Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2016

BECM 3201

(Construction and Project Management II)

Full Marks: 210 Time: 3 hrs

N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) Define Project and Project Management. Describe the techniques for Project Management. (10)
   (b) Outline the elements of Project Management. (05)
   (c) Outline the key components of the Strategic Management process. Why project managers need to understand the Strategic Management process? (12)
   (d) Write down the activities of Strategic Management process. (08)

2. (a) What is the difference between mitigating a risk and contingency planning? (08)
   (b) What are the sources of change in your project? Describe the process of change control. (12)
   (c) Define risk and risk management. (05)
   (d) Draw the flow chart of risk management process. (10)

3. (a) When would it be appropriate to hold a formal team-building session on a project? (10)
   (b) Outline the benefits that you could get from risk management of your project. (05)
   (c) Describe 5 Stage team development model. (10)
   (d) What do you mean by partnering? Outline the risk of partnering. (10)

4. (a) Why partnering effort fail? How to deal with un reasonable peoples? (10)
   (b) Outline the issue in managing international project. (05)
   (c) Describe how do environmental factors affect project implementation? (10)
   (d) What is culture shock? How can you avoid cross cultural pitfall? (10)

Section – B

5. (a) Define project monitoring. Write down the purposes of project monitoring. (06)
   (b) Define earned value analysis. Write down the benefits of earned value analysis. (08)
   (c) Draw six possible arrangements of actual cost (AC), earned value (EV) and baseline planned value (PV) resulting in four combinations of positive and negative schedule variance (SV) and cost variance (CV). (09)
   (d) The basic information of a building construction project is given in the following Table. Also the updated information as of day 7 in the project is given in another Table. Determine the values of cost variance (CV), schedule variance (SV), cost performance index (CPI), schedule performance index (SPI) and cost-schedule index (CSI). Also write down the interpretation of the status of the project after 7 days. (12)

Basic project information

Activity	Predecessor	Duration (days)	Cost/day	Total cost
A	-	2	300	600
B	A	3	400	1200
C	B	3	400	1200
D	B	2	200	400
E	D	3	100	300

Updated information as of day 7 in the project

Field report at the end of day 7		
Activity	Actual % complete	Incurred cost
A	100	600
B	100	1400
C	33	500
D	50	200
E	0	0

6. (a) Define conflict. Write down the major sources of conflict in different phases of project. (06)
   (b) Briefly describe the common types of conflict found in project team. (10)
   (c) Write down the recommended solutions for major sources of conflict in different phases of project. (09)
   (d) Define quality assurance. Describe the different stages for developing and implementing quality assurance systems. (10)

7. (a) Define project crashing. Write down the trade-off concept. (06)
   (b) Write down the definitions of crash time (CT), crash cost (CC) and crash point by showing in activity graph. (08)
   (c) Write down the characteristics of good project control system. (07)
   (d) The precedence and durations are given in the following Table shows the normal schedule for a project. You can decrease (crash) the durations at an additional expense. The time-cost information for the activities is also given in the table. The owner wants you to finish the project in 110 days. Find the minimum possible cost for the project if you want to finish it on 110 days. (14)

Time-cost information for the activities

Activity	Predecessor	Normal duration (days)	Crash duration (days)	Normal cost (TK)	Crash cost (TK)
A	-	120	100	12,000	14,000
B	-	20	15	1800	2800
C	B	40	30	16,000	22,000
D	C	30	20	1400	2000
E	D, F	50	40	3600	48,000
F	B	60	45	13,500	18,000

8. (a) Define project control. Describe the different types of project control mechanism with figure. (09)
   (b) Define project audit. Write down the typical steps in a project audit. (05)
   (c) Prepare a mid-term audit report for a building construction project which have a budgeted cost at TK. 1000000 with a total project duration 8 months. Also consider at the time of mid-term 40% construction work is completed at a cost of TK. 600000. (10)
   (d) Define project review. When do you complete a project review? (05)
   (e) Define project closeout. Write down the purposes and process of project closeout. (06)

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B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2016

BECM 3205

(Acoustics and Lighting)

Full Marks: 210 Time: 3 hrs

N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) What is Sabine's law? Describe with equation. (10)
   (b) Define Eco and Eco control. (05)
   (c) A class room 60ft long, 35ft high has sound absorption coefficient □'s of o.30 for wall, 0.04 for ceiling, 0.10for floor. All □'s are at 500Hz. 60 percent of the ceiling surface is treated with acoustical panels at □'of 0.85. Find the reverberation time. (20)

