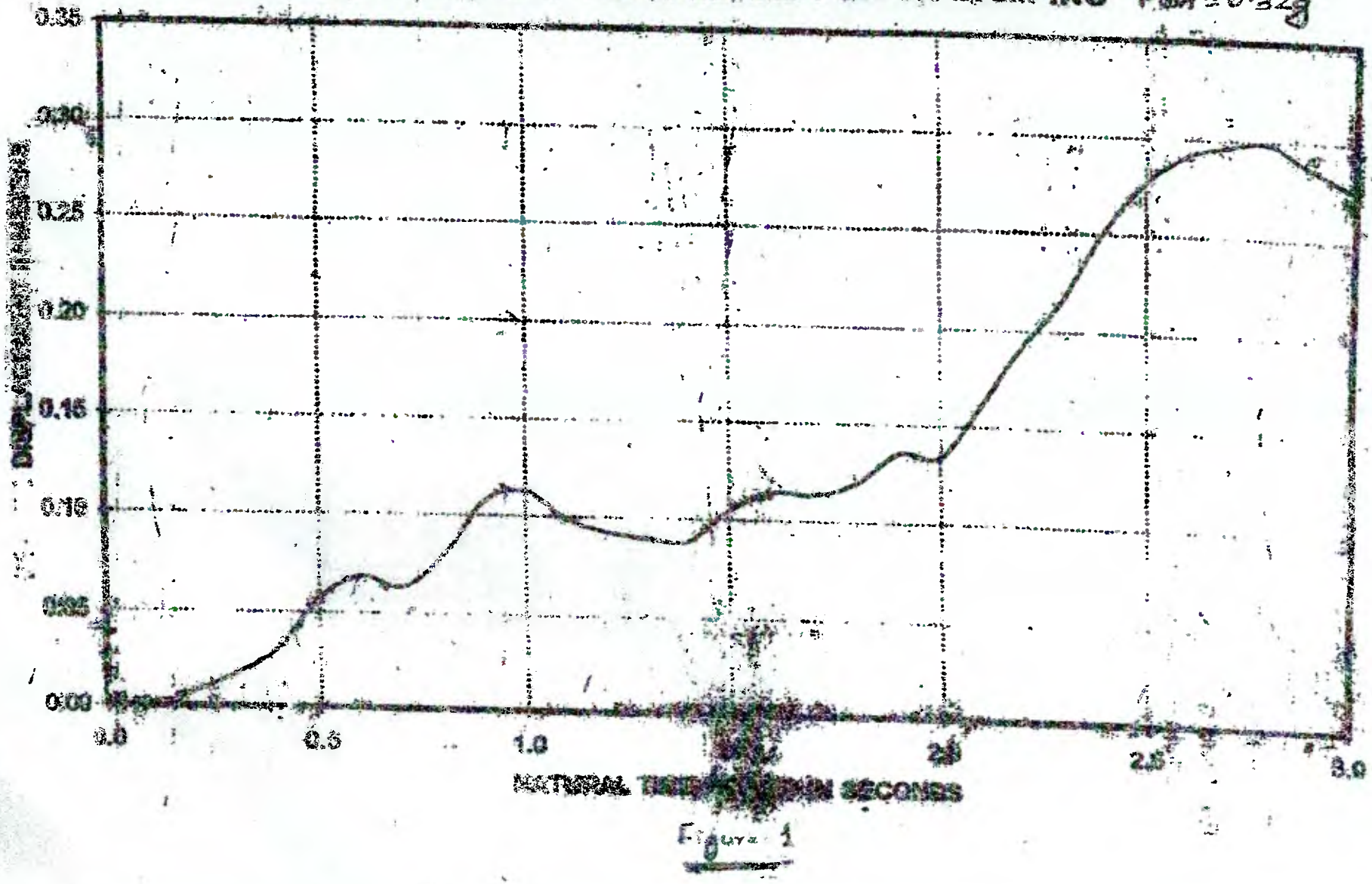
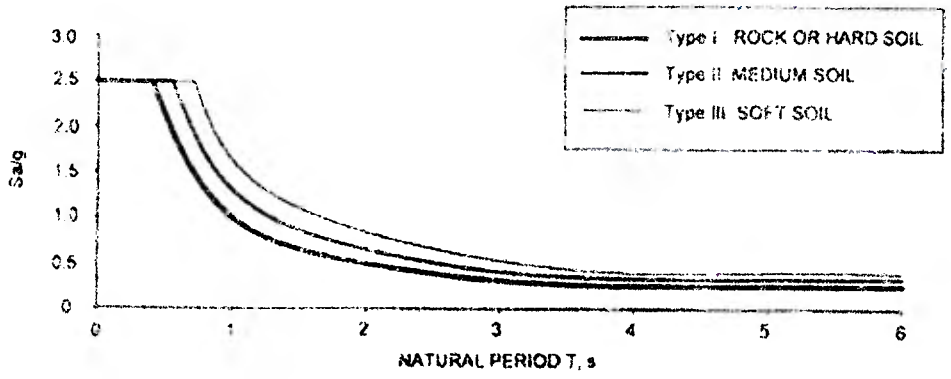
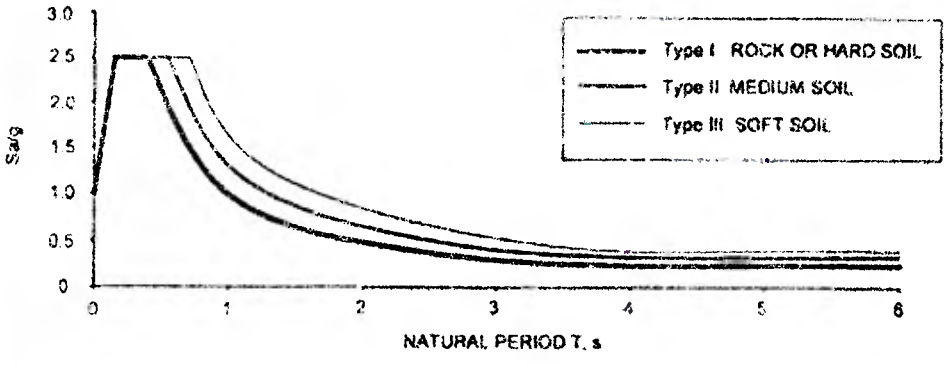


