Khulna University of Engineering & Technology

Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2018

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) Briefly explain how the effective project management contributes in sustainable business and leadership building? (07)
   (b) Define project start-up. Concisely describe the standard methods of project start-up. (08)
   (c) The technical and socio-cultural dimensions of project management are two sides to the same coin – Explain the statement. (10)
   (d) Define project management and its importance in the context of construction sector. (10)

2. (a) Write down the factors which are responsible for partnering effort fail. (10)
   (b) Concisely describe the elements of strategic project management. (10)
   (c) Graphically describe the strategic project management process. (15)

3. (a) Briefly deduce the punctuated equilibrium model. (05)
   (b) Describe the unique challenges to managing a virtual project team. (10)
   (c) How do environment factors affect the project implementation? (10)
   (d) Write short notes on (i) Domestic (ii) Overseas (iii) Foreign and (iv) Global project. (10)

4. (a) Define risk management. Illustrate risk assessment matrix with example. (10)
   (b) What is cultural shock? Depict cultural shock cycle. (11)
   (c) The chances of risk events occurring and their respective costs vary over the project life cycle – Explain. (14)

Section – B

5. (a) Define Project Management and Project Monitoring. Write down the purposes of Project Monitoring. (08)
   (b) Write down the definitions of Earned Value, Actual Cost and Planned Value. Also write down the benefits of Earn Value Analysis. (09)
   (c) Define project termination. Describe the common ways for terminating a project. (08)

(d) Suppose you are managing a building construction project. The project is expected to be completed in 10 months at a cost of TK 11000 per month. After 7 months, you realize that the project is 80% completed at a cost of TK 70000. Interpret the status of the project after 7 months by calculating performance indices and drawing graphical representation. (10)

6. (a) Define conflict and conflict management. Write down the sources of conflict in construction management. (09)

(b) State the types of conflict. Write down the recommended solutions for major sources of conflict in different phases of project. (09)

(c) Define Quality Management and Quality Planning. Describe the different stages for developing and implementing Quality assurance systems. (10)

(d) A construction project whose planned cost was TK 700000 but actual cost to date is 500000 so far and the value completed is only 60%, Calculate the performance indices. (07)

7. (a) Define project control. Write down the objectives of project control. (09)

(b) Describe Crash Time (CT), Crash Cost (CC) and Crash Point with figure. Write down the trade-off concept. (08)

(c) Write down the characteristics of good project control system. (05)

(d) The precedence and durations are given in Table-1 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-1. The owner wants you to finish the project in 115 days. Find the minimum possible cost for the project if you want to finish it on 115 days. (13)

Table-1: Time-cost Information for the Activities

Activity	Predecessor	Normal Duration (Days)	Crash Duration (Days)	Normal Cost (TK)	Crash Cost (TK)
A	-	120	100	12000.00	14000.00
B	-	20	15	1800.00	2800.00
C	B	40	30	16000.00	20000.00
D	C	30	20	1400.00	2000.00
E	D, F	50	40	3600.00	4800.00
F	B	60	45	13500.00	1800.00

8. (a) Define Project Termination. Describe the different ways for terminating a project. (08)

(b) Define Project Closeout. Write down the purposes and process of Project Closeout. (07)

(c) Define Project Review. When do you complete a project review? (05)

(d) Define Project Audit. Write down the typical steps in a Project Audit. (05)

(e) Prepare a mid-term audit report for a building construction project which has a budgeted cost at TK 900000 with a total project duration 7 months. Also consider at the time of mid-term 60% construction work is completed at a cost of TK 600000. (10)

Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2018
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) Why sound transmission is zero in free field? There's room with two equal operable windows of glass situated on the one elongated side wall of the room. The size of each of the window is 7' x 10'. The dimension of the room is 15' x 20' x 12'. The sound absorption co-efficient for wall = 0.80, ceiling = 0.30, floor = 0.50 and the glass with panel = 0.70. Calculate the total room sound absorption when 50% of these windows are open. (13)

   (b) Why a small room with windows does not create reverberation where a large room with less windows makes echoes or reverberation? (06)

