



Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

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



End Sem – Decemeber 2022 Examinations

Program:

Civil Engg.

B.Tech Civil Engg Sem VII

Duration: 3 hr

Course Code: PC-BTC701

Maximum Points:100

Course Name:

Design of Concrete Structures

Semester: VII

Notes:

- 1) Use of IS 456:2000 is permitted.
- 2) Figures to right indicate full marks.
- 3) Assume suitable data if necessary and state the same clearly

Q.No.	Questions	Points	CO	BL	Module No.
1	The staircase room for a four storeyed framed structure of a residential building is of size 3.9m X 5.3m between centre of columns. The columns are of size 350 mm x 350mm. The width of beam and supporting wall is 250 mm. The floor to floor height is 3.0 m .Use M-30,Fe-500D.Design a suitable dog-legged stairs. Draw reinforcement details .	20	1,2,3,4	4,5,6	1
2	A reinforced cantilever RW is supporting backfill of height 4.5m above ground level with density of soil =16 kN/m ³ ,Angle of repose=30°,S.B.C of soil=165 kN/m ² and coefficient of friction between concrete and soil =0.3. Design stem and heel slab of the wall showing all stability checks. Draw reinforcement details also. Use M30 & Fe 500.	20	1,2,3,4	4,5,6	5
3	Design circular tank using approximate method with fixed base resting on ground and free at top for capacity of 650m ³ .Height of tank is restricted to 5.5m.Use M-30 and Fe-415. Draw reinforcement details. $\sigma_{ct}=1.5\text{N/mm}^2$ and $\sigma_{st}=130\text{N/mm}^2$.	20	1,2,3,4	4,5,6	6
4	For the floor system shown in figure 1,design SLAB S1-S2-S3. Take live load =3kN/m ² and 200mm soil fill (density 18kN/m ³). Use M30 and Fe-500.Draw reinforcement details along the sections shown. Give all checks.	20	1,2,3,4	4,5,6	3
5	For the floor system shown in figure 1,design beam B1-B2-B3- B4 . Use M30 and Fe-500.Draw reinforcement details. Assume slab depth as 200mm and assume 200mm soil fill (density 18 kN/m ³) on slabs .Give all checks with proper detailing of the beams.	20	1,2,3,4	4,5,6	4
6a	Write note on joints provided in water tank.	07	1,2,3,4	2,3	7



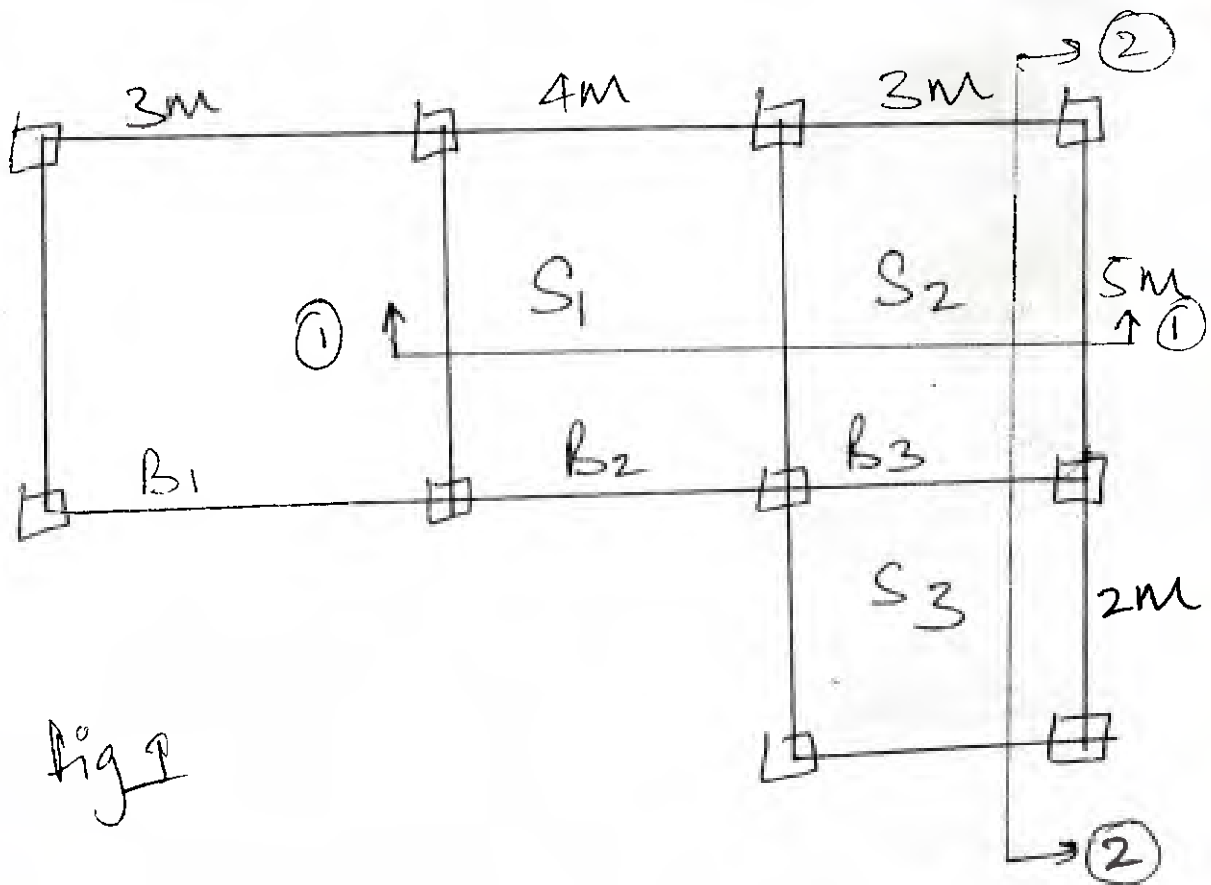
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End Sem - Decemeber 2022 Examinations

6b	Design circular tank using approximate method with flexible base resting on ground and free at top for capacity of 450m^3 . Height of tank is restricted to 4.5m . Use M-30 and Fe-415. Draw reinforcement details. $\sigma_{ct} = 1.5\text{N/mm}^2$ and $\sigma_{st} = 130\text{N/mm}^2$.	13	1,2,3,4	4,5,6	7
7	Design open rectangular water tank $L \times B \times H = 6\text{m} \times 4\text{m} \times 3\text{m}$ resting on ground. Use M 30 and Fe 500.	20	1,2,3,4	4,5,6	6





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End Semester Examination
December - 2022



Max. Marks: 100

Class: B.Tech. *Civil sem VII* Semester: VII

Name of the Course: Advanced Structural Analysis

Duration: 3 Hours

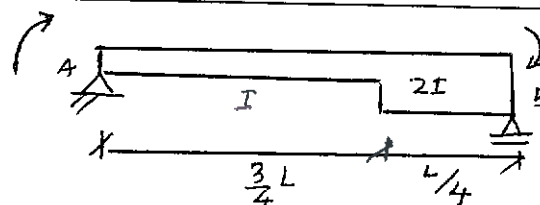
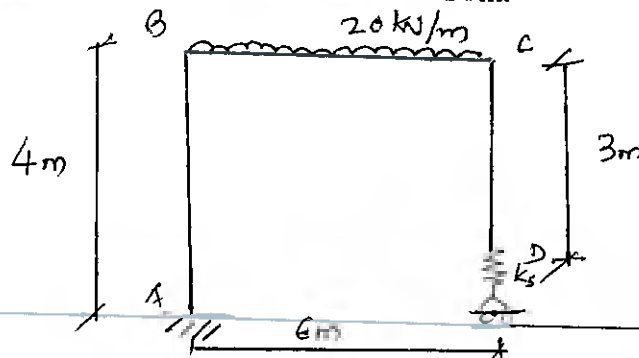
Program: Civil Engineering

Course Code : PEC- BTC721

Instructions:

- Answer to any five 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)	Distinguish between rigid jointed plane frame and rigid jointed plane grid in terms of structural behavior, internal forces, dof, etc.	4	2	1
Q1 (b)	Analyse the rigid jointed frame shown in Figure by flexibility method and draw BMD and deflected shape. Note that D is simply supported on elastic foundation, which is free to move horizontally and also free to rotate. $EI = 1 \times 10^4 \text{ KN-m}^2$ and $K_s = 1000 \text{ KN/m}$.	8	2	4
Q1 (c)	For the non-prismatic beam element shown in figure calculate the rotational stiffness at A and COF from A to B.	8	2	4





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END SEM EXAMINATION December 2022

7/12/22

Program: **B.Tech Civil** *sem VII*

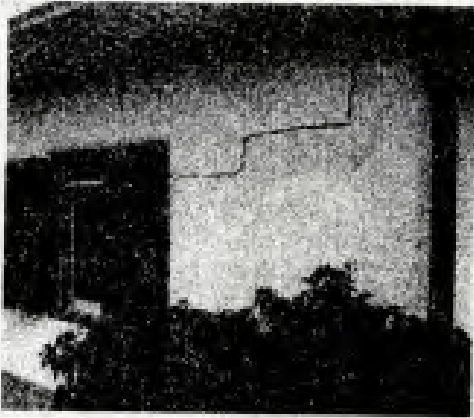
Duration: **3 Hr**

Course Code: **PE-BTC723**

Maximum Points: **100**

Course Name: **Repair and Rehabilitation of Structures**

Semester: **VII**

Q.No.	Questions	Points	CO	BL	Module No
Q1 a	Write a detailed note on causes of damages on RCC Structure	15	1	2,3	2
b	What is difference between retrofitting and rehabilitation	02	1	3,4	1
c	Define following terms- a. Maintenance b. Inspection c. Durability	03	4	2,3	1
Q2a	 Identify reason of the crack pattern and write detailed note on it	10	1	2,3	2
b	Write note on structural cracks in hardened concrete	10	1	2,3	2
Q3a	What are various types of Non Destructive tests carried on concrete. Explain any three in detail.	15	1	2,3	3



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END SEM EXAMINATION Decemaber 2022

Q3b	What are objectives of maintenance ? Explain broad categories of maintenance	05	4	2,3	1
Q4a	Explain in detail holistic models of deterioration.	10	4	3	2
Q4b	Write a detailed note on essential parameters for repair materials.	10	1	3	3
Q5a	Prepare preventive maintenance schedule for G+7 residential building. OR Write note on various repair materials	06	1	3	1
b	Write note on methodology for strengthening of beams using concrete jacketing.	14	3	4	4
Q6	Explain methodology for strengthening of RCC column using concrete jacketing. OR Explain methodology for strengthening of slabs using CFRP laminates.	20	3	4	4
Q7	Write a detailed note on grouting of beams and columns.	20	3	4	4

**End Semester Examinations December 2022**

(2022-23)

Program: B.Tech. Civil Engineering (UG) *sem V/I*

Course Code: PE-BTC-731

Course Name: Surface Hydrology

Duration: 03 Hrs.