Figure 1



2A SPECTRA FOR EQUIVALENT STATIC METHOD

Fig. 2



2B SPECTRA FOR RESPONSE SPECTRUM METHOD

FIG. 2 DESIGN ACCELERATION COEFFICIENT (S_a/g) (CORRESPONDING TO 5 PERCENT DAMPING)

Table 4 Classification of Types of Soils for Determining the Spectrum to be Used to Estimate Design Earthquake Force

(*Clause* 6.4.2.1)

Fig. 3

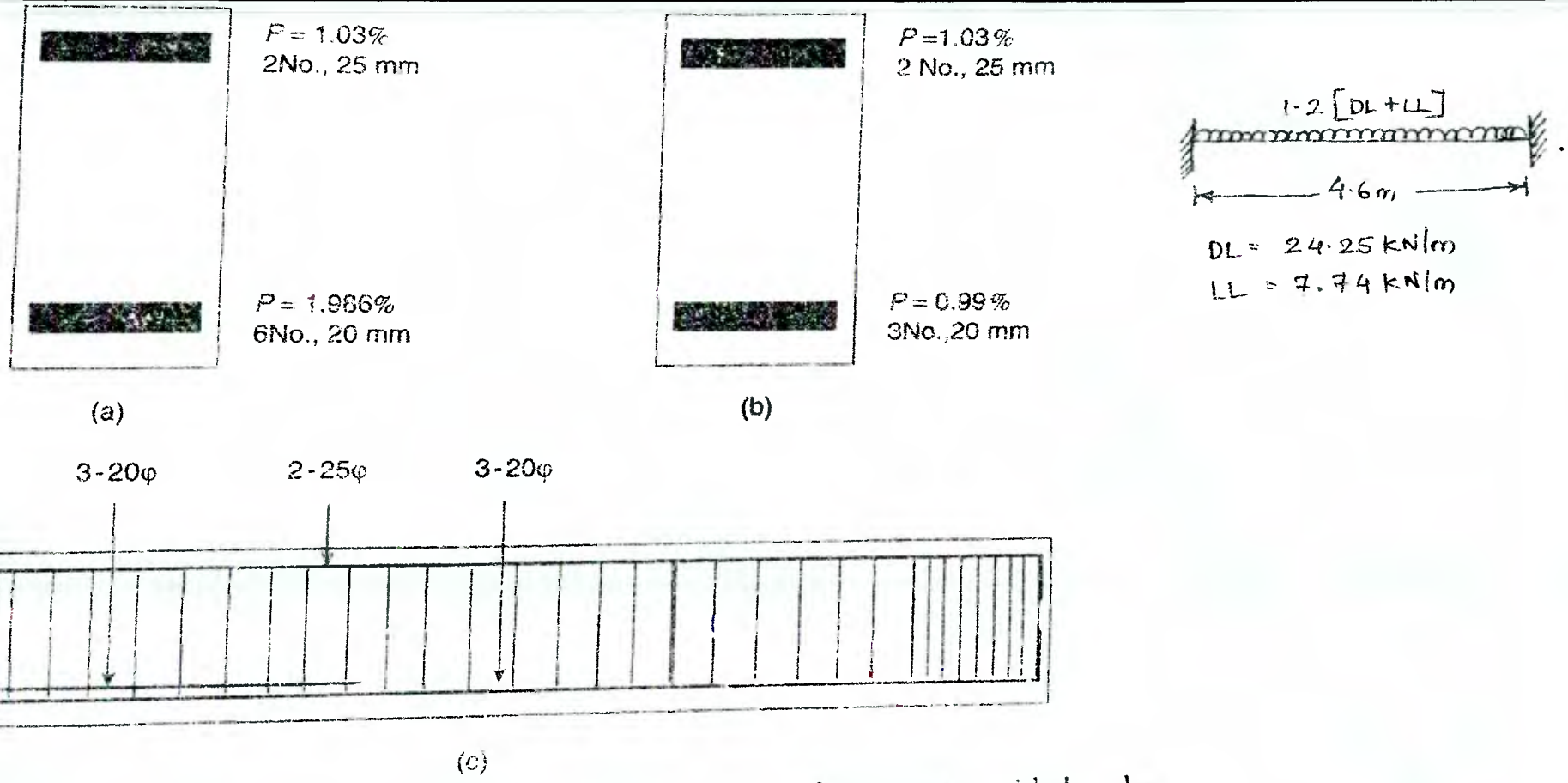


Figure 7 Reinforcement provided at both sides of the section. (a) Final reinforcement provided at the left of the span. (b) Final reinforcement provided at the right of the span. (c) Arrangement of reinforcement for entire length.

For calculating $\frac{Mu}{bd^2}$, consider top and bottom steel as tensile steel respectively [due to reversal of moments]. Use Table 50 for calculating Mu