   (c) Illustrate the working mechanism of panel resonance and hybrid system as acoustic solution for building. (10)

   (d) Differentiate between sound insulating and absorbing materials. (06)

2. (a) Discuss about the impact of sound on the boundary surface of a room. (10)

   (b) Draw a simple room section with sound absorbing material and describe the sound behavior. (10)

   (c) A classroom, 60 *ft* long by 40 *ft* wide by 12 *ft* high has sound absorption co-efficient α's of 0.30 for walls, 0.40 for ceiling, and 0.10 for floor. All α's are at 500 Hz. Find reverberation time T if 60 percent of the ceiling surface (along the perimeter of the room) is treated with acoustical panels at α of 0.85. (15)

3. (a) Briefly discuss about the spatial considerations for achieving better sound quality in designing an auditorium? Provide necessary sketch. (15)

   (b) How loud speaker intelligibility is affected by power and clarity? (06)

   (c) Discuss about the commercial acoustical materials. (08)

   (d) How can you solve acoustic problem for a room with inclined ceiling and the room with ceiling dome? (06)

4. (a) Can you explain the behavior of sound in an enclosed space under the following ways: reflection, absorption, refraction, diffusion, diffraction and transmission? (15)

   (b) Describe the properties, pros and cons of sound proofing materials which are made from the natural resources? (14)

   (c) How sound behaves in the room with mezzanine level, rooms with convex ceiling and the rooms with round wall? And show the proper acoustic solution for the particular spaces. (06)

Section – B

5. (a) What is Photometry? Distinguish between Luminous flux and Luminous intensity? (10)

   (b) Write short notes on: *(i) Illuminance (ii) Luminous Efficacy (iii) Luminance* (15)

   (c) Discuss the Munsell color classification system in brief. (10)

6. (a) What are the primary reasons for using daylight to meet the illumination requirements of an architectural space? (05)

   (b) Discuss the concept of daylight factor in brief. (15)

   (c) Discuss the quality and quantity goals of daylighting with necessary examples. (15)

7. (a) What are the problems associated with skylight in our climatic context? Explain. (05)

   (b) What window strategies should you follow to shade windows from excess sunlight during summer? Explain with necessary illustrations. (15)

   (c) Discuss incandescent lamps in brief. (15)

8. (a) What do you understand by 'light pollution' and 'light trespass'? Give examples. (05)

   (b) What is 'architectural lighting'? Discuss core lighting in brief. (15)

   (c) Write short notes on: (i) Landscape Lighting (ii) Emergency Lighting (15)

Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2018

CE 3211

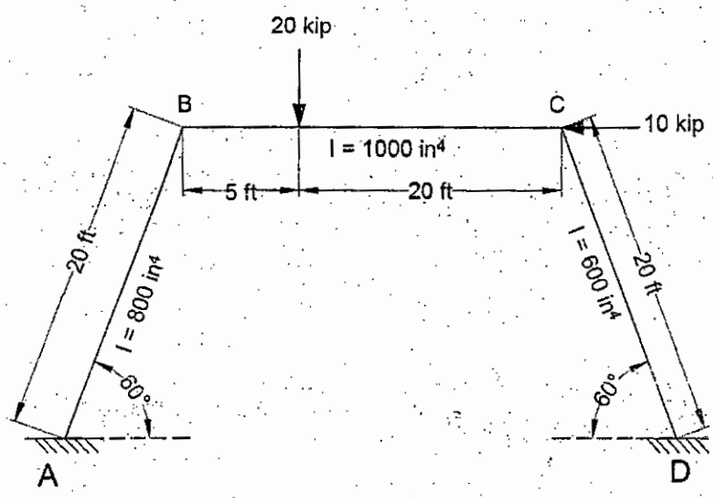
(Structural Analysis and Design-II)