2. (a) What are the design considerations of an open-air theater? (10)
   (b) Describe the acoustical and design solution of Epidaurus with proper sketches. (15)
   (c) Write down Inverse square law with equation. (10)

3. (a) Briefly describe about Auditorium acoustics. (15)
   (b) Give proper acoustics solution for a round room, a large room with low ceiling and a room with mezzanine floor with sketches. (15)
   (c) Define sound insulating material and sound absorbing material. (05)

4. (a) Discuss about the impact of sound on the boundary surface of a room (10)
   (b) What are the factors that affect the behavior of sound in an enclosed space? (15)
   (c) Draw a simple room section with sound absorbing material and describe the result. (10)

Section – B

5 (a) Explain the basic consideration of architectural lighting. (05)
   (b) What happens when the light is allowed in an indoor space? Discuss about different types of blinds and sheds with their functions. (15)
   (c) Illustrate the basic design strategy in different climatic conditions with neat sketches (15)

6 (a) Establish the relationship between light surface and effect. (08)
   (b) Define glare. Discuss the reasons of creating glare and the possible safeguard to defeat. (12)
   (c) Classify daylight. Analyze the basic factors of daylight which should be considered in daylight designing. (15)

7 (a) Screen wall is one of the best design element for exterior- explain it considering daylight. (05)
   (b) How natural light helps the designer to evaluate their concept? (10)

(c) Write down the functions of light in an indoor space. (15)

(d) A production area in a factory measures 80 meters x 22 meters. Find the number of lamps required if each lamp has a Lighting Design Lumen (LDL) output of 18,000 lumens. (05)

Utilization factor = 0.4

Lamp Maintenance Factor = 0.75

8 Write short note on given topics (any five) (5x7)

(a) Side lighting

(b) Maintenance Factor

(c) Artificial light source

(d) Factor of day light

(e) Utilization Factor

(f) Top lighting

(g) General diffuse light

Khulna University of Engineering & Technology

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B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2016

CE 3211

(Structural Analysis and Design-II)

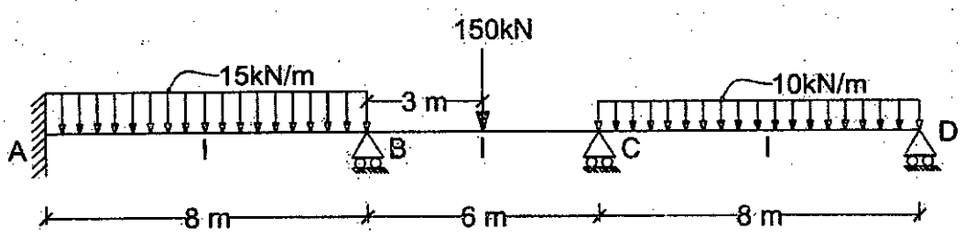
Full Marks: 210 Time: 3 hrs

N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) What is the relative stiffness factor? Show that the stiffness of a member AB at near end is 4EI/L, where the end B is fixed. Also show that the moment at B is $\frac{1}{2}M_{AB}$. (05)

   (b) From the beam shown use the moment distribution method to: (30)
   (i) Determine all the reactions at supports, and also
   (ii) Draw its quantitative shear and bending moment diagrams, and qualitative deflection shape.

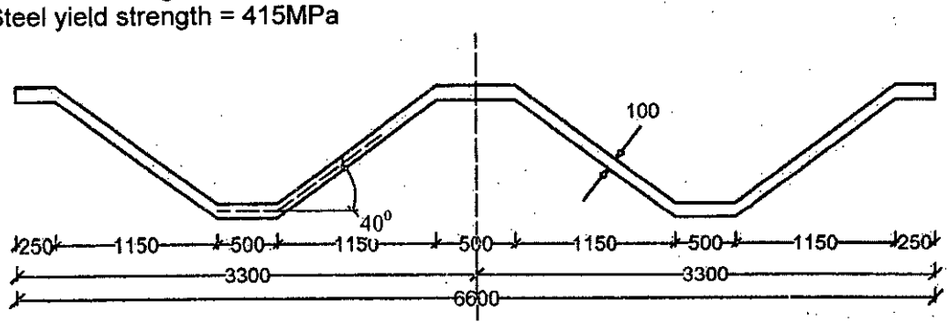


2. (a) What are the advantages and disadvantages of concrete shell structures over the conventional R.C.C structures? (07)