The maximum ultimate shear value due to critical load combinations is 75kN

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(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination – July 2023 Examinations

26/7/23

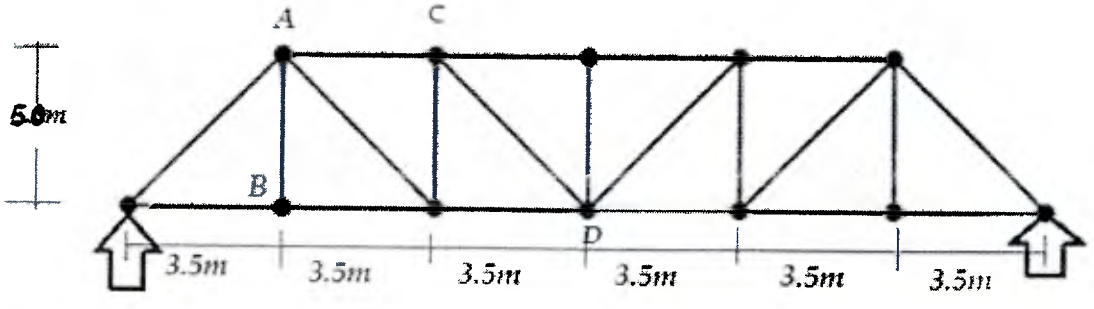
Program: F.Y.M.Tech (Structural Engineering)
Course Code: EC-MST203
Course Name: Bridge Engineering

Duration: 3 Hours
Maximum Points: 100
Semester: II

F.Y.M.Tech (Structural engg.) Sem-II

Notes:
1) Attempt any 5 questions out of 7
2) Assume suitable data if missing and mention the same
3) Answers to all sub-questions shall be grouped together
4) Use of IRC 6, IRC 112, and IS 800 is allowed is allowed