Full Marks: 210 Time: 3 hrs

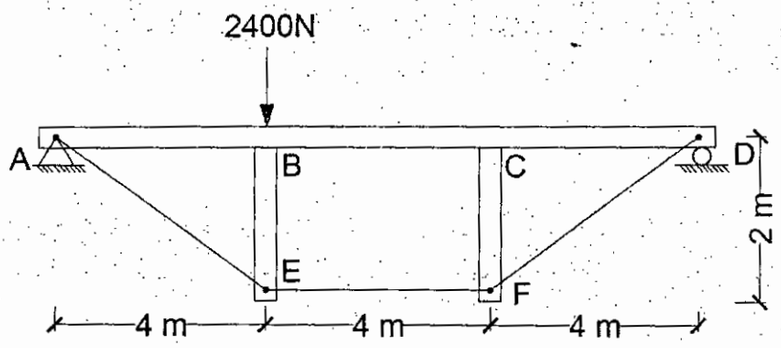
N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.
iii) All figures are not drawn in scale.

Section – A

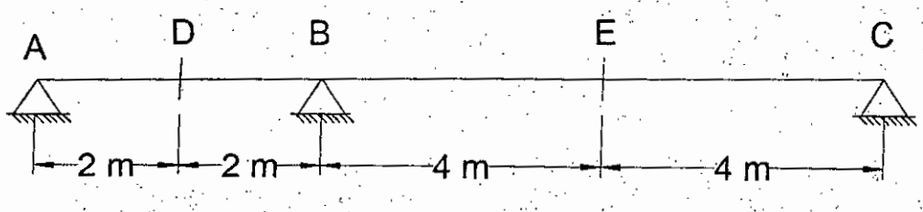
1. Analyze the following inclined frame by slope defection method and find all unknown support moments. Moment of inertia of all the members as shown in the figure. (35)



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



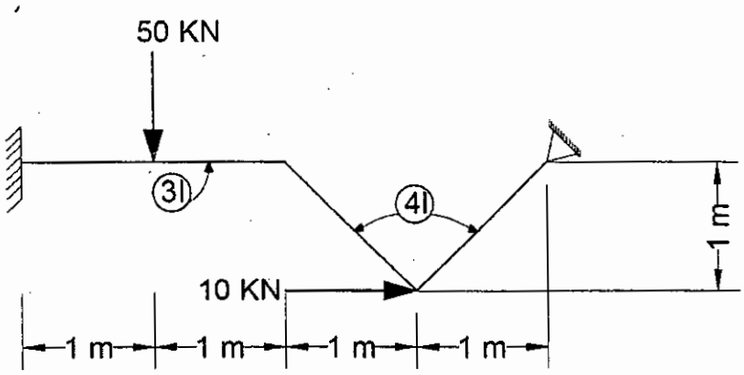
3. (a) Draw the influence lines for the vertical reaction at A, bending moment at D and share at E of the following beam at a interval of 2 m, where EI is constant. (20)



(b) What is the difference between equivalent lateral force and response spectrum method? Write short notes on (i) Natural period and frequency (ii) Drift and (iii) P - Δ effect. (15)

4. (a) Distinguish between stiffness and flexibility.(04)

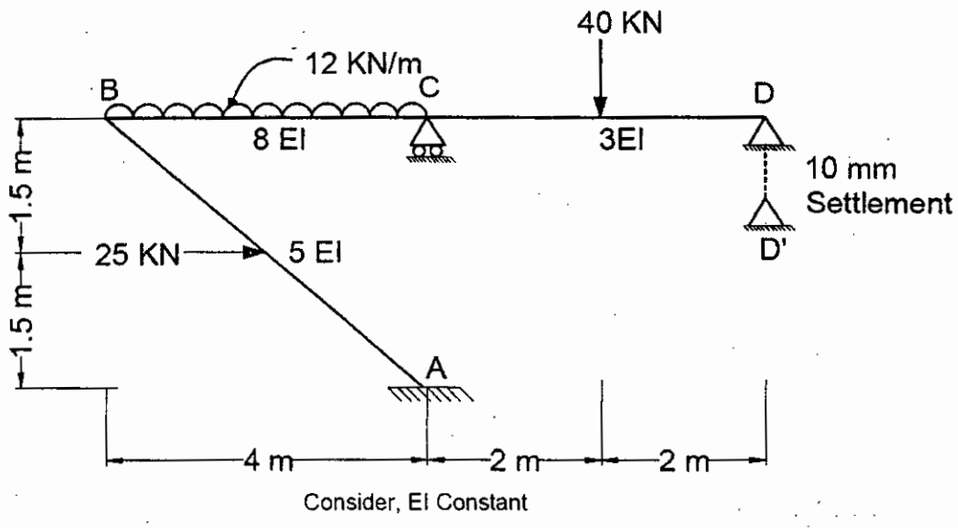
(b) Analyze the frame by flexibility matrix method.(31)