Maximum Points: 100

Semester: VII

Notes:

- Attempt *any five* questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI																											
1	(a) Explain hydrologic cycle. What is water budget equation in hydrology? Explain each term used.	10	1	2	1.2.1																											
	(b) Explain the energy budget method of estimating evaporation from a lake.	10	1	2	1.2.1																											
2	(a) Define and explain: evapotranspiration, actual evapotranspiration (AET) and potential evapotranspiration.	10	1	4	1.2.1																											
	(b) Explain depth - area - duration relationship and intensity -duration - frequency relationship	10	1	3	1.3.1																											
3	(a) Explain the various commonly used methods of measurement of stage of a river.	10	2	5	1.3.1																											
	(b) The gauge and discharge collected at a particular section of a river by stream gauging operation is given below; Develop a gauge-discharge relationship for this stream at this section for use in estimating the discharge for a known gauge reading. What is the coefficient of correlation of the derived relationship? Use $a = 7.45$ m for the gauge reading corresponding to zero discharge. <table><tr><th>Gauge reading (m)</th><th>Discharge (m³/sec)</th><th>Gauge reading (m)</th><th>Discharge (m³/sec)</th></tr><tr><td>7.70</td><td>12</td><td>9.75</td><td>175</td></tr><tr><td>7.75</td><td>30</td><td>9.90</td><td>390</td></tr><tr><td>7.85</td><td>58</td><td>10.25</td><td>560</td></tr><tr><td>8.10</td><td>65</td><td>11.10</td><td>875</td></tr><tr><td>8.95</td><td>90</td><td>11.30</td><td>1250</td></tr><tr><td>9.50</td><td>110</td><td>11.75</td><td>1950</td></tr></table>	Gauge reading (m)	Discharge (m ³ /sec)	Gauge reading (m)	Discharge (m ³ /sec)	7.70	12	9.75	175	7.75	30	9.90	390	7.85	58	10.25	560	8.10	65	11.10	875	8.95	90	11.30	1250	9.50	110	11.75	1950	10	2	5
Gauge reading (m)	Discharge (m ³ /sec)	Gauge reading (m)	Discharge (m ³ /sec)																													
7.70	12	9.75	175																													
7.75	30	9.90	390																													
7.85	58	10.25	560																													
8.10	65	11.10	875																													
8.95	90	11.30	1250																													
9.50	110	11.75	1950																													
4	(a) What is hydrograph? Explain methods of base flow separation in hydrograph analysis.	10	2	2	1.2.1																											
	(b) Explain rainfall-runoff relationship and methods of runoff estimation.	10	2	2	1.3.1																											



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End Semester Examinations December 2022

(2022-23)

5	(a) What do you understand by synthetic hydrograph? Explain in details with terms used in its analysis.	10	2	3	1.3.1
	(b) What is Hydrological forecasting? Why it is important? Explain with an example.	10	2	3	3.2.1
6	(a) Define the terms: Design flood, Standard project flood, probable maximum flood and risk, reliability and safety margin with respect to design of hydraulic structure	10	2	4	3.3.1
	(b) For the maximum one day rainfall depth = 325 mm and return period = 50 years, determine the probability (p) of one day rainfall depth equal to or greater than 325 mm: (i) once in 25 successive years (ii) two times in 20 successive years and (iii) at least once in 25 successive years	10	2	5	4.1.1
7	(a) Explain the procedure for hydrologic channel routing. Also explain prism and wedge storage in channel routing.	10	2	4	4.1.2
	(b) For an annual flood of N=90 years, mean = 6500 m ³ /sec., standard deviation = 2955 m ³ /sec., with Gumbel's method of flood discharge with a return period of 300 years, what are the (1) 95% and (2) 80% confidence limits for this estimates. Take: $\bar{Y}_n = 0.5588$, $S_n = 1.21$, $f_c = 1.96$ for 95% confidence and $f_c = 1.282$ for 80% confidence.	10	2	5	4.3.2



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END SEMESTER EXAMINATION DECEMBER - 2022

Program: B. Tech. Civil *sem VII*

Course Code: PE - BTC - 761

Course Name: Pavement Design and Construction

Duration: 3 Hour

Maximum Points: 100

Semester: VII

Q.No.	Questions	Points	CO	Module No.
Q.1				
a	Enlist the different types of pavements	04	02	01
b	Discuss about flexible pavements	04	01	01
c	Discuss with neat sketch the wheel load configurations	04	01	01
d	Explain with neat sketch equivalent single wheel load	04	01	01
e	Discuss with neat sketch distribution of stress in single layer and two layer system as per Burmister approach.	04	01	01
f	State the deflection equation for flexible and rigid plate. Also, explain about deflection factors	04	01	01
Q.2.				
a	Explain with neat sketch procedure of conducting the plate bearing test in field. Also, discuss about necessary corrections for calculation of modulus of subgrade reactions.	10		2
b	Design the flexible pavements as per IRC 37 - 2012 using following data. (Refer Table 1 and 2.) i. Road passing through mountain area ii. The traffic on last count = 2700 cvpd iii. CBR value of subgrade soil = 5 % iv. Rate of growth of traffic = 5 % v. years required for construction after last count = 4 years Design the pavement for following alternatives and estimate the quantity of materials required for the construction of each layers. i. Granular subbase and base ii. Cemented base, cemented subbase with crack relief interlayer of aggregate	10		2
Q.3.				
a.	Discuss revised PRA system for classification of subgrade soil. Also, discuss the GI value and its importance.	10		2
b	Discuss how will you conduct the Benkelman beam study for overlay design. Also, Explain the steps for calculation of overlay thickness from the data collected	10		5



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END SEMESTER EXAMINATION DECEMBER - 2022

Q.4.			
a.	Discuss with neat sketch surface and subsurface drainage system	10	6
	The surface water from the road side is drained to longitudinal side drain. From across the half of bituminous surface of total width 7.0 m, the shoulder and adjoining land on one side of drain is 10 m and on other side of longitudinal drain the water flow across from reserved land with grass and 2 % cross slope to words side drain. The width of strip of reserved land is 30 m. The runoff coefficient for pavement, shoulder and reserved land with gross cover is 0.80, 0.30 and 0.38 respectively. The length of stretch of land parallel to road from where water is expected to flow to the side drain is 500 m. Estimate the quantity of runoff flowing through longitudinal drain. Also, Design the Rectangular longitudinal drainage system. Take $n = 0.022$, $v = 0.50$ m/sec. Period of frequency = 25 years.		
b	(Refer Figure 1 and Figure 2)	10	6
Q.5.			
	Discuss the advantages of rigid pavement over flexible pavements.	04	
b	Discuss the warping stress at edge, corner and interior region of rigid pavement	06	
c	Design a rigid pavement using Modified Westergaard's wheel load and warping stress equation at edge region of the slab. The design data are given in the Table 3. Maximum difference of temperature between top and bottom fiber during mid-day at the site under consideration is 16°C . The desired factor of safety for load stress is 1.1 and temperature stress at edge is 1.2.	10	
Q.6.			
a	Why joints are necessary in cement concrete pavements. Discuss with neat sketch different Joints in Concrete Pavement.	06	
b	Discuss the steps for construction of Water Bound Macadam (WBM) base course.	06	
c	Calculate the wheel load stress and warping stress at edge in the low volume rural road using following data. Wheel load = 4000 kg Modulus of Elasticity of Concrete = 3.0×10^5 kg/cm ² Modulus of subgrade reaction, $k = 12$ kg/cm ³ Thickness of slab = 15 cm Tyre pressure = 7 kg/cm ² Poissons ratio = 0.15	08	



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END SEMESTER EXAMINATION DECEMBER - 2022

Q.7.			
a.	Discuss fatigue and rutting failure criteria in flexible pavement design.	08	02
b.	Enlist at least 12 types of distresses may observed in the pavements	06	05
c.	Design the tie bar in longitudinal joint of cement concrete pavement having thickness 30 cm and width 3.5 m using the following Density of concrete = 2400 kg/cm^3 Allowable working stress in plain steel bar = 1250 kg/cm^2 Permissible bond stress in concrete = 17.5 kg/cm^2 Coefficient of friction = 1.2	06	02

Q.2 b. Table 1. Design catalogue for the Flexible Pavement with Granular Base and Subbase