Q.No.	Questions	Points	CO	BL	PI
1)	a) Enlist various methods of bridge superstructure erection. Explain in detail any one method with its suitability and neat sketches	10	4	2	2.1.
	b) Explain the Courbon's theory for proportioning the live loads on the girders in detail with its assumptions and limitations. Calculate the Courbon's factors for 3 girders equally spaced at 2m c/c, the bridge is symmetrical in transverse direction with carriageway of 6 m for 1 lane of IRC class A vehicle loading.	10	1	3	1.4.
2)	a) Design an RCC slab of a solid slab bridge with following details : Effective span = 6m Carriageway width = 7.5m SIDL = 7 kN/m Wearing course = 75mm thick The bridge is subjected to 1 lane of IRC Class 70R tracked vehicle. Use M35 and Fe500	15	3	4	3.1. 3.2.
	b) A simply supported span of 20m is supported on fixed (FX) and free bearing (FR) at each end. The width of carriageway is 7.5m. Calculate the braking forces for Class 70R wheeled vehicle plying on the span. If the reaction from dead load on each bearing is 1000kN, what are the longitudinal forces on each of the bearings? ***(Assume that the supports are unyielding, μ=0.05)***	5	1,3	3	2.4.
3)	a) Obtain the maximum bending moment at centre and absolute maximum shear force for a girder of span 15m subjected to a single class 70R wheeled vehicle and having a courbon factor of 0.45	7	1	4	2.4

	b) Design T-beam girder of span 15m as per IRC 112-2011 with following specifications: UDL on girder due to SIDL = 8kN/m UDL on girder due to wearing course = 2.5kN/m UDL due to slab = 18kN/m Live load as per Q.3(a) Effective slab width as beam flange = 2.4m Depth of slab = 0.25m Use M35 and Fe500	13	3	4	3.1.4 3.2.
4)	For the steel truss bridge shown below: Equivalent UDL due to live loads = 50kN/m SIDL = 10kN/m Use E250grade steel. Design members AC and CD. Also design the connection for member CD	20	3	4	3.1.4 3.2.
					
5)	a) Explain the behavior of box girder under transverse loads. What are the various techniques for analysis of box girder? Explain the limitations of each.	10	3	2	2.3.1 2.3.2
	b) Calculate the axial load and uniaxial moment carrying capacity of an RCC pier of size 1400 x 1400 mm. The pier has 7 bars of 25mm diameter along each face. Concrete grade is M45 and steel grade is Fe500. ***Assume:*** Neutral axis at 450mm from extreme compression fibre. Use rectangular parabolic stress block as per IRC 112-2011	10	3	4	1.4.1 3.1.4
6)	Design a shallow foundation as per IRC 112 for a pier of size 1.25m x 1.25m. The design axial load = 2800kN and design moment along transverse axis = 750kNm. SBC of soil = 165kN/m^2. Use M40 and Fe500. Provide checks for : a) Flexure	20	3	4	3.1.4 3.2.1

	b) One way shear c) Punching shear at distance 2 x depth of footing from face of pier and at face of pier				
7)	a) Explain briefly the suitability and components of a cable stayed bridge and load transfer mechanism for such bridge.	10	2	2	3.1.4 3.2.1
	b) Explain the classification of bridges based on i) structural form, ii)Function	05	1	2	2.2.1
	c) Explain the data to be collected for selecting a site for constructing bridge	05	1	2	2.2.1

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TERM END EXAMINATION JULY 2023

Program: M. tech Civil (Structural engineering) **Duration: 3 Hr**

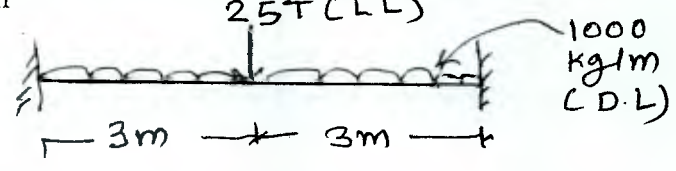
Course Code: EC MST214 **Maximum Points: 100**