Section – B

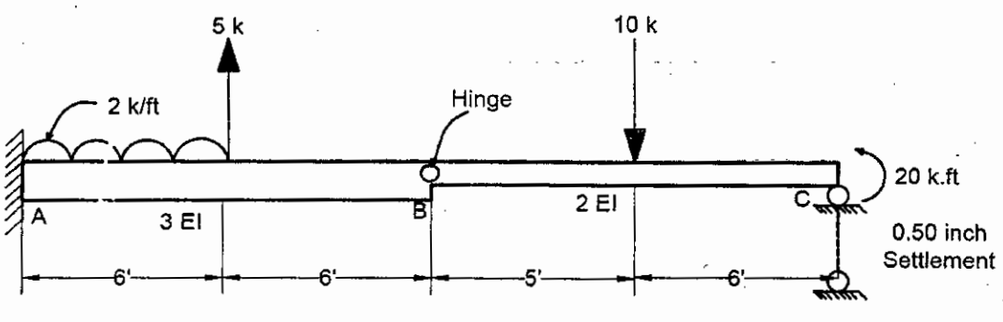
5. (a) What is meant by carry over factor? Prove that rotational stiffness, K = 4EI/L, where the symbols bear usual meaning. (05)

(b) Analyze the frame by moment distribution method and draw the SFD and BMD. (30)

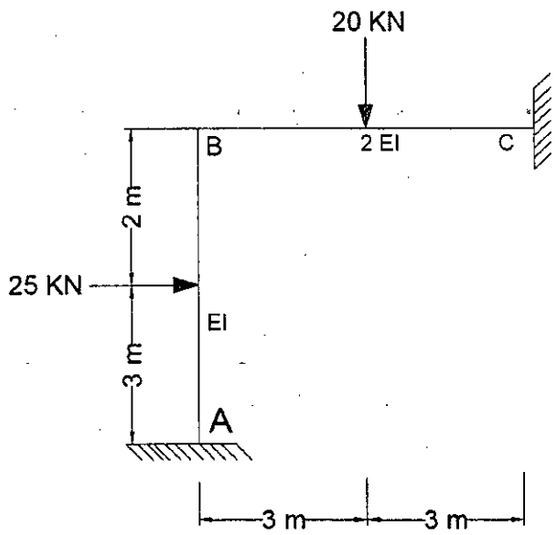


Consider, EI Constant

6. Write down the characteristic of the beam element stiffness matrix. Analyze the beam by stiffness matrix method and draw SFD and BMD. Assume reasonable value of EI. (35)