CBR %	Traffic in mas	Granular subbase	Granular base	DBM	BC/SDBC	Total	Remark
5 %	2	215	225	50	20	510	Use SDBC
	5	250	250	55	25	580	
	10	300	250	70	40	660	
	20	300	250	100	40	690	
	30	300	250	115	40	705	Use BC
	50	300	250	120	40	710	
	100	300	250	130	50	730	
	150	300	250	145	50	745	

Q.2.b. Table 2. Cemented base, cemented subbase with crack relief interlayer of aggregate

CBR %	Traffic in msa	Cement treated subbase	Cement treated base	Aggregate layer	DBM	BC/SDBC	Total thickness	Remark
5 %	2	250	60	100	--	30	440	Use SDBC
	5	250	80	100	--	30	460	
	10	250	90	100	--	40	480	
	20	250	110	100	--	50	510	
	30	250	130	100	--	50	530	
	50	250	90	100	50	50	540	Use BC
	100	250	110	100	50	50	560	
	150	250	130	100	50	50	580	



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END SEMESTER EXAMINATION DECEMBER - 2022

Q.5. c. Table 3. The design data

1	Design wheel load	4000 kg
2	Tyre pressure	7 kg/cm ²
3	Spacing between longitudinal joints	3.5 m
4	Spacing between transverse joint	4.5 m
5	Modulus of elasticity of concrete	3×10^5 kg/cm ²
6	Poisson's ratio	0.15
7	Flexural strength of concrete	45 kg/cm ²
8	Modulus of subgrade reaction of base	30 kg/cm ³
9	Coefficient of thermal expansion	10×10^{-6} per °C

Q.5. c. and Q. 6. c. Value of Constant C based on Bradbury chart

L/l or W/l	C	L/l or W/l	C
1	0	7	1.030
2	0.040	8	1.077
3	0.175	9	1.080
4	0.440	10	1.075
5	0.720	11	1.050
6	0.920	12	1.00

Smooth pavement	Ditch section	Bare Soil	Poor turf	Average turf
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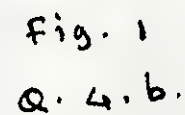


Fig. 2.
Q. 4. b.





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END SEMESTER EXAMINATION DECEMBER 2022

Program: B. Tech. Civil Engineering *Sum VII*

Course Code: PE-BTC762

Course Name: Advanced Foundation Engineering

Duration: 3 Hrs.

Maximum Points: 100

Semester: VII

Notes:

1. Question 1 is compulsory.
2. Solve any four out of remaining five questions.
3. Each new question must begin on a new page and sub-questions must be grouped together.
4. Please write units everywhere. Marks will be deducted where no or incorrect units are written.
5. Make assumptions where necessary but state them very clearly.

Q. No.	Questions	Points	CO	BL	Module No.
1. a	For a site where pile foundations are to be constructed, the soil was found to be mostly sandy with friction angle of 29° . What angle of friction would you recommend to be used for design if the pile is bored and cast in situ? Defend your answer	5	3	5	6
b	Determine the critical rigidity index for a shallow foundation founded at a depth of 2.5 m in clayey soil having shear modulus of 9.6×10^3 kN/m ² , cohesion of 32 kPa, friction angle of 20° and unit weight of 16.9 kN/m ³ . If existing rigidity of the system is 123, comment on the compressibility of the soil.	5	3	4	5
c	Why is the field compression curve different from the one in the lab? Explain the process of estimating the field consolidation curve.	5	2	2	2
d	Explain the function of a sand drain. How does the smear zone affect its functioning?	5	4	2	7
2 a	Compare and contrast the behavior of loose sand and dense sand in drained triaxial test	5	2	2	3

**END SEMESTER EXAMINATION DECEMBER 2022**

	b	Explain why a CPT is preferred over an SPT in subsurface exploration.	5	1	2	1				
	c	Estimate the safe pile capacity for a driven pile with diameter of 400 mm, length of 18 m. The soil is sand and is layered with details as given below and critical depth is 15d. The bulk unit weight of the soil is 18.1 kN/m ³ , saturated unit weight is 19.8 kN/m ³ and GWT is 3 m below ground surface. (See Figure 1) <table border="1"><tr><td>0-3 m</td><td>$\phi = 28^\circ$</td></tr><tr><td>> 3 m</td><td>$\phi = 32^\circ$</td></tr></table>	0-3 m	$\phi = 28^\circ$	> 3 m	$\phi = 32^\circ$	10	3	6	6
0-3 m	$\phi = 28^\circ$									
> 3 m	$\phi = 32^\circ$									

3	a	What is secondary compression of soil? In what type of soils is it commonly observed? How can it be estimated?	5	3	2	2
	b	What are stone columns? Where are they used?	5	4	3	7
	c	Design a square footing embedded in a cohesionless soil at a depth of 1.2 m below GS. The GWT is at 0.7 m below GS and the soil has bulk unit weight of 16.8 kN/m ³ and saturated unit weight of 18.9 kN/m ³ . Assume a gross allowable load of 670 kN, soil friction angle of 33° and factor of safety as 3. (See Fig 2)	10	3	6	5

4	a	What is a closed layer and how is it different from an open layer? Explain how it affects the time required for consolidation.	5	2	3	2
	b	A footing of size 2 m x 2 m carries a uniformly distributed load of 150 kN/m ² . Calculate the vertical pressure on the crest of a pipe which is at a depth of 5 m below the centre of the footing by approximating the load to a point load. If a sewage pipe material strength is 8 kN/m ² , determine if that pipe will be damaged.	5	2	5	4
	c	Discuss the limitations of using Terzaghi's compressibility correction factors when local shear failure is possible. What alternative would you recommend to it?	5	3	5	5
	d	Calculate the efficiency of a pile group in clay using the following data: 3 x 4 pile group, length of piles is	5	3	5	6



END SEMESTER EXAMINATION DECEMBER 2022

		14 m, pile diameter is 300 mm, spacing of piles is 3d. Discuss if the efficiency of a pile group in clay can be assumed as 1.0				
5	a	What is reconnaissance? Explain in detail how modern technology can be used for effective reconnaissance.	5	1	2	1
	b	Explain how total and effective stresses are used for determining the short term and long term strength of sand and clay.	5	3	3	4
	c	For a 3 x 3 pile group in NC clay, determine the settlement based on the following data: Pile diameter: 200 mm, spacing: 2.5d, pile length: 5 m, Load on group: 500 kN, Saturated clay exists from ground surface up to 7 m where bed rock is encountered. Saturated unit weight of clay: 20 kN/m ³ , LL: 40%, PL: 25.5%, void ratio: 1.05.	10	3	5	6
6	a	Explain quasi-preconsolidation and discuss its significance	5	1,3	3	2
	b	What is dilatancy of sand? Explain how void ratio affects the stress-strain behavior of sandy soil	5	3	2	3
	c	Explain in detail the cyclic pile load test and its use.	10	3	3	6

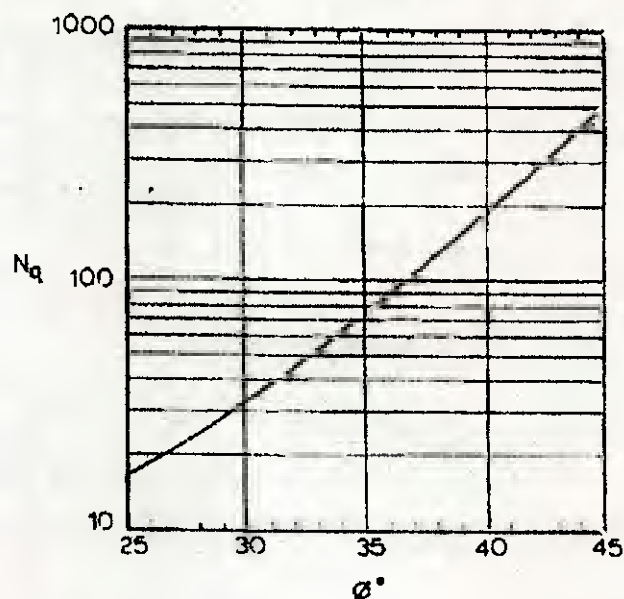
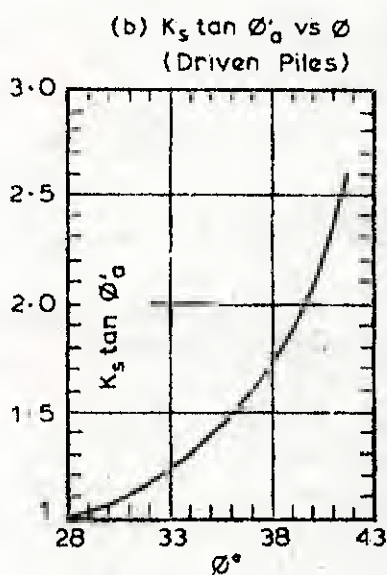


Figure 1: Question 2 c)

**END SEMESTER EXAMINATION DECEMBER 2022****IS 6403 : 1981****TABLE 1 BEARING CAPACITY FACTORS**

(Clause 5.1.1)

BEARING CAPACITY FACTORS

ϕ (Degrees)	N_c	N_q	N_γ
0	5.14	1.00	0.00
5	6.49	1.57	0.45
10	8.35	2.47	1.22
15	10.98	3.94	2.65
20	14.83	6.40	5.39
25	20.72	10.66	10.86
30	30.14	18.40	22.40
35	46.12	33.30	48.03
40	75.31	64.20	109.41
45	138.88	134.88	271.76
50	266.89	919.07	762.89

Note — For obtaining values of N'_c , N'_q and N'_γ , calculate $\phi' = \tan^{-1}(0.67 \tan \phi)$. Read N_c , N_q and N_γ from the Table corresponding to the value of ϕ' instead of ϕ which are values of N'_c , N'_q , N'_γ respectively.