   (b) State the assumption of shell analysis with beam theory? (05)

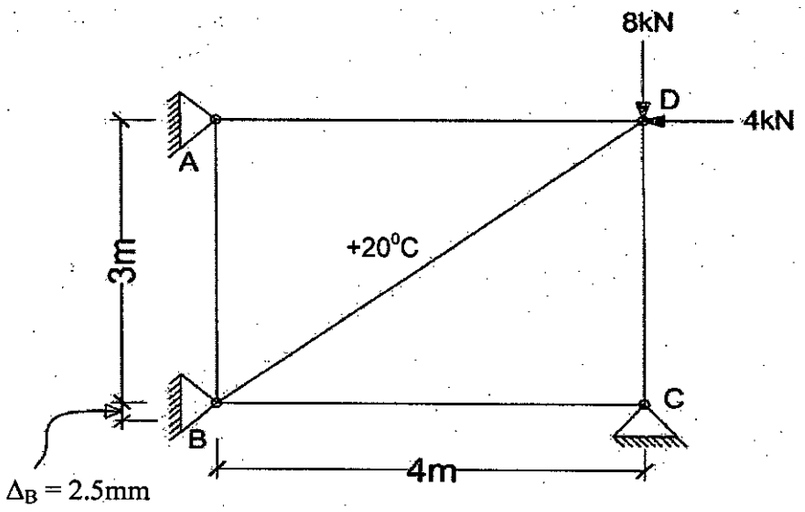
   (c) Analyze the symmetrical V-shaped folded plate roof shown in figure below and find the stresses in the folded plate shell. (23)

   Span of the folded plate = 20m
   Thickness of plates = 100mm
   Live load = 0.75 kN/m^2
   Concrete strength = 20MPa
   Steel yield strength = 415MPa



Note: All dimensions are in millimeter (mm)

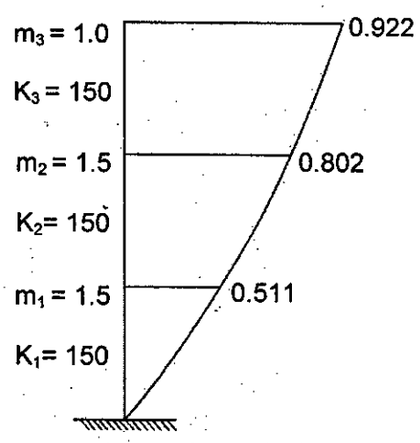
3. (a) For the truss shown below, use the stiffness method to: (35)
   (i) Determine the end forces of each member and reactions at supports.
   (ii) Determine the deflections of the loaded joint.
   The support *B* settles downward 2.5mm. Temperature in member *BD* increases 20°C. Take $\alpha = 12\times10^{-6}$/°C, $AE = 8(10^3)$ kN.



4. (a) Describe the characteristics of response spectrum method for seismic analysis of structures. (07)

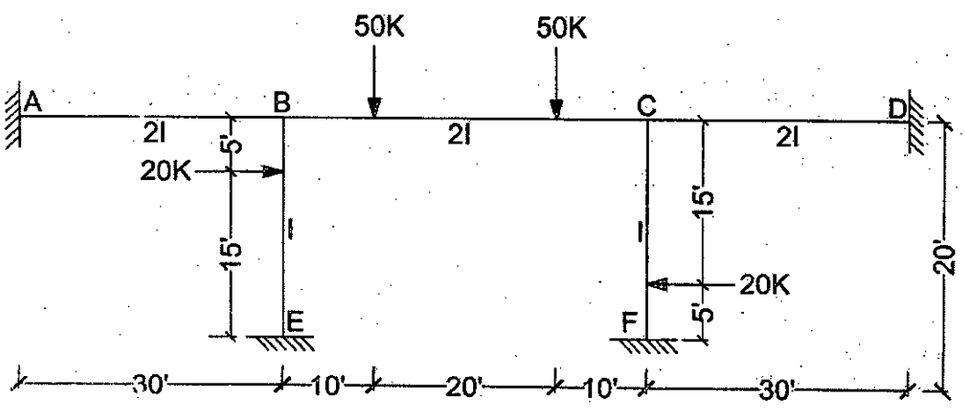
   (b) Describe briefly the following term those are related with seismic analysis: (08)
   (i) Damping (ii) Story Drift (iii) P-Δ Effect