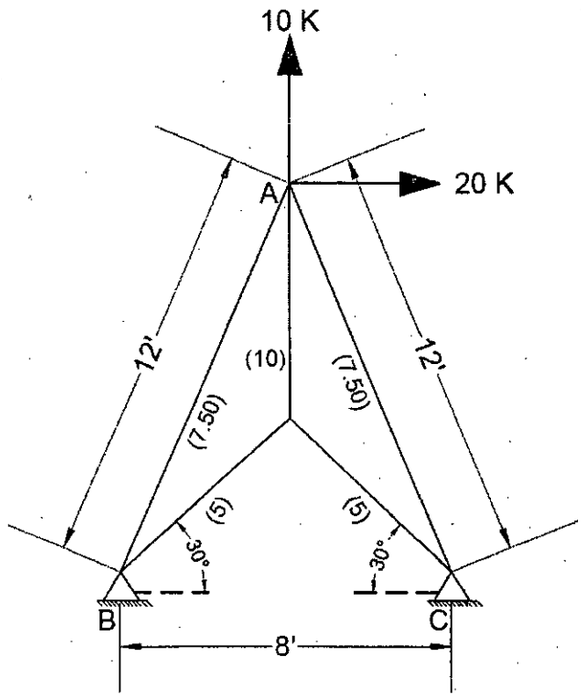


7. Analyze the frame by stiffness matrix method and draw SFD and BMD. Assume reasonable value of EI (35)



8. (a) What are the advantages and disadvantages of concrete shell structures over the conventional R.C.C structures? (05)

(b) For the following indeterminate truss, assemble the global stiffness matrix and find out the bar forces. Figure in parenthesis gives the corresponding cross – sectional area of the bars in in². Assume E as constant. (30)



Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 3rd Year 2nd Term Regular Examination, 2018

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.

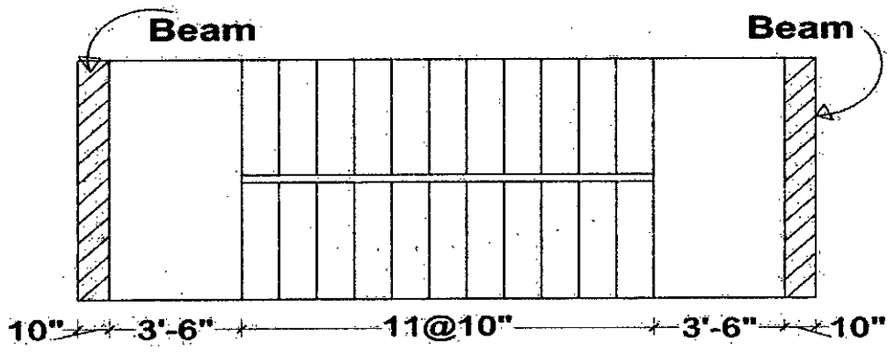
Section – A

1. (a) In a two way slab system, show the typical cross section of an effective beam. How can you calculate an approximate value of its moment of inertia? (07)

   (b) Design the interior panel of a flat slab system having column spacing of 18 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. (28)

2. (a) Draw the various types of stairs. (07)

   (b) Design and draw the reinforcement details of the stair shown in figure. Consider f_c' = 3250 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 ft. (28)



3. A flat plate floor system is composed of slab panels measuring 24 ft x 20 ft. Beams, drop panels and column capitals are not permitted. Specified live load is 80 psf and dead load includes the weight of the slab plus an allowance of 25 psf for floor finish. The column will be 20 inch square, and the floor to floor height of the structure will be 12 ft. Design the exterior panel, using materials strengths f_c' = 3500 psi and f_y = 72,500 psi straight bars are used as reinforcement in this slab. (35)

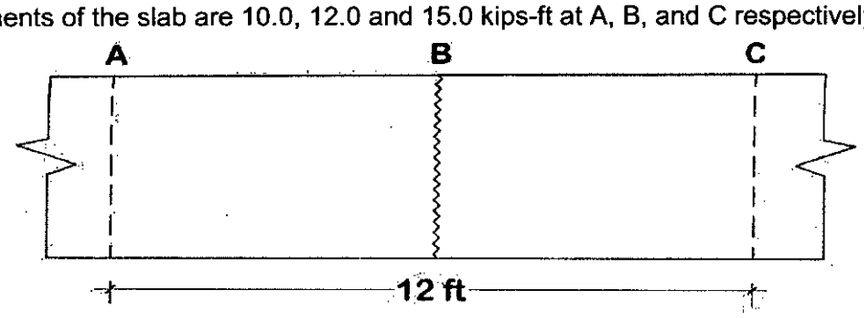
4. (a) Write down the rules of yield line. (05)

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

   (c) Discuss the plastic hinge characteristics of a RC member from the typical moment-curvature diagram. (08)

   (d) Describe the following terms with appropriate sketches: (i) Plastic hinge mechanism and (ii) Yield line (04)