5.1.2 The ultimate net bearing capacity obtained in 5.1.1 for strip footing shall be modified to take into account, the shape of the footing, inclination of loading, depth of embedment and effect of water table. The modified bearing capacity formulae are given as under:

- a) In case of general shear failure q_u }
$$= cN_c s_d s_i s_b + q(N_q - 1) s_d s_i s_b + \frac{1}{2} B \gamma N_\gamma s_d s_i s_b W'$$
- b) In case of local shear failure q'_u }
$$= \frac{2}{3} cN'_c s_d s_i s_b + q(N'_q - 1) s_d s_i s_b + \frac{1}{2} B \gamma N'_\gamma s_d s_i s_b W'$$

5.1.2.1 The shape factors shall be as given in Table 2.

TABLE 2 SHAPE FACTORS

Sl. No.	SHAPE OF BASE	SHAPE FACTOR		
		s_d	s_i	s_b
i)	Continuous strip	1.00	1.00	1.00
ii)	Rectangle	$1 + 0.2 B/L$	$1 + 0.2 B/L$	$1 - 0.4 B/L$
iii)	Square	1.3	1.2	0.6
iv)	Circle	1.3	1.2	0.6

Use B as the diameter in the bearing capacity formula.

8

Figure 2: Question 3 c)



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End semester exam – December 2022 Examinations

Program: B.Tech Civil Engg. *sem VII*

Duration: 3 Hours

Course Code: PE-BTC 724

Maximum Points: 100

Course Name: Advanced design of steel structures

Semester: VII

- Notes: 1) Assume suitable data if missing and mention the same clearly
2) Use of IS 800, IS 875 – Part III, IS 1161 and steel tables is allowed
3) Draw neat sketches to illustrate your solutions.
4) Attempt any 5 main questions

Q.No.	Questions	Points	CO	BL	PI
1.a)	Draw a neat sketch of an elevated rectangular water tank and explain the forces acting on it with the load transfer mechanism	10	3,6	2	3.1.4
1.b)	Explain any 5 lattice tower configurations with their suitability and neat sketches	10	4,6	2	2.1.2
2	A gantry girder is composed of ISWB 600@133.7 kg/m and a channel section ISMC 300@53.8 kg/m placed on the top of the beam with its flanges down. Crane capacity = 200 kN Self-weight of the crane girder excluding trolley = 170 KN Self wt of the trolley, electric motor, hook etc = 35 KN Min approach of the crane hook to the gantry girder = 1.0 m Wheelbase = 3 m, Center to center distance between columns = 8 m Center to center distance between gantry rail = 15 m, Self-weight of rail section = 250 N/m Check the safety of the section in bending and shear. Consider a manually operated crane for the design.	20	5,6	4	3.1.4, 3.1.6
3	Design an elevated cylindrical steel tank with conical bottom for 100 m ³ capacity. The tank has a conical roof. Take $f_y = 250 \text{ N/mm}^2$. The ring beam of the tank is at a height of 12 m from the GL. Design the cylindrical portion, conical roof, conical bottom with connection and the ring beam (Select appropriate number of columns)	20	3,6	4	3.1.4, 3.1.6
4	Design an appropriate staging system for the tank designed in Q.no. 3. The tank is to be built at Mumbai. The ring beam of the tank is at a height of 12 m from the GL.	20	3,6	4	3.1.4, 3.1.6



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End semester exam – December 2022 Examinations

End semester exam — December 2022 Examinations

5	A self-supporting steel chimney of a height of 66 m above the foundation & is situated in Agra. The diameter at the top is 4.0 m. The thickness of the fire brickwork lining is 110 mm, the lining is supported by a stack throughout the height. Design the chimney & check the section at 1/3rd height from the top and 1/3rd height from the bottom. Wind forces to be considered as per IS:875 (Part III) - Terrain Category is 3.	20	4,6	4	3.1.4, 3.1.6																																																											
<table><tr><th rowspan="2">h/D</th><th colspan="14">Max permissible Stress in N/mm² for D/t</th></tr><tr><th>140</th><th>150</th><th>160</th><th>170</th><th>180</th><th>190</th><th>200</th><th>225</th><th>250</th><th>300</th><th>350</th><th>400</th><th>450</th><th>500</th></tr><tr><td>Upto 20</td><td>126</td><td>124</td><td>123</td><td>120</td><td>118</td><td>115</td><td>112</td><td>105</td><td>99</td><td>87</td><td>78</td><td>70</td><td>64</td><td>58</td></tr><tr><td>30</td><td>108</td><td>107</td><td>105</td><td>103</td><td>101</td><td>99</td><td>96</td><td>90</td><td>85</td><td>75</td><td>67</td><td>60</td><td>55</td><td>50</td></tr></table>						h/D	Max permissible Stress in N/mm ² for D/t														140	150	160	170	180	190	200	225	250	300	350	400	450	500	Upto 20	126	124	123	120	118	115	112	105	99	87	78	70	64	58	30	108	107	105	103	101	99	96	90	85	75	67	60	55	50
h/D	Max permissible Stress in N/mm ² for D/t																																																															
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30	108	107	105	103	101	99	96	90	85	75	67	60	55	50																																																		
6	A 65m high microwave antenna lattice tower is to be built in Mumbai where the terrain at the site is nearly a level ground with the terrain of category 2. The diameter of the hemispherical antenna disc, fixed at the top is 3.5 meters. The minimum width of the square platform is 3 m. Choose a suitable configuration for the tower and determine maximum compression and tension force in the column leg and shear at the base. Weight of antenna disc = 10 kN Weight of platform at top = 1.0 kN/m ² Weight of railing at top = 0.4 kN/m Weight of ladder and cage = 0.5 kN /m	20	4,6	5	3.1.4, 3.1.6																																																											
7.a)	Design a suitable end plate connection for ISMB 450 connected to ISHB 350 to transmit an end reaction of 100 kN and a moment of 25 kN-m.	13	1,6	4	3.1.4, 3																																																											
7.b)	Two members of tubular trusses i.e. principal rafter and a tension member meet at an inclination of 60°. The principal rafter carries a design force of 180 kN (compressive) and its length is 2.0 meters while the tension member carries a design force of 70 kN. Design the members using tubes of Yst 240 grade	07	2,6	4	3.1.4, 3.1.6																																																											



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End Semester December 2022 Examinations

Program: B. Tech. Civil Engineering *Sum VII*

Course Code: PE-BTC742

Course Name: Sustainable Engineering & Technology

9/11/22
Duration: 3hrs.

Maximum Points: 100

Semester: VII

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 and 2 is COMPULSORY**.
3. From the remaining **FIVE** Questions Solve **ANY THREE**.
4. Assume suitable data, wherever necessary and State it clearly.
5. Answers to be accompanied with appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart wherever necessary or required.

Q.No.	Questions	Points	CO	BL	PI
1.A	<p>Answer the following:</p> <p>a. _____ is the main source of air pollution from construction activities. (Greenhouse gases, Dust particles, Carbon emission)</p> <p>b. Research on Material Flow Analysis (MFA) for Anthropogenic metabolism or Human metabolism was carried out by _____ (Antoine Lavoisier (1743-1794), Santorio Santorio (1561-1636), Abel Wolman (1965))</p> <p>c. The hierarchy of waste management starts from _____ (Prevention to favorable Disposal, Product to Distribution, Protection to Damage)</p> <p>d. Carbon footprint can be measured by _____ (Carbon dating, Carbon accounting, Instruments)</p> <p>e. Magnitude of Sustainable Challenges is given by IPAT equation, where (a) I = Impact, (b) P = Performance, and (c) T = Technology _____ (True / False)</p> <p>f. The process of burning municipal solid waste in a properly designed furnace under suitable temperature and operating conditions is called as _____</p> <p>g. Energy consumption of HVAC systems and its design should comply with _____</p> <p>h. The greenhouse gas emissions scenarios described in the IPCC Special report has been used to make projections of _____ (possible future GHG emissions, possible future climate change)</p> <p>i. Ecological footprint of a country is measured in _____</p> <p>j. In a Risk matrix approach, the level of risk is from _____ (No Risk to Very High Risk, Low Risk to Very High Risk)</p>	20	1,2,3,4	1	7.1.1



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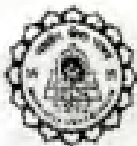
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End Semester December 2022 Examinations

1.B	Answer the following: a. State three pillars of Sustainability. b. With an appropriate sketch show the sustainability concept. c. State the ISO that defines Life Cycle Analysis (LCA). d. State the major renewable energy sources of India. e. Define 'Planet Equivalent'. f. Define 'Ecological footprint'. g. Define 'Bio-capacity'. h. How can one calculate the bio-capacity deficit or reserves? i. Give the relation between Embodied energy (EE) and Embodied carbon (EC). j. In the equation for Sustainable Development Index $(SDI) = I_1 + I_2 + I_3$, state what is I_1 , I_2 , and I_3 .	10	1,2,3,4	1	7.1.1
2.	With a real world application, explain how you have understood the importance of sustainable engineering & technology in defining a problem (unsustainable issue of the real world), approach towards providing a sustainable solution for the problem, the short term and long term outcome / benefits of the sustainable solution.	20	2,4	2	7.1.4
3.A	Discuss the relation between Material Flow Analysis (MFA) and Waste management and its importance for designing sustainable processes.	10	1,2	2	7.1.1
3.B	Discuss how MFA can be included in Industrial Ecology (IE). (2) Give the Design Principles for including MFA in IE. (3) Discuss different types of MFA related analysis. (5)	10	1,2	2	7.1.1
4.A	Define 'Life Cycle Analysis (LCA)' as per ISO. (2) Give the stages of a typical LCA framework.	10	1,3	2,3	7.1.3
4.B	Explain with an appropriate case study, the importance of any two stages of LCA.	10	1,3	2,3	7.1.3
5.A	Define 'Sustainability Risk', 'Risk Assessment' and 'Risk Management'. (6) State, with the help of a flowchart, general steps of risk assessment. (4)	10	1,3	2	7.1.2
5.B	Define 'Embodied Energy (EE)', 'Embodied Carbon (EC)', 'Figure of Merit (FoM)'. (6) Discuss how one can bring 'a mindshift from linear to circular' in construction industry. (4)	10	2	2,3	7.1.2



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End Semester December 2022 Examinations

6.A	State different approaches and methods for risk assessment. (3) Explain any one approach in detail with a case study. (7)	10	1	1,2	7.1.1
6.B	With a proper sketch, explain the hierarchy of a waste management system (WMS). Explain the importance of biological treatment in a WMS	10	2	2,3	7.1.1
7	Write short note on: a. Low energy buildings (6) b. Alternative building materials (6) c. IGBC green homes certification - criteria (8)	20	3	6	7.1.1

----- The End -----



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END SEMESTER EXAMINATION-DEC-2022

Program: Civil Engineering

B.Tech (Civil) Sem VII

Duration: 3 hrs.