   (c) Determine the drifts, story shears, and total base shear for the structure shown in figure below. Assume the spectral displacement and acceleration are 4 (arbitrary units) and 0.28g (108 in/sec^2), respectively. Assume consistent units are used. (20)

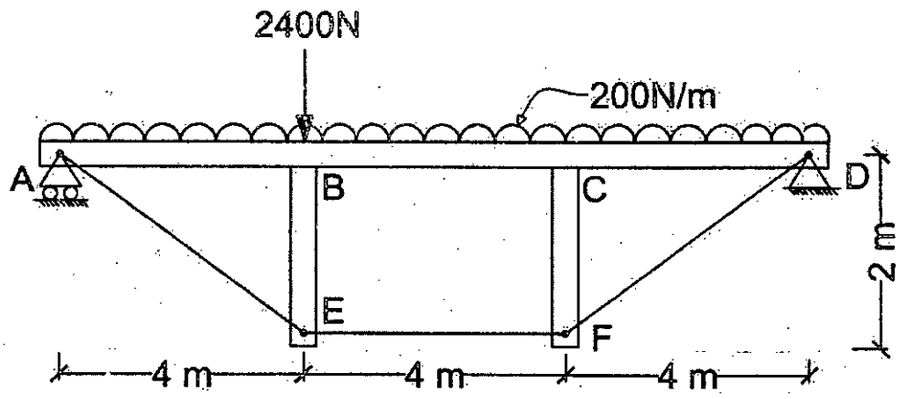


Section – B

5. (a) Analyze the following frame by slope deflection method. (35)

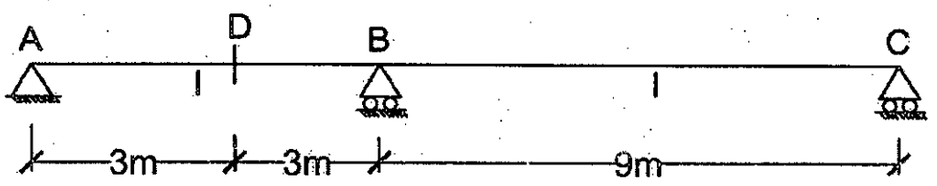


6. (a) Find the forces in the struts and tie rods of the following structure. Diameter of each tie rod is 2cm and each strut is 10cm x 10cm. The beam ABCD is 12cm x 20cm. E for steel is 2 x10^5 N/mm^2 and that for timber is 1x10^4 N/mm^2. (35)

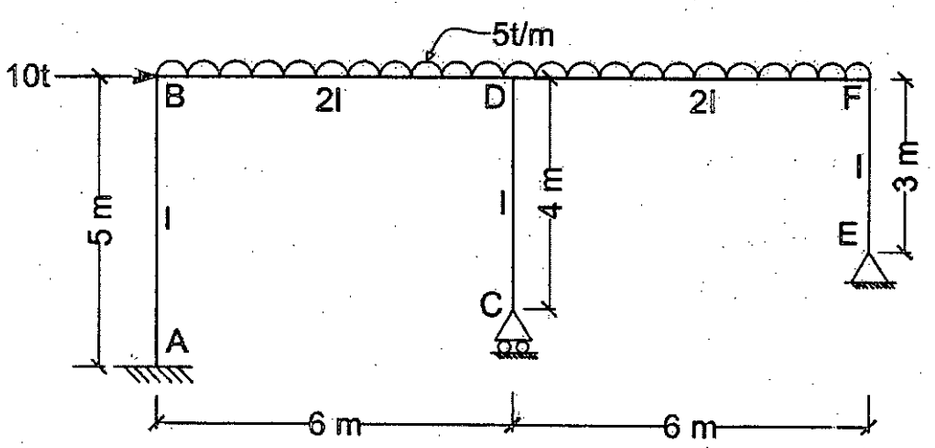


7. (a) List the general steps of the finite element method and also list four common types of finite elements. Write down the advantages of the finite element method. (17)