   (e) Determine the collapse load and yield line location of the one-way uniformly loaded continuous slab shown in figure using the method of virtual work. The resisting moments of the slab are 10.0, 12.0 and 15.0 kips-ft at A, B, and C respectively. (12)

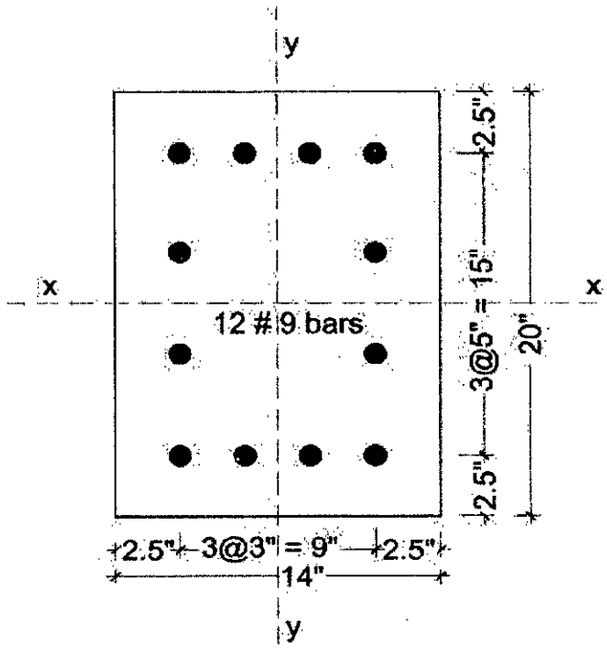


Section – B

5. (a) Write down the ACI code limitations for reinforced concrete short column. (05)

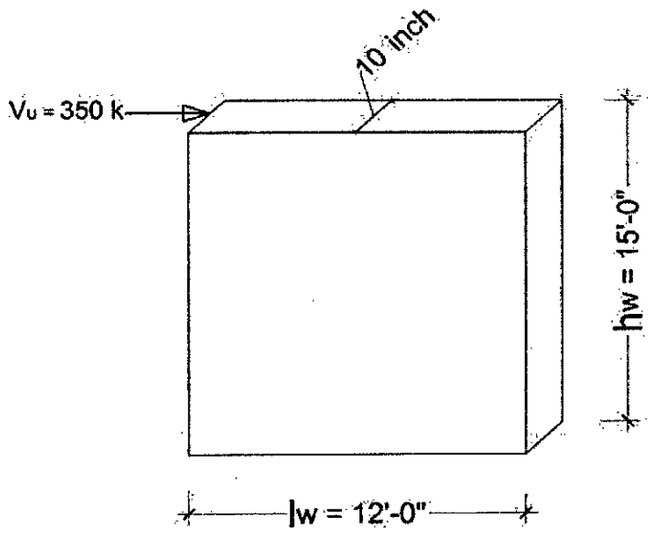
   (b) Describe why the strength reduction factor for a column is more conservative than those for a beam. (06)

   (c) Use the appropriate interaction curves, determine the nominal axial capacity of short tied column shown in figure below, which have bending about both axis if e_x = 8 in. and e_y = 4 in. Assume f_y = 60,000 psi and f'_c = 4000 psi. Solve it by USD method. [Necessary graph will be supplied] (24)



6. (a) What are the limitations of shear wall design in RC structures according to ACI code? (05)