Course Code: PE-BTC-843

Maximum Points: 100

Course Name: Industrial Wastewater Treatment

Semester: VII

Notes:

1. Q.1 is compulsory and attempt any 4 out of remaining All questions are compulsory
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

No.	Questions	Points	BL	CO	Module No										
1.	Write a short note on : (Any four) 1. Zero Liquid Discharge 2. Oxygen Sag Analysis 3. Treatability Study 4. Domestic Wastewater Vs Industrial wastewater 5. Treatment Flow sheet for Paper-Pulp Industry 6. Sequencing Batch Reactor	20	1	1-3	1-7										
2	1. "India's Supreme Court has ordered industrial facilities there to quit operating near bodies of water unless they have effluent treatment plants that treat sewage and industrial wastewater" Discuss the above statement with Minimata accident. 2. Why Government of India is more concern about treatment of Industrial waste than domestic waste? And explain the effects of industrial waste disposal on natural water courses.	10+10	2	1-3	1										
3	1. Write a short note on Equalization & Neutralization of Industrial wastewater. 2. Derive streeter-phelps equation and Determine D.O. deficit profile for 80 km from the following data: Velocity of mix = 0.2 m/sec, $R'=0.4$, $K'=0.23$. <table border="1"><tr><td>River</td><td>Flow from STP</td></tr><tr><td>$Q=0.6\text{m}^3/\text{s}$</td><td>$Q=12000\text{m}^3/\text{d}$</td></tr><tr><td>$\text{BOD}_5@20^\circ\text{C}=2\text{ mg/l}$</td><td>$\text{BOD}_5@20^\circ\text{C}=30\text{ mg/l}$</td></tr><tr><td>$T=20^\circ\text{C}$</td><td>$T=26^\circ\text{C}$</td></tr><tr><td>$\text{DO}=8\text{mg/l}$</td><td>$\text{DO}=2\text{mg/l}$</td></tr></table>	River	Flow from STP	$Q=0.6\text{m}^3/\text{s}$	$Q=12000\text{m}^3/\text{d}$	$\text{BOD}_5@20^\circ\text{C}=2\text{ mg/l}$	$\text{BOD}_5@20^\circ\text{C}=30\text{ mg/l}$	$T=20^\circ\text{C}$	$T=26^\circ\text{C}$	$\text{DO}=8\text{mg/l}$	$\text{DO}=2\text{mg/l}$	10+10	3	1-3	2,3
River	Flow from STP														
$Q=0.6\text{m}^3/\text{s}$	$Q=12000\text{m}^3/\text{d}$														
$\text{BOD}_5@20^\circ\text{C}=2\text{ mg/l}$	$\text{BOD}_5@20^\circ\text{C}=30\text{ mg/l}$														
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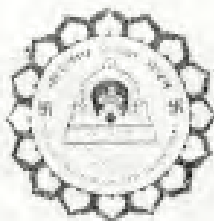
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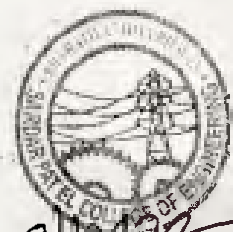
4	<ol style="list-style-type: none">1. Explain how to dewater and dispose industrial sludge.2. Write a short note on self-purification of river and how industrial waste affects the self-purification mechanism.	10 +10	2	1-3	2,5
5	<ol style="list-style-type: none">1. Write a short note on constructed wetland system for treatment of Industrial wastewater.2. Write a short note on MBR & MBBR system for treatment of Industrial wastewater.	10 +10	3	1-3	4
6	<p>Explain manufacturing processes, wastewater sources, and wastewater characteristics, Treatment used in following Industries,</p> <ol style="list-style-type: none">1. Sugar Industry2. Textile Industry	10 +10	2	1-3	6
7	<p>A. What are the various types of manufacturing processes & wastewater sources in Pharmaceutical & Distillery industry?</p> <p>B. Discuss & Draw a treatment flow sheet for effluent generated from Tannery and glass industry.</p>	10 +10	2	1-3	6



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END SEM Examinations December 2022

Program: Civil Engineering

Duration: 3hr

Course Code: PE-BTC751

Maximum Points: 100

Course Name: Engineering Risk and Uncertainty

Semester: VII

Instructions:

1. Question no.1 is compulsory, out of remaining 6 questions attempt any 4 questions
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q.No.	Questions	Points	CO	BL	PI
1(a)	A company has to replace a present equipment after 15 years at an outlay of Rs, 5,00,000/-.	5	CO2	BL4	1.4.1
	It plans to deposit an equal amount at the end of every year for the next 15 years at an interest rate of 18% compounded annually. Find the equivalent amount that must be deposited at the end of every year for the next 15 years.				
1 (b)	Discuss FMEA and FMECA	5	CO1	BL2	1.3.1
1(c)	Explain in depth the process of risk assessment along with process flow chart as per IS 15883 Part 8 : 2015	6	CO1	BL2	2.1.1
1 (d)	Brief about the steps in risk management with the help of flow chart.	4	CO1	BL3	1.3.1
2 (a)	Identify the risk in the following construction project and tabulate the risk and their mitigation measures.	10	CO2	BL3	2.3.1
	Laying of a pipeline in a construction project which under passes the ground as well as water, where some portion consists of pavement road.				
2(b)	The oil India Corporation is considering whether to go for an offshore oil drilling contract to be awarded in Mumbai High.	10	CO2	BL4	2.1.1
	If the bid value would be Rs. 600 million with a 65% chance of gaining the contract, they may set up a new drilling operation or more already existing operation which has proved successful, to the new site. If the corporation do not bid or lose the contract, they can use the Rs. 600 million to modernize their operation. This would result in a return of either 5% or 8% on the sum invested with probabilities of 0.45 and 0.55. Assume that all costs and revenues have been discounted to the present value				

Construct a decision tree for the problem showing clearly the course of action. By applying an appropriate decision criteria recommend whether or not the oil India Corporation should bid the contract.
The probability of success and expected returns are as follows:

Outcome	New drilling operation		Existing operation	
	Probability	Expected Revenue (Rs.) Million	Probability	Expected Revenue (Rs.) Million
Success	0.75	800	0.85	700
Failure	0.25	200	0.15	250

What would be the financial return if they bid?

3 (a)	Hindustan Construction Company has 3 mutually exclusive project alternatives for expanding their Business.	9	CO2	BL4	2.1.1												
	Each alternative has insignificant salvage value at the end of its life. The details are as given below. Life is 10 years																
	<table><tr><td>Project</td><td>Initial cost ₹</td><td>Annual Maintenance cost ₹</td></tr><tr><td>A1</td><td>25,00,000</td><td>8,00,000</td></tr><tr><td>A2</td><td>20,00,000</td><td>6,00,000</td></tr><tr><td>A3</td><td>30,00,000</td><td>10,00,000</td></tr></table>					Project	Initial cost ₹	Annual Maintenance cost ₹	A1	25,00,000	8,00,000	A2	20,00,000	6,00,000	A3	30,00,000	10,00,000
Project	Initial cost ₹	Annual Maintenance cost ₹															
A1	25,00,000	8,00,000															
A2	20,00,000	6,00,000															
A3	30,00,000	10,00,000															
	Assuming an interest rate of 20% compounded annually, find the best project alternative for expanding the business operation of the company using annual equivalent method.																
3(b)	Discuss process of Risk analysis and Management for projects (RAMP)	6	CO1	BL2	2.1.1												
3 (c)	Discuss risk management plan as IS 15883 (Part 8) : 2015.	5	CO3	BL1	2.4.1 3.1.4												
4 (a)	A steel manufacturing company is concerned with the possibility of a strike.	8	CO2	BL4	2.3.2												
	It will cost an extra Rs. 20,000/- to acquire an adequate stockpile. If there is a strike and company has not stockpiled management estimates an additional expenses of Rs. 60,000/- on account of lost sales. Should the company stockpile or not if it is to use following criteria. (i) Optimistic criteria (ii) Hurwicz criteria for $\alpha=0.4$ (iii) Regret criterion (iv) Laplace criterion																
4(b)	Brief about the need of development of Hybrid annuity model	4	CO1	BL2	1.2.1												
4 (c)	Discuss various techniques that may be used for quantitative risk analysis as per IS 15883 (Part 8):2015.	8	CO3	BL3	1.2.1 3.1.4												