Course Name: Advanced design of concrete Structures **Semester: II**

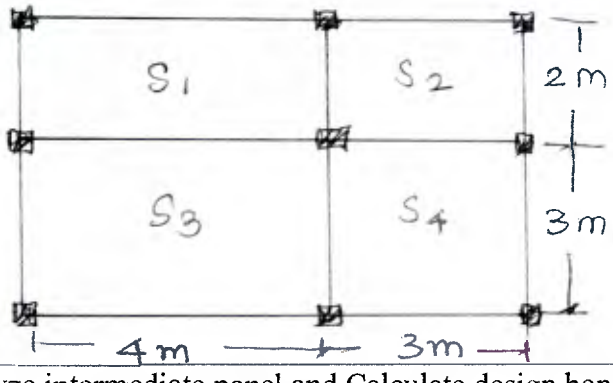
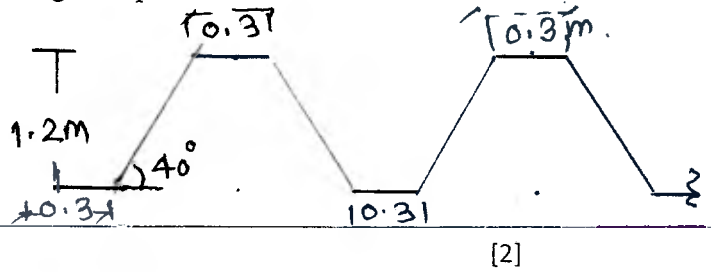
Notes: 1) Each question carries 20 marks

2) Solve any five questions out of seven questions

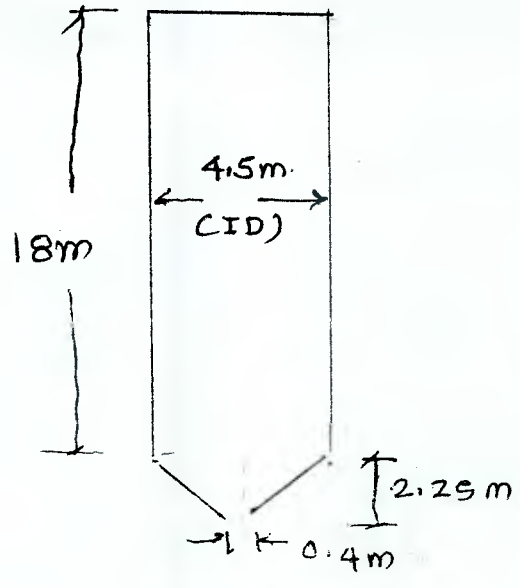
F.Y.M.Tech (Structural engg.) Sem-II

Q.No.	Questions	Points	CO	BL	PI
Q. 1(a)	For a doubly reinforced beam of size 30 cm x 50 cm (overall depth) is provided with 25 cm^2 steel as compression and tension reinforcement at effective cover of 5 cm each, calculate ultimate moment carrying capacity of beam. The concrete has a 28 day cube strength of 250 kg/cm^2 and steel has compressive and tensile yield stress of 2500 kg/cm^2 and 2800 kg/cm^2 respectively. **Use ultimate load method**	14	CO1	L6	
Q.1(b)	Explain how limit state of serviceability for deflection and cracking is taken care by various IS 456 clauses	06	CO1	L2	
Q. 2(a)	For the beam shown with the service load, Use load factors 1.8 for dead load and 2.2 for live load. Design the beam using Cambridge method approach. Give checks for rotation required and rotation capacity available. . The concrete has a 28 day cube strength of 200 kg/cm^2 and steel has tensile yield stress of ~~2500 kg/cm²~~ and 2800 kg/cm^2 	20	CO1	L2	
Q.3(b)	Explain the concept of tensile hinge and compression hinge used in Baker's method of analysis	06	CO1	L3	