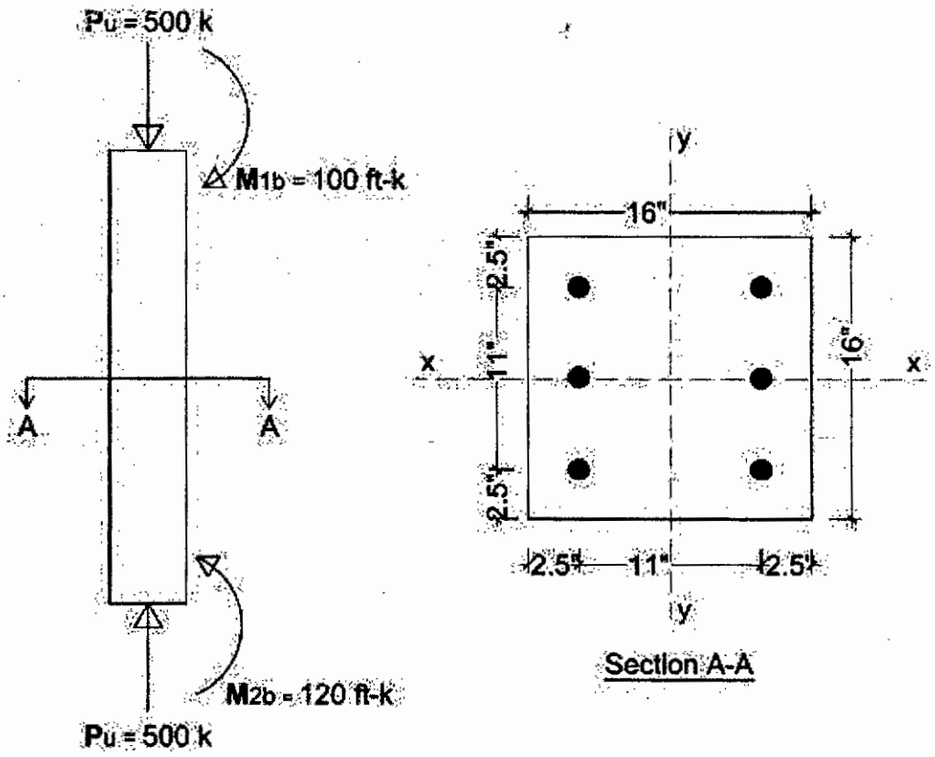
   (b) Design the reinforced concrete shear wall for the flexural and shear as shown in figure below, if f'_c = 4 ksi, and f_y = 60 ksi. (30)



7. (a) How the slenderness ratio effects on the load-deformation behavior of RC long column. Clarify with suitable examples graphically. (06)

   (b) Compare and contrast between rectangular and spiral short RC column. (05)

   (c) Select the reinforcing bars for the braced tied square column, as shown in figure. The reinforcement will be placed in two faces where the distance from the column edge to the center of the bars is 2.5 in. The square column is bent in double curvature about their strong axis and it has an l_u of 16 ft. Also note that the unfactored dead axial load P_D is 120 k. If k = 1.0, f_y = 60 ksi, and f'_c = 4 ksi. Use the ACI equation for low percentage of steel for EI. [Necessary graph will be supplied] (24)



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

   (b) Define the term "Engineered Timber". Summarize the procedure of timber structure design. (08)

   (c) What are the bundled bars? Show with neat sketch the clear distance between reinforcing bars in column design based on ACI code. (06)

   (d) Design a short RC spiral column of diameter not more than 28 inch to carry a concentric allowable load of 1142 kips, f'_c = 4 ksi, and f_y = 60 ksi. Include the design of spiral and sketch the cross and long sections of the column. Use WSD method. (14)

Khulna University of Engineering & Technology

Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year, 2nd Term, Regular Examination, 2018

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 the terms soil and soil mechanics. Why do you study the soil mechanics? (10)

   (b) Define the residual soil and alluvial soil. Describe the ASTM and AASHTO soil classification systems. (12)

   (c) Mention the significances to study the formation of soil. Describe the soil formation system with diagram. (13)

2. (a) Write a short note on the soil phase system. Using phase diagram show that, $\gamma_d = \frac{\gamma}{(1+W)}$, where the symbols bear their usual meanings. (10)

   (b) Using phase diagram briefly describe all the weight-volume ratios. (12)

   (c) The moisture content of a soil sample is 19.2%. The soil sample has dry unit weight of 120 lb/ft^3 and the specific gravity is 2.63. Calculate: (13)
   (i) The degree of saturation and
   (ii) Maximum dry unit weight to which this soil can be compacted without change in its moisture content.