	Two mutually exclusive projects are being considered for investment.	7	CO2	BL4	2.4.1																		
5 (a)	Project A requires an initial initial outlay of Rs 3,000,000/- with the net receipts estimated as Rs, 900,000/- per year for the next 5 years. The initial outlay for Project B is Rs. 6,000,000/- and net receipts have been estimated at Rs.1,500,000/- per year for the next seven years. There is no salvage value associated with either of the projects. Using B/C ratio method which project would you select? Assume an interest rate of 10%.																						
5(b)	Discuss in detail management and mitigation of rare events.	8	CO1	BL3	3.1.1																		
5 (c)	Define HAM and differentiate NAHI HAM and Maharashtra PWD HAM.	5	CO3	BL1	1.2.1																		
6 (a)	Discuss in detail process of risk management and mitigation for the risk in PPP-highway projects.	8	CO3	BL2	1.2.1																		
6(b)	Hari-Om plumbing and heating maintains a stock of 30 liter hot water heaters that it sells to and install for homeowners.																						
	Owner of Hari-Om plumbing likes the idea of having a large supply at hand to meet customer demand, but he also recognizes that it is expensive to do so. He examines hot water heater sales over the past 50 weeks and notes the data given below																						
	<table><tr><th>Hot water heater sales per week</th><th>Number of weeks this number was sold</th></tr><tr><td>4</td><td>6</td></tr><tr><td>5</td><td>5</td></tr><tr><td>6</td><td>9</td></tr><tr><td>7</td><td>12</td></tr><tr><td>8</td><td>8</td></tr><tr><td>9</td><td>7</td></tr><tr><td>10</td><td>3</td></tr><tr><td>Total</td><td>50</td></tr></table>					Hot water heater sales per week	Number of weeks this number was sold	4	6	5	5	6	9	7	12	8	8	9	7	10	3	Total	50
	Hot water heater sales per week	Number of weeks this number was sold																					
	4	6																					
	5	5																					
	6	9																					
	7	12																					
	8	8																					
	9	7																					
10	3																						
Total	50																						
a) If Hari-Om plumbing maintains a constant supply of 8 hot water heaters in any given week, how many times will he be out of stock during a 20 week simulation? Use random numbers as:10,24,03,32,23,59,95,34,34,51,08,48,66,97,03,96,46,74,77,44.																							
b) What is the average number of sales per week (including stock outs) over the 20 weeks period?																							
c) Using an analytic non simulation technique, what is expects number of sales per week? Also compare average number of sales per week for 20 weeks with answer from analytic non simulation technique.																							
7 (a)	Discuss RPN and its significance in risk management process.	6	CO1	BL3	2.1.2																		
7(b)	A furniture manufacturer produces and sells cabinet, office tables and chairs.	8	CO2	BL4	2.4.1																		

The various details regarding his business are given as below																																		
<table><tr><th>Product</th><th>Selling price/unit (Rs)</th><th>Variable cost/Unit (Rs)</th><th colspan="4">% of Rs. sales Volume</th></tr><tr><td>File cabinet</td><td>1000</td><td>900</td><td colspan="4">20</td></tr><tr><td>Office tables</td><td>500</td><td>400</td><td colspan="4">30</td></tr><tr><td>Chairs</td><td>200</td><td>125</td><td colspan="4">50</td></tr></table>							Product	Selling price/unit (Rs)	Variable cost/Unit (Rs)	% of Rs. sales Volume				File cabinet	1000	900	20				Office tables	500	400	30				Chairs	200	125	50			
Product	Selling price/unit (Rs)	Variable cost/Unit (Rs)	% of Rs. sales Volume																															
File cabinet	1000	900	20																															
Office tables	500	400	30																															
Chairs	200	125	50																															
Capacity of the firm= Rs. 1,50,000/- of total sales volume, Annual fixed cost= Rs. 20,000/- Calculate (i) BEPs, (ii) Profit if the firm works at 80% of capacity.																																		
7 (c)	Discuss in brief about advantages of HAM compared to BOT PPP Model in the context of risk management.		6	CO3	BL2	2.4.1																												



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End Semester Exam

Dec 2022

12/12/22

Max. Marks: 50

Duration: 2 Hrs

Class: B. Tech (Civil, Elect, Mech) *Sum VII*

Semester: VII

Name of the Course: Entrepreneurship Innovation and Design thinking Program: B. Tech

Course Code: OE BTC 712

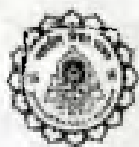
Instructions:

- Attempt any five questions
- Draw neat sketches/diagrams wherever required in the answer sheet and upload
- Assume suitable data if necessary and state them clearly
- Figure on right indicate maximum points for the given question, course outcomes attained, Bloom's Level and Performance Indicators
- Evaluation of 50 marks from the business plan report and pitch deck presentation will be added to the marks obtained in End Semester written exam

Q1	Answer the following questions:	(10)	CO 1-2	BL 4-5	PI 5.1.1
(a)	Explain various types of IPRs. Which according to you is most useful for engineers and how?	(05)			
(b)	Consider two companies (a) Ball bearing manufacturer (b) nanoparticle manufacturing for disinfection. Which of the two is a start up? Which of the two is most likely to be invested by a bank loan and which one will be invested by venture capitalist and why?	(05)			
Q (2)	Explain in minimum 350-400 (2 – 3 pages) words what are the key ingredients for a start up to be successful according to the book zero to one. OR Explain in minimum 350-400 (around 2 pages- 3 pages) words what are the various steps towards lean start up as per the book lean start up	(10)	2,3	5	5.3.1
Q(3)	Explain the major steps for design thinking and methods of execution of these steps. Which according to you is most important and why?	(10)	2,3,4	5	5.4.1
Q(4)	Answer the questions:	(10)	2,3	5	5.3.1
(i)	Who is an entrepreneur? Enumerate 10-12 qualities of an entrepreneur.	(04)			

(ii)	Explain assets, liabilities and equity and where are they used ? Give an equation linking them. Explain a balance sheet giving details of assets, liabilities and equity	(06)			
Q (5)	Enumerate and explain various ways of validating Minimum Viable Product (MVP)	(10)			
Q (6)	Explain terms Proof of Concept Prototype Minimum Viable Product (MVP)	(10)			

All the Best



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End Semester December 2022 Examinations

Program: B. Tech. Civil Engineering *sem VII*

Course Code: PE-BTC713

Course Name: Disaster Management & Preparedness

Duration: 2hrs.

Maximum Points: 60

Semester: VII

Notes:

1. There are TOTAL SEVEN MAIN questions, each of 20 points.
2. QUESTION No. 1 & 2 is compulsory. From remaining FIVE Questions, attempt any THREE.
3. Write answer to each question on a new page.
4. Answers to be accompanied with appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart wherever necessary or required.
5. Answer to a main question should start from a fresh page.

Q.No.	Questions	Points	CO	BL	Module
1.	Answer the following: (Any 4 - 3 marks each)				
	<ol style="list-style-type: none"> 1. Yokohoma strategy is presented in ____ (one/two) parts. (1) 2. There are ____ (10 or 12) principles in part 1 of Yokohoma strategy. (1) 3. The National Institute of Disaster Management(NIDM) is under the Ministry of Home Affairs ____ (true or false) (1) 4. ____ is the successor instrument (framework) to Hyogo Framework for Action. (1) 5. Give full form of: (2) <ol style="list-style-type: none"> a. UNISDR b. IDNDR 6. As per IS 15656: 2006, define 'Risk analysis'. (2) 7. Give the formation year for: (2) <ol style="list-style-type: none"> a. National Disaster Management Plan (NDMP) b. National Platform for Disaster Risk Reduction (NPDRR) 8. Explain the formation of the Disaster Management Act (DMA) 2005 of India. (2) 9. State the national level important entities for DMA 2005. (2) 10. Give the use of following technologies in any disaster management: (6 points - 2 each) <ol style="list-style-type: none"> a. VHF watt sets b. Satellite Phone c. Common Alerting Protocol (CAP) 	20	1 to 5	1, 2	1 to 5
2.	In the light of the guidelines of NDMA, describe ONE natural hazard w.r.t. its scientific aspect, causes and consequences, mechanisms for mitigation (conventional and technological), and strategies for preparedness and awareness.	20	1 to 5	2	1,2,3



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End Semester December 2022 Examinations

3.	a) State different methods to characterize the vulnerability of any natural disaster. (5) b) Discuss any one method to assess vulnerability with an appropriate example. (5) c) Define 'Disaster Risk Reduction (DRR)'. (2) d) Explain the United Nation's (UN's) 'moving agenda' of DRR. (8)	20	2, 3	2, 3	5
4.	a) State the importance of hazard, vulnerability, and risk assessment (HVRA) system. (2) b) State different methods of resource assessment. (2) c) Explain any one method of resource assessment in detail. (6) d) Discuss the quantitative and qualitative approaches for risk assessment w.r.t the methods and application with appropriate example. (10)	20	5	2, 4	5
5	a) Define 'Disaster management'. (2) b) State the goals of disaster management. (3) c) With a proper sketch, explain the four cycles/phases of disaster management. (15)	20	3	2, 3	4
6	a) State the agenda of Yokohama Strategy and Plan of Action for a Safer World, 1994. (4) b) State the five objectives of Hyogo Framework for Action (HFA), 2005. (5) c) State the 7 global targets of Sendai Framework of Disaster Risk Reduction (SFDRR), 2015. (7) d) Discuss how SFDRR, 2015 is different from HFA, 2005. (4)	20	2	2, 3	3
7	Write a note on: (5 points each) a. Early Warning System (EWS) for Tsunami b. Early Warning System (EWS) for Cyclone c. National Disaster Management System (NDMS) existing network in India d. India Disaster Resource Network (IDRN)	20	4	2, 3	3, 4



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End Sem – Decemeber 2022 Examinations

B. Tech Civil 2nd Sem VII

Program: Civil Engg.