(b) Draw the influence lines for the shear and bending moment at point 'D' of the following beam at a interval of 3m. (18)



8. Define stiffness and flexibility. Analyze the frame shown in figure below by method of consistent deformation if the downward settlements at C and E in t-m units are 100/EI and 50/EI respectively. Take E as constant. (17)



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CE 3213

(Reinforced Concrete Structures-II)

Full Marks: 210 Time: 3 hrs

N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

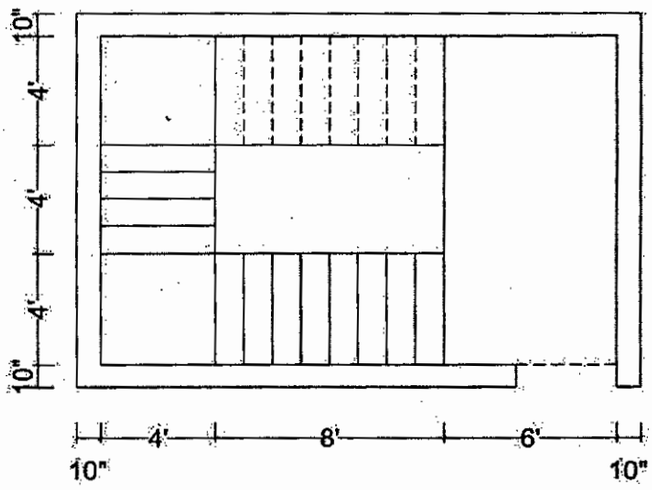
Section – A

1. (a) What are the limitations to the flat slab systems designed by the direct design method. (05)

   (b) Design the interior panel of a flat slab system having column spacing of 20 ft c/c in both directions. Columns have the capital of 3 ft square at bottom face of the drop. The crushing strength of concrete cylinder is 3000 psi, yield strength of steel is 60000 psi, live load is 100 psf and floor finish is 25 psf. (30)

2. (a) Write down the requirements of a good stair. (05)

   (b) Design and draw reinforcement details of the stair case shown in figure below. Consider f_c' = 3000 psi, f_y = 60000 psi, live load on stair is 100 psf and floor finish load is 25 psf. Floor to floor height of this system is 10'-0". (30)



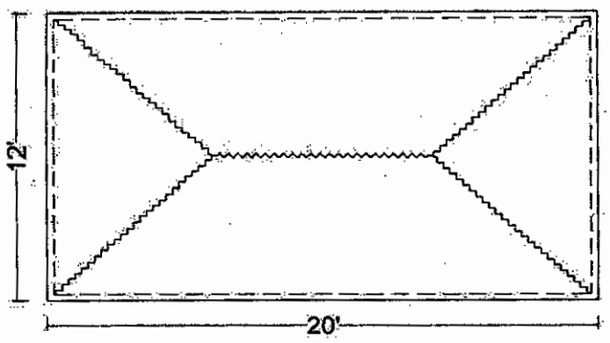
3. An office building is designed using a flat plate floor system is composed of slab panels measuring 24 ft x 24 ft. Beams, drop panels and column capitals are not permitted. Specified live load is 100 psf and dead load will include the weight of the slab plus an allowance of 25 psf for finish floor plus suspended loads. The column will be 24 inch square, and the floor to floor height of the structure will be 12 ft. Design the exterior panel, using materials strengths f_c' = 3000 psi and f_y = 60,000 psi, straight bar used as reinforcement in this slab. (35)

4. (a) Write down the rules of yield line. (05)

   (b) Explain upper bound and lower bound theorems of the yield line theory. (06)

   (c) Analysis the external work done by loads and internal work done by resisting moments. (08)

(d) The two-way slab shown in figure below is simply supported on all four sides and carries a uniformly distributed load of W psf. Determine the require moment resistance for the slab, which is to be isotropically reinforced. (16)

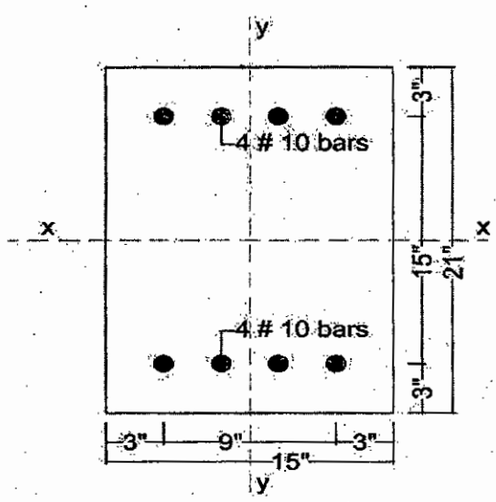


Section – B

5. (a) Write down the ACI Code limitations for reinforced concrete column. (07)