TERM END EXAMINATION JULY 2023

Q. 3(a)	Using the Virtual Work Method, analyze a 250 mm thick reinforced concrete slab spanning 6.0 m x 4.5 m. The slab occupies a corner bay of a floor, which has columns at each corner connected by stiff beams in each direction. The slab can be regarded as being continuous over two adjacent sides and simply supported on the other two. Assume isotropic reinforcement with equal 'm' in each direction. Calculate value of m (assume yield lines formation at an angle of 45 degrees.)	14	CO1	L5	
Q.4	For the slab beam arrangement shown calculate design bending moments for slab after redistribution of moments. Design the slab reinforcement. The slabs are subjected to live load of 3.0 Kn/m2 in addition to floor load 1 Kn/m2 and self-weight. **Draw reinforcement in section.** Use Limit State Method. 	20	CO1	L6	
Q. 5	Analyze intermediate panel and Calculate design bending moments for flat slab of size 7.0 m x 7.0 m. The slab is supported by columns of size 450 mm x 450 mm . Provide drop panel. Use M20 concrete & Fe415 steel. **Use direct design method** **Draw reinforcement in plan**	20	CO2	L6	
Q.6	Perform **preliminary analysis upto stress distribution for compatibility** only for the folded plate shown . Thickness of plate 110 mm. Loading on inclined plate 200 kg/m2 and loading on horizontal plate 250 kg/m2. Length of plate 20 m 	20	CO2	L5	

TERM END EXAMINATION JULY 2023

Q. 7	Design Silo to store Rice. The dimensions of silo as shown in the figure. Use Airy's theory Assume unit weight of rice as 6500N/m3. Use M20 grade of concrete and mild steel reinforcement Fe 250. Perform calculations at h =4 m, 8m, 12m, 16m and 18 m Use $\mu = 0.46$ and $\mu' = 0.44$ 	20	CO2	L6	

Notes – 1) $h = b\left[\mu + \sqrt{\frac{\mu(1+\mu^2)}{\mu+\mu'}}\right]$

$$p_h = wb\left[\frac{1}{\sqrt{(1+\mu^2)+\mu(\mu+\mu')}}\right]^2$$

2) $$p_h = \frac{wb}{(\mu+\mu')}\left[1 - \frac{\sqrt{1+\mu^2}}{\sqrt{\frac{2h}{b}(\mu+\mu')+1(1-\mu\mu')}}\right]$$

$$p_h = \frac{wb^2}{2(\mu+\mu')^2}\left[\sqrt{\frac{2h}{b}(\mu+\mu')+(1-\mu\mu')} - \sqrt{1+\mu^2}\right]^2$$

TERM END EXAMINATION JULY 2023

Table for slab moment coefficients

(*Clauses* D-1.1 *and* 24.4.1)

Case No.	Type of Panel and Moments Considered	Short Span Coefficients α_x (Values of l_y/l_x)								Long Span Coefficients α_y for All Values of
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	l_y/l_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	*Interior Panels:*									
	Negative moment at continuous edge	0.032	0.037	0.043	0.047	0.051	0.053	0.060	0.065	0.032
	Positive moment at mid-span	0.024	0.028	0.032	0.036	0.039	0.041	0.045	0.049	0.024
2	*One Short Edge Continuous:*									
	Negative moment at continuous edge	0.037	0.043	0.048	0.051	0.055	0.057	0.064	0.068	0.037
	Positive moment at mid-span	0.028	0.032	0.036	0.039	0.041	0.044	0.048	0.052	0.028
3	*One Long Edge Discontinuous:*									
	Negative moment at continuous edge	0.037	0.044	0.052	0.057	0.063	0.067	0.077	0.085	0.037
	Positive moment at mid-span	0.028	0.033	0.039	0.044	0.047	0.051	0.059	0.065	0.028
4	*Two Adjacent Edges Discontinuous:*									
	Negative moment at continuous edge	0.047	0.053	0.060	0.065	0.071	0.075	0.084	0.091	0.047
	Positive moment at mid-span	0.035	0.040	0.045	0.049	0.053	0.056	0.063	0.069	0.035

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058.

End –SEM Examinations, JULY 2023

3/7/23

Total points:100

Duration: *Total Time allotted will be 3Hr.*

Class: M. TECH(CM) & MTECH(STR) Semester: II Program: Civil

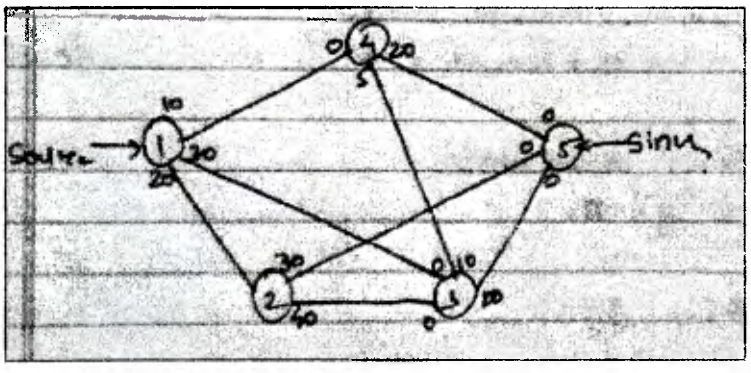
Name of the Course-Operational Research **Course** Code : OE-PG03 PC-MTCM-202