3. (a) Define relative density. Classify the cohesionless according to the relative density. Explain why Atterberg limits are so important? (10)

   (b) Define the soil consistency. Briefly describe the Multi-Point Method and Fall Cone Method for the determination of liquid limit. (13)

   (c) Write short notes on liquidity index and Casagrande plasticity chart. (12)

4. (a) What is soil compaction? Differentiate between Standard Proctor Test and Modified Proctor Test. (10)

   (b) Define the Zero-air-void-line, line of optimum and entrapped air. Why do you study the theory of lateral earth pressure? Write down the factors affecting lateral earth pressure. (10)

   (c) Following are the results of a KUET foreign dormitory project soil sample. The field density test is performed on the soil by Sand-Cone method. The results are: (15)
   - Calibrated dry density of Ottawa sand = 1570 kg/m^3
   - Calibrated mass of Ottawa sand to fill the cone = 0.625 kg
   - Mass of jar+ Cone+ Sand (before use) = 8.29 kg
   - Mass of jar+ Cone+ Sand (after use) = 5.47 kg
   - Mass of moist soil from hole = 3.59 kg
   - Moisture content of the moist soil = 13.2%

   Determine:
   (i) In-situ-dry density
   (ii) If the maximum dry density is equal to 20.45 KN/m^3 in laboratory, calculate relative field compaction.

Section – B

5. (a) Write down the importance of determining the permeability of soil in geotechnical projects. (10)

   (b) Briefly describe the laboratory procedures to determine the value of co-efficient of permeability of fine and coarse grained soils. (14)

   (c) In a falling head test, initial head is 40cm. The head drops by 5cm in 10 minutes. 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 0.5cm^2. (11)

6. (a) Define the following terms: (i) Effective stress (ii) Hydrostatic pore water pressure (iii) Excess pore water pressure. (09)

   (b) Prove that the effective stress remains constant due to the fluctuation of WT above the ground surface. (12)

   (c) A 5-m depth of sand overlies a 6-m thick layer of clay, the water table being at the ground surface, the permeability of the clay is very low. The saturated unit weight of the sand is 19 KN/m^3 and that of the clay is 20 KN/m^3. A 4-m depth of fill material of unit weight 20 KN/m^3 is placed on the ground surface over an extensive area. Determine the effective vertical stress at the centre of the clay layer many years after the fill has been placed. (14)

7. (a) State Mohr-Coulomb failure criteria and show that: (15)
   $\sigma_1=\sigma_3\tan^2(45^0+\phi/2)+2C\tan(45^0+\phi/2)$, where the symbols bear the usual meanings.

   (b) Draw the graphical representation of Mohr-Coulomb failure criteria for: (i) General case, (ii) Granular (non-cohesive) soils and (iii) Saturated plastic clay. (06)

   (c) The results of a consolidated undrained test on a sample of fully saturated clay are given below: (14)

	Specimen 01	Specimen 02	Specimen 03
Cell Pressure (KN/m^2)	300	400	600
Deviator stress (KN/m^2)	326	416	635
PWP (KN/m^2)	146	206	280

   Find out the strength parameters for effective stress conditions.

8. (a) Define the co-efficient of consolidation (C_V). State square-root-time method to calculate C_V. (10)

   (b) Define settlement. Derive the expression for settlement: (10)
   $S=\frac{C_c}{(1+e_o)}H\log_{10}(\frac{\sigma'_0+\Delta\sigma'}{\sigma'_o})$, where the symbols bear their usual meanings.

   (c) For a normally consolidated laboratory clay specimen drained on both sides, the test results are: (15)

   - σ'_o = 3000 lb/ft^2, $e_1 = e_o = 1.1$
   - $\sigma'_o+\sigma\Delta'$= 6000 lb/ft^2, $e_2 = 0.9$
   - Thickness of clay specimen = 1 in.
   - Time for 50% consolidation = 2 min

   (i) Determine the hydraulic conductivity of the clay for the loading range.
   (ii) How long will it take for a 6-ft clay layer in the field (drained on one side) to reach 90% consolidation?