Duration: 3 hr

Course Code: PC-BTC701

Maximum Points:100

Course Name: Design of Concrete Structures

Semester: VII

Notes:

- 1) Use of IS 456:2000 is permitted.
- 2) Figures to right indicate full marks.
- 3) Assume suitable data if necessary and state the same clearly

Q.No.	Questions	Points	CO	BL	Module No.
1	The staircase room for a four storeyed framed structure of a residential building is of size 3.9m X 5.3m between centre of columns. The columns are of size 350 mm x 350mm. The width of beam and supporting wall is 250 mm. The floor to floor height is 3.0 m .Use M-30,Fe-500D. Design a suitable dog-legged stairs. Draw reinforcement details .	20	1,2,3,4	4,5,6	1
2	A reinforced cantilever RW is supporting backfill of height 4.5m above ground level with density of soil =16 kN/m ³ ,Angle of repose=30°,S.B.C of soil=165 kN/m ² and coefficient of friction between concrete and soil =0.3. Design stem and heel slab of the wall showing all stability checks. Draw reinforcement details also. Use M30 & Fe 500.	20	1,2,3,4	4,5,6	5
3	Design circular tank using approximate method with fixed base resting on ground and free at top for capacity of 650m ³ .Height of tank is restricted to 5.5m.Use M-30 and Fe-415. Draw reinforcement details. $\sigma_{ct}=1.5\text{N/mm}^2$ and $\sigma_{st}=130\text{N/mm}^2$.	20	1,2,3,4	4,5,6	6
4	For the floor system shown in figure 1,design SLAB S1-S2-S3. Take live load =3kN/m ² and 200mm soil fill (density 18kN/m ³). Use M30 and Fe-500.Draw reinforcement details along the section shown. Give all checks.	20	1,2,3,4	4,5,6	3
5	For the floor system shown in figure 1,design beam B1-B2-B3- B4 . Use M30 and Fe-500.Draw reinforcement details. Assume slab depth as 200mm and assume 200mm soil fill (density 18 kN/m ³) on slabs . Give all checks with proper detailing of the beams.	20	1,2,3,4	4,5,6	4
6a	Write note on joints provided in water tank.	07	1,2,3,4	2,3	7



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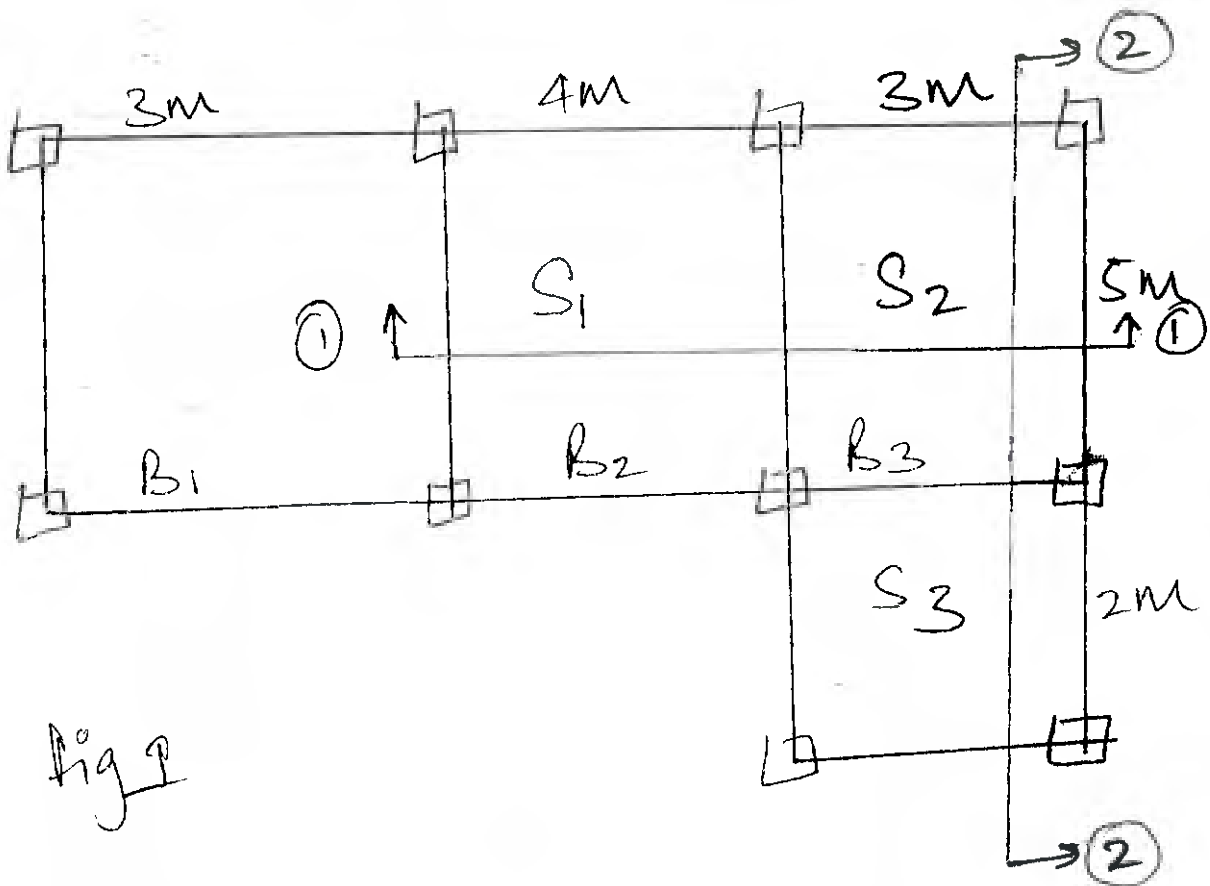
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End Sem - Decemeber 2022 Examinations



6b	Design circular tank using approximate method with flexible base resting on ground and free at top for capacity of 450m^3 . Height of tank is restricted to 4.5m . Use M-30 and Fe-415. Draw reinforcement details. $\sigma_{ct} = 1.5\text{N/mm}^2$ and $\sigma_{st} = 130\text{N/mm}^2$.	13	1,2,3,4	4,5,6	7
7	Design open rectangular water tank $L \times B \times H = 6\text{m} \times 4\text{m} \times 3\text{m}$ resting on ground. Use M 30 and Fe 500.	20	1,2,3,4	4,5,6	6



**End Semester Examinations December 2022**

(2022-23)

Program: B.Tech. Civil Engineering (UG)*B.Tech (Civ) Sem VII Dec 22***Duration: 03 Hrs.****Course Code: PE-BTC-731****Maximum Points: 100****Course Name: Surface Hydrology****Semester: VII****Notes:**

- Attempt *any five* questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI																												
1	(a) Explain hydrologic cycle. What is water budget equation in hydrology? Explain each term used.	10	1	2	1.2.1																												
	(b) Explain the energy budget method of estimating evaporation from a lake.	10	1	2	1.2.1																												
2	(a) Define and explain: evapotranspiration, actual evapotranspiration (AET) and potential evapotranspiration.	10	1	4	1.2.1																												
	(b) Explain depth - area - duration relationship and intensity -duration - frequency relationship	10	1	3	1.3.1																												
3	(a) Explain the various commonly used methods of measurement of stage of a river.	10	2	5	1.3.1																												
	(b) The gauge and discharge collected at a particular section of a river by stream gauging operation is given below; Develop a gauge-discharge relationship for this stream at this section for use in estimating the discharge for a known gauge reading. What is the coefficient of correlation of the derived relationship? Use $a = 7.45$ m for the gauge reading corresponding to zero discharge.	10	2	5	2.1.2																												
	<table><tr><td>Gauge reading (m)</td><td>Discharge (m^3/sec)</td><td>Gauge reading (m)</td><td>Discharge (m^3/sec)</td></tr><tr><td>7.70</td><td>12</td><td>9.75</td><td>175</td></tr><tr><td>7.75</td><td>30</td><td>9.90</td><td>390</td></tr><tr><td>7.85</td><td>58</td><td>10.25</td><td>560</td></tr><tr><td>8.10</td><td>65</td><td>11.10</td><td>875</td></tr><tr><td>8.95</td><td>90</td><td>11.30</td><td>1250</td></tr><tr><td>9.50</td><td>110</td><td>11.75</td><td>1950</td></tr></table>					Gauge reading (m)	Discharge (m^3/sec)	Gauge reading (m)	Discharge (m^3/sec)	7.70	12	9.75	175	7.75	30	9.90	390	7.85	58	10.25	560	8.10	65	11.10	875	8.95	90	11.30	1250	9.50	110	11.75	1950
	Gauge reading (m)					Discharge (m^3/sec)	Gauge reading (m)	Discharge (m^3/sec)																									
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8.95	90	11.30	1250																														
9.50	110	11.75	1950																														
4	(a) What is hydrograph? Explain methods of base flow separation in hydrograph analysis.	10	2	2	1.2.1																												
	(b) Explain rainfall-runoff relationship and methods of runoff estimation.	10	2	2	1.3.1																												



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End Semester Examinations December 2022

(2022-23)