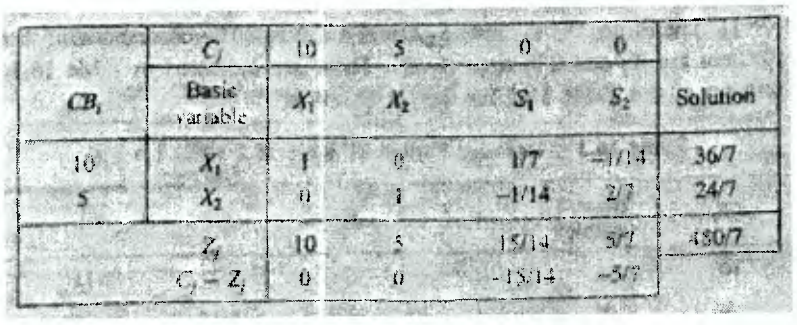
Instructions: F.Y.M.Tech(Struc./Cons. mgt.) Sem-II

1. Draw neat diagrams
2. Assume suitable data if necessary and state the clearly.

		Points	CO	BL	PI
Q1(A)	Solve Following LPP by using Kuhn-Tuckers conditions Max Z = $-(X-2)^2 - 2(Y-1)^2$ Subject to, X+ 4Y <= 3 -X+ Y <= 0 X, Y >= 0	10	2,4	4	2.2.2
Q1(B)	There are 7 jobs, each of which must go through the machines A and B in the order AB. The processing times (in hours) are given as Determine a sequence of these jobs that will minimise the total elapsed time T. Also obtain: I) the minimum elapsed time; and ii) the idle time for each of the machines.	10	3,4	3	4.2.1
Q2	Solve following LPP by revised simplex method Max Z =2X1+X2	20	1,2	4	3.2.1

JOB	J1	J2	J3	J4	J5	J6	J7
MACHINE A	3	12	15	6	10	11	9
MACHINE B	8	10	10	6	12	1	3

	Subject to, 3X1+4X2 <= 6 6X1+X2 <= 3 X1, X2 >= 0				
Q3(A)	Explain all types of cost involved in Deterministic inventory model If for a project, annual demand is 10000/year, order cost=300/order, carrying cost = Rs 4/unit/year then 1. Estimate Economic order quantity and Total cost of project 2. Draw graphs for all types of costs in EOQ concept.	10	2,4	4	4.3.2
Q3(B)	 Find the maximum flow above in the Model.	10	2,4	3	2.3.2
Q4(A)	Customers arrive at the clinic at the rate of 8/hour (Poisson's Ratio), And doctor can serve at the rate of 9/hour (Exponential), 1. What is the probability that customer does not join the que and walks in doctor's room? 2. What is the probability that there is no que? 3. What is the probability that there are 10 customers in the que? 4. What is the expected number in the system? 5. What is the expected waiting time in the que?	10	3,4	4	2.3.2
Q4(B)	Consider following parametric linear programming problem- Max Z = (10 – 2t)X1 + (5 – 3t)X2 S.T. 8X1 + 2X2 <= 48 2X1 + 4X2 <= 24 X1 , X2, t >= 0 Perform parametric analysis with respect to objective function coefficient and find the range of t over which optimal solution will not change. Use following linear programming The optimum table –	10	2,4	3	4.3.3



C_j		10	5	0	0	
CB_i	Basic variable	X_1	X_2	S_1	S_2	Solution
10	X_1	1	0	1/7	−1/14	36/7
5	X_2	0	1	−1/14	2/7	24/7
	Z_j	10	5	15/14	5/7	480/7
	$C_j - Z_j$	0	0	−15/14	−5/7	