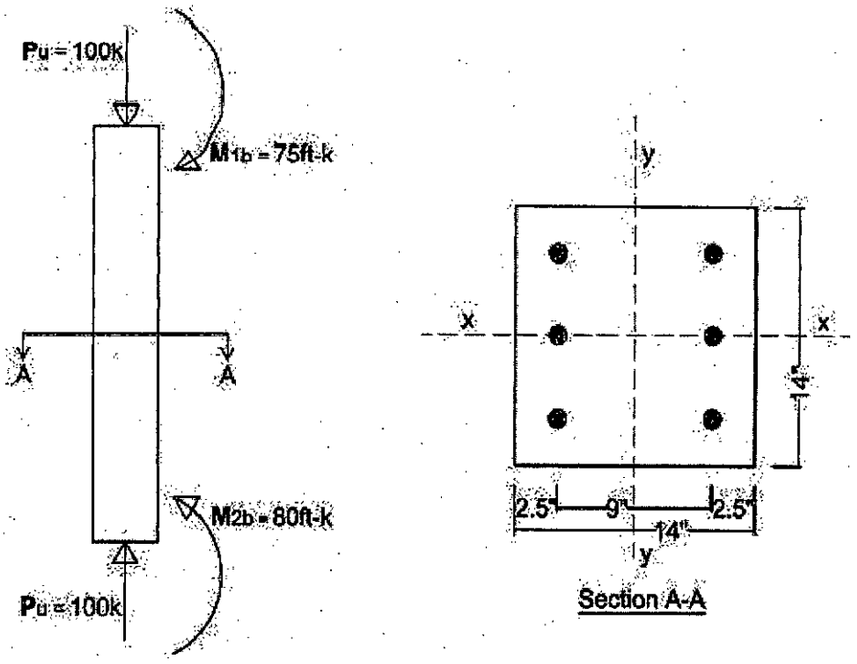
   (b) Discuss the load-moment interaction diagram of reinforced concrete column with neat sketches. (10)

   (c) Using the appropriate interaction curves, determine the value of P_n for the short tied column shown in figure below, which have bending about one axis if e_x = 12 in. Assume f'_c = 4000 psi and f_y = 60,000 psi. [Necessary graph will be supplied] (18)



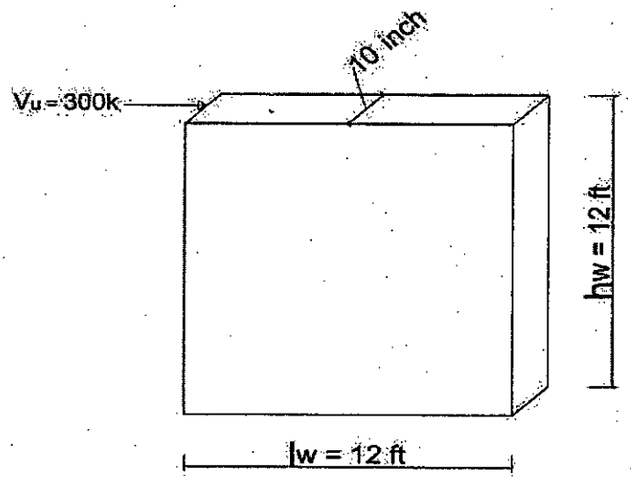
6. (a) Describe the following term for braced and un-braced frames with appropriate sketches: (i) Unsupported lengths (ii) Effective length factors. (08)

   (b) The tied slender column is to be used in a braced frame shown in figure below. It is bent its y-axis with the factored moments and l_u is 16 ft. If k=1.0, f'_c = 4000 psi and f_y = 60,000 psi. Select the amount of reinforcement when P_D = 50k. [Necessary graph will be supplied] (27)



7. (a) What is a shear wall building? Why are buildings with shear walls preferred in seismic regions? (07)

   (b) Design the reinforced concrete shear wall shown in figure below, if f_c' = 4000 psi and f_y = 60,000 psi. (28)