5	(a) What do you understand by synthetic hydrograph? Explain in details with terms used in its analysis.	10	2	3	1.3.1
	(b) What is Hydrological forecasting? Why it is important? Explain with an example.	10	2	3	3.2.1
6	(a) Define the terms: Design flood, Standard project flood, probable maximum flood and risk, reliability and safety margin with respect to design of hydraulic structure	10	2	4	3.3.1
	(b) For the maximum one day rainfall depth = 325 mm and return period = 50 years, determine the probability (p) of one day rainfall depth equal to or greater than 325 mm: (i) once in 25 successive years (ii) two times in 20 successive years and (iii) at least once in 25 successive years	10	2	5	4.1
7	(a) Explain the procedure for hydrologic channel routing. Also explain prism and wedge storage in channel routing.	10	2	4	4.1.2
	(b) For an annual flood of $N=90$ years, mean $=6500\text{m}^3/\text{sec.}$, standard deviation $=2955\text{ m}^3/\text{sec.}$, with Gumbel's method of flood discharge with a return period of 300 years, what are the (1) 95% and (2) 80% confidence limits for this estimates. Take: $\bar{Y}_n = 0.5588$, $S_n = 1.21$, $f_c = 1.96$ for 95% confidence and $f_c = 1.282$ for 80% confidence.	10	2	5	4.3.2



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End Semester Examination
December - 2022



Max. Marks: 100

Class: B.Tech. *Civil sem VII* Semester: VII

Name of the Course: Advanced Structural Analysis

7/1/22

Duration: 3 Hours

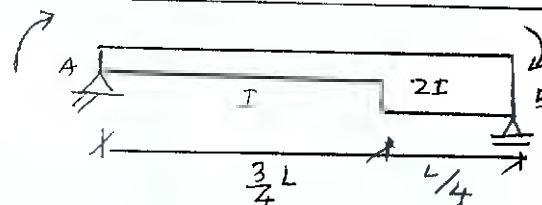
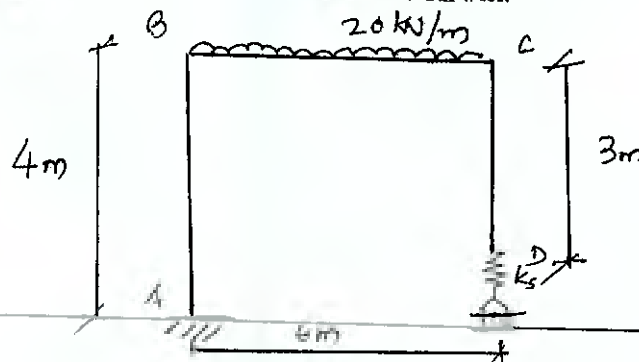
Program: Civil Engineering

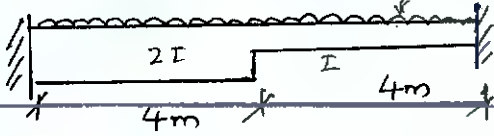
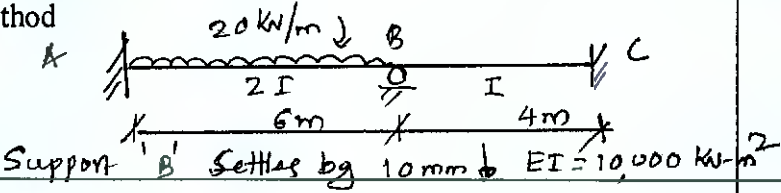
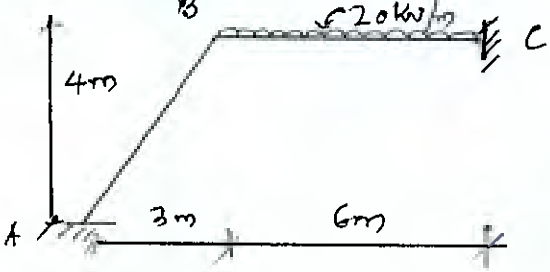
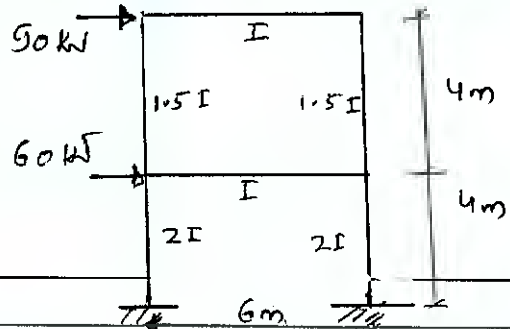
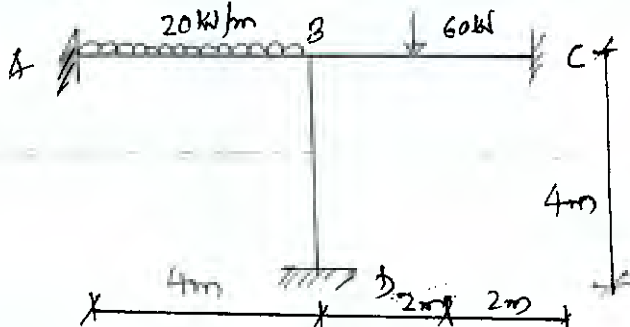
Course Code : PEC- BTC721

Instructions:

- Answer to any five 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)	Distinguish between rigid jointed plane frame and rigid jointed plane grid in terms of structural behavior, internal forces, dof. etc.	4	2	1
Q1 (b)	Analyse the rigid jointed frame shown in Figure by flexibility method and draw BMD and deflected shape. Note that D is simply supported on elastic foundation, which is free to move horizontally and also free to rotate. $EI = 1 \times 10^4 \text{ KN-m}^2$ and $K_s = 1000 \text{ KN/m}$.	8	2	4
Q1 (c)	For the non-prismatic beam element shown in figure calculate the rotational stiffness at A and COF from A to B.	8	2	4



Q2(a)	<p>Using Column Analogy Method, analyse the beam shown in figure and draw BMD and Deflected shape.</p> 	8	2	4
Q2 (b)	<p>Analyse the beam shown in figure by Matrix Stiffness Method</p>  <p>Support 'B' Settles by 10 mm \downarrow $EI = 10,000 \text{ kN-m}^2$</p>	12	1,6	2
Q 3(a)	Derive the modified stiffness and carry over factor for a column with fixed support of a single storey, single bay symmetric frame subjected to Anti -symmetric loads	3	1	3
Q3 (b)	<p>Analyse the frame shown in figure by Elastic Centre Method and draw BMD and deflected shape.</p> 	17	2	4
Q4	<p>Analyse the frame shown in figure by Modified Moment Distribution Method and draw SFD, BMD & deflected shape</p> 	20	1	3
Q5(a)	<p>Analyse rigid jointed plane frame shown in figure by Matrix Stiffness Method and draw BMD and deflected shape.</p> 	10	1,8	2

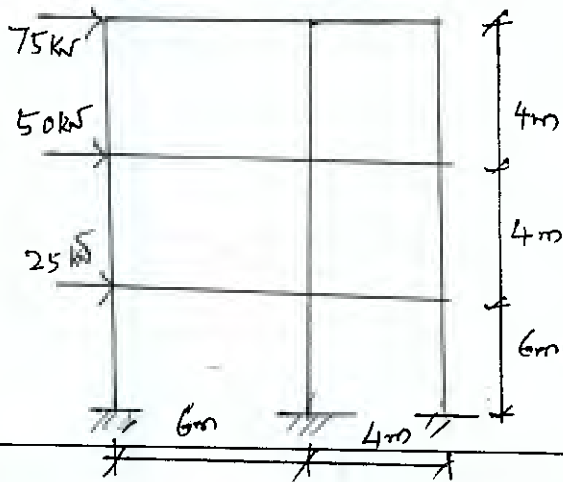
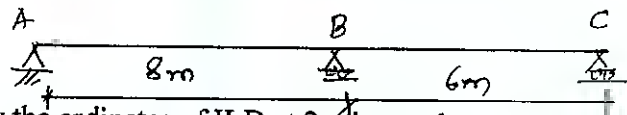
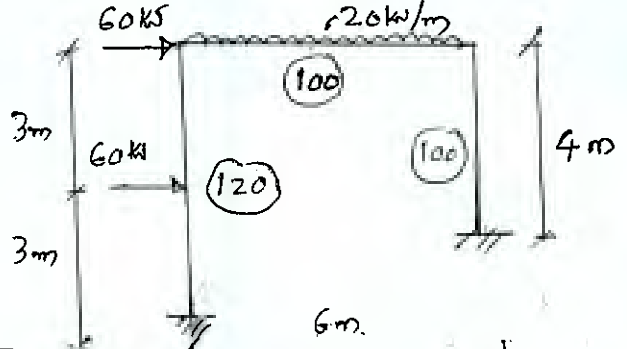
Q5(b)	<p>Analyse the frame shown in figure by Cantilever Method and draw SFD, BMD and deflected shape.</p> 	10	3	6
Q6(a)	<p>(i) Define ILD and state its significance in structural analysis</p> <p>(ii) State and explain Muller Breslau's Principle</p>	2 2	5	5
Q6(b)	<p>For the beam shown in figure, construct the ILD for:</p> <p>(i) Reaction at 'B' R_B</p>  <p>Show the ordinates of ILD at 2m intervals</p>	8	5	5
Q6(c)	<p>Analyse the frame shown in figure by portal method.</p> <p>(See below at the end)</p>	8	3	5
Q7(a)	<p>Using plastic analysis, determine the load factor for the frame loaded as shown in figure. The Plastic Moment capacity of each member in KN-m is indicated in the figure.</p> 	16	5	7
Q7(b)	<p>i) Explain the need of approximate methods of Analysis</p> <p>(ii) State the various approximate methods of analysis for vertical and lateral loads.</p>	2 2	3 3	6

Fig. Q no. 6(c)