Q5	Minimise f(x) = $7 * X_1 * X_2^{-1} + 3 * X_2 * X_3^{-2} + 5 * X_1^{-3} * X_2 * X_3 + X_1 * X_2 * X_3$ Where, X1, X2, X3 >= 0 Solve above model using geometric programming	20	1,3	5	3.2.1
Q6	A trader stocks a particular seasonal product at the beginning of the season and cannot re-order. The item costs him Rs. 25 each and he sells at Rs. 50 each. For any item that cannot be met on demand, the trader has estimated a goodwill cost of Rs. 15. Any item unsold will have a salvage value of Rs. 10. Holding cost during the period is estimated to be 10 per cent of the price. The probability distribution of demand is as follows: Unit Stocked: 2 | 3 | 4 | 5 | 6 Probability of demand: 0.35 | 0.25 | 0.20 | 0.15 | 0.05 Determine the optimal number of items to be stocked using **Pay-off Matrix method.**	10	3,1	5	3.2.2
Q6(B)	A factory manufactures two products A and B. To manufacture one unit of A, 1.5 machine hours and 2.5 labour hours are required. To manufacture product B, 2.5 machine hours and 1.5 labour hours are required. In a month, 300 machine hours and 240 labour hours are available. Profit per unit for A is Rs. 50 and for B is Rs. 40. Formulate as LPP.	10	1,4	5	3.2.1
Q7(A)	Activity | Duration 1-2 | 8 1-3 | 10 1-4 | 5 2-7 | 6 3-4 | 3 4-5 | 7	10	1,3	4	1.2.3

	4-7	0				
	5-6	4				
	5-7	3				
	5-8	6				
	6-8	5				
	7-8	5				

Determines all types of floats and critical Path using information given in above table.

Q7(B)

Activity	Duration(weeks)		
	a	m	b
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

10 | 1,3 | 4 | 1.2.3

I) Construct the project network

II) Find expected duration and variance of each activity

III) Find critical path and expected project duration time

IV) What is the probability of completing the project on or before 18 weeks?

V) What is the probability of completing the project 3 weeks earlier than expected time?

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997

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SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester – July 2023 Examinations

21/8/23

Program: F Y M.Tech
Course Code:AU-PG-03
Course Name: Disaster Management

Duration: 3 Hours
Maximum Points:100
Semester: II

F.Y.M.Tech (Disaster management) Sem-II

Notes: 1. Answer any five questions.
2 All questions carry 20 points.

Civil Engg.

Q.No.	Questions	Points	CO	BL	Module No.
1	1.1 What is Disaster Risk Reduction? Explain in detail.	10	1	2	5
	1.2 Explain 'exposure' with an example and its drivers. Explain 'vulnerability' and its drivers.	10	1	2	5
2	2.1 What are the seven Global targets of the Sendai Framework for Disaster Risk Reduction? What was the status of Target E by 2019?	10	4	2	5
	2.2 What are the four Global priorities for action of the Sendai Framework for Disaster Risk Reduction?	10	4	2	5
3	3.1 What is Disaster Mitigation? How does it differ from other disaster management disciplines/phases? What are goals of Disaster Mitigation?	10	4	2	6
	3.2 Explain structural and non-structural activities in Disaster Mitigation. What are mitigation strategies for floods?	10	3	2	6
4	4.1 What is the aim of Disaster/Emergency Response? List out the key activities and elements of Disaster Response.	10	3	3	4
	4.2 Explain the three Humanitarian Principles that Humanitarian agencies must observe while responding to Disasters.	10	3	3	4

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End Semester – July 2023 Examinations

Q.No.	Questions	Points	CO	BL	Module No.
5	5.1 What are the three levels and responsibilities of Disaster Management Authorities specified in Disaster Management Act, 2005? What has the Act been criticized for?	10	4	2	4
	5.2 Riverine flooding is perhaps the most critical climate-related hazard in India. Explain.	10	4	2	3
6	6.1 With the help of a diagram explain the four phases of the Disaster Management Cycle. Mark the point in the cycle where the disaster occurs.	10	2	2	1
	6.2 Explain the causes and typical adverse effects of Floods.	10	3	2	2
7	7.1 Explain the four interrelated components involved in Community Risk assessment.	10	2	2	5
	7.2. List out ten focus areas pertaining to strategies for survival from disasters.	10	4	2	5