8. (a) Write down the advantages and disadvantages of timber structures? (06)

   (b) Explain the term "Engineered Timber". Describe the procedure of timber structure design. (12)

   (c) What are the mechanisms behind the plastic hinge form in a structure? (07)

   (d) Discuss the effect of plastic hinge in indeterminate structures with figure. (10)

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CE 3223

(Soil Mechanics)

Full Marks: 210 Time: 3 hrs

N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) Define "soil" and "soil Mechanics". Why do we study soil mechanics? Give some practical examples where the principles of soil Mechanics are required. (10)
   (b) What is the phase composition of soil? Mention a typical phase composition of soil? Describe the formation of soil. (12)
   (c) What do you mean by Residual soil, Alluvial soil and Dense sand? Describe ASTM and AASHTO soil classification system. (13)

2. (a) Define the following terms: (i) Void ratio (ii) Porosity (iii) Degree of saturation (iv) Specific gravity and (v) Unit weight (09)
   (b) Briefly describe the soil phase system. Using phase diagram, develop a relationship among e, s, w and Gs; where the symbols bear their usual meanings. (12)
   (c) Given γ=16.5 KN/m^3, w=17% and Gs=2.63,determine (i) γ_d, (ii) n (iii) S_r (iv) Mass of water required to reach full saturation (v) Air content (14)

3. (a) Define consistency of soil. Explain why Atterberg limits are so significant? How can you determine liquid limit (LL)? (10)
   (b) Briefly describe Casagrade plasticity chart (08)
   (c) What is soil compaction? Narrate the principles of soil compaction (07)
   (d) Summarise the specification of standard proctor test and modified proctor test (10)

4. (a) Define lateral earth pressure. What do you mean by active earth pressure and passive earth pressure? What are the factors affecting lateral earth pressure? (10)
   (b) What are the objectives of slope stability analysis? Describe different types of slope failure? What are the factors that affect the slope stability? (12)
   (c) Prove that in an infinite slope in sand, the factor of safety is independent of the height of the slope (13)

Section – B

5. (a) Define the coefficient of permeability of soils. State the factors that affect this property of soils. (07)
   (b) Derive an expression for the effective coefficient of permeability of stratified soils for the horizontal flow. (08)
   (c) Briefly describe a suitable laboratory method to determine the value of coefficient of permeability of fine grained soil. (08)
   d) In a falling head test, initial head is 40cm.The head drops by 5 cm in 10 minute. Calculate the time required to run the test for final head to be at 20cm if the sample is 6cm in height and 50 cm^2 in cross section. Also calculate "k" taking area of the stand pipe 0.5 cm^2. (12)

6. (a) Describe and prove the Terzaghi's effective stress principle (06)

(b) Show that " there is no change of effective stress due to rise of water table above ground surface" (05)

(c) A 5m depth of sand overlies a 4m layer of clay. The water table is at 3m below the G.S. The unit weight of sand is 17 kN/m^3. The saturated unit weight of sand is 20 kN/m^3 and that of the clay is 19kN/m^3.Show how the stresses are affected if the WT rises to the G.S. (12)

(d) Define shear strength of soil. Explain the " Mohr-Coulomb Failure Criterion" (12)

7. (a) Differentiate between Consolidation and Compaction (05)

(b) Define pre-consolidation pressure. Describe the Casagrande method of estimating Pre-consolidation pressure from test results. (10)

(c) Define "settlement". Derive the expression for settlement: (08)

$$S=\frac{Cc}{1+e_0} H \log_{10}\left(\frac{\sigma'_{v0}+\Delta\sigma'}{\sigma'_{v0}}\right)$$

Where, the symbols bear their usual meanings.

(d) The results of an oedometer test on a normally consolidated clay are given below (two way drainage): (12)

σ' (kN/m^2)	e
50	1.01
100	0.90

The time for 50% consolidation for the load increment from 50 to 100 KN/m^2 was 120 min, and the average thickness of the sample was 24 mm. Determine the co-efficient of permeability and the compression index.

8. (a) Derive the equation of bearing capacity for a surface footing resting on Ø=0° soil based on limit equilibrium method. (15)

(b) What is the allowable soil pressure? If SF=3.0, using the Hansen bearing capacity equation for the footing shown in the figure below. (20)