Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 3rd Year 1st Term Regular Examination, 2018
BECM 3101
(Construction and Project Management - I)

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) Write down the principle characteristics of a typical subcontracting in the field of construction. (10)
   (b) Write down the objectives of cost estimate from owner, designers and contractor's perspective. (12)
   (c) For construction of a high-rise residential building project in Khulna city of Bangladesh, a schedule of works items without quantity is prepared by the client. Based on the information provided above, which types of construction contract will be appropriate for the project? Write down the main aspect, advantages and disadvantages of the selected contract type. (13)

2. (a) Define value of engineering and write down the objectives of value of engineering. (10)
   (b) Briefly describe the reasons for unnecessary costs in a construction project. (10)
   (c) Concisely describe the steps of value engineering job plan. (15)

3. (a) What is attendance in subcontracting? State the principle characteristics of a typical subcontracting in construction field. (10)
   (b) Describe the bid unbalancing and upfront payment method as a part of a bidding strategy. (15)
   (c) The Managing Director of a well known firm has decided to submit potential bid with zero profit. Critically explain the rational to submit the bid with zero profit. (10)

4. (a) What is repetitive construction? Write down the characteristics of repetitive construction. (10)
   (b) Describe the contribution of construction management in sustainable building project. (10)
   (c) Write short notes on (i) Specialist gang (ii) Optimum team size and (iii) Target build rate. (15)

Section – B

5. (a) How would you differentiate "Construction Management" from "Project Management"? Define a project with help of an example. (12)

   (b) Explain the concept of triple constraint (Time – Cost – Scope) and its effect on a project. (08)

   (c) Briefly discuss about the four crucial skills of a project manager as project management professional. How his roles influence the project activities? (15)

6. (a) Define project organization. What are the critical issues involved in project organization? Which types of organization best suits in building construction project and why? (13)

   (b) What are the two variables of stress of psychology in administration? Draw and shortly describe the "Plutchik's eight basic emotion" diagram. (10)

   (c) What are Eustress and Distress? Briefly discuss about the psychology of a good project manager. (12)

7. (a) Explain the necessary steps to build a schedule by using Linear Scheduling Method (LSM). How LSM works? (13)

   (b) What are the WBS and OBS? Describe briefly how you transform a WBS into a network diagram with an appropriate example. (12)

   (c) How the role of a project manager influences the project activities? Briefly discuss about the skills of a good project manager. (10)

8. (a) Write short note on: (i) CPM (ii) Free float (iii) Variance (iv) Optimistic time (v) Pessimistic time (10)

   (b) Write down the advantages and shortcoming of PERT. (05)

   (c) A project consisting of twelve distinct activities is to be analyzed by using PERT. The following information is given (time estimates are in days): (20)

Activity	Predecessor Activity	Optimistic Time (a)	Normal Time (m)	Pessimistic Time (b)
A	-	2	2	2
B	-	1	3	7
C	A	4	7	8
D	A	3	5	7
E	B	2	6	9
F	B	5	9	11
G	C, D	3	6	8
H	E	2	6	9
I	C, D	3	5	8
J	G, H	1	3	4
K	F	4	8	11
L	J, K	2	5	7

Khulna University of Engineering & Technology

Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year 1st Term Regular Examination, 2018

BECM 3107

(Construction Contract and Law)

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 construction contract. What types of problems may arise with conflicted construction documents? (08)

   (b) Distinguish between: (12)
   (I) General and Supplementary Specifications
   (II) Contract Addenda and Modification

   (c) Write note on: (15)
   (i) Latent ambiguity
   (ii) Patent ambiguity
   (iii) Contra Proferentem

2. (a) What is construction change directives? Write down the rules for construction change directives. (08)

   (b) What are the possible sources of constructive changes? How the changed work is performed? (12)

   (c) What do you think about the regular site visit and inspection of A/E has any positive effect on project progress? Write down the interpretation of court in this regard. (15)

3. (a) What do you mean by construction insurance? Explain the importance and benefits of it. (08)

   (b) What is surety bond? Explain the "three Cs" prequalification screening process of the surety bond. (10)

   (c) Discuss the types of Letter of Credit (LOC). How LOC is issued? What are the elements of LOC? (12)

   (d) Distinguish between Implied and Express Indemnity Agreement. (05)

4. (a) What is meant by Termination of Contract? What are the contractual termination provisions? (08)

   (b) Under what circumstances a contract may be terminated by– (i) Owner and (ii) Contractor? (12)

   (c) Write down the steps involved in a project close- out report. What is "Lessons Learned" session? Write down the importance and procedure to contract a lessons Learned session of a project. (15)

Section – B

5	(a)	Define Liquidated Damage (LD). Describe with diagram the evolution of LD in a typical construction contract.	(15)
	(b)	List down the nature of contractual agreement for liquidated damage.	(10)
	(c)	Describe the situation when time is set at large during EOT claim?	(10)
6	(a)	List down the reasons to choose adjudication rather than litigation	(05)
	(b)	Write down the roots and nature of construction dispute.	(06)
	(c)	Define alternative dispute resolution (ADR) and write down the advantages of ADR.	(12)
	(d)	What is arbitration? Describe the main features of arbitration process.	(12)
7	(a)	Briefly describe letter of award or letter acceptance. Write down the important terms and conditions that must contain in the letter acceptance.	(10)
	(b)	Describe why letter of intent is so dangerous for the construction contract?	(10)
	(c)	David asked Henry to purchase some water proofing paint for the roof of a building from Samuel. Show the contractual relationship among David, Henry and Samuel with diagram in the context of law of agency. What are the contractual implications if (i) Samuel knows about David (ii) Samuel never knows about David	(15)
8	(a)	List down the name of dispute settlement process with clause number according to Bangladesh PW3.	(03)
	(b)	Write down the name of at least seven (07) standard conditions of contracts that are practicing in the construction sector globally.	(07)
	(c)	Write short notes on (i) Tort of negligence and (ii) Causation	(10)
	(a)	Define contract. Briefly describe the factors that affect the validity of contract.	(15)

Khulna University of Engineering & Technology

Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year 1st Term Regular Examination, 2018

BECM 3115

(Climate & Architectural Design)

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 differences exist among Climate, Context and Comfort? (10)
   (b) Can you defend your position about Climate and Built Environment that we should "accept the fate", "reject the development" or mitigate? (15)
   (c) Can you distinguish between sustainable building and green building? (10)

2. (a) Show the zoning of a building in a particular site according to "Khulna" for climate responsive building in Bangladesh. Illustrate that with necessary sketches. (15)
   (b) Discuss about layout, spacing and position of opening for ensuring air movement and ventilation in a building. Provide necessary sketches. (20)

3. (a) Can you explain how climate factors affect the building envelops in designing micro-climate? Use necessary sketches. (22)
   (b) Show the working mechanism of Stevenson Screen for measuring temperature. (08)
   (c) Mention the design tools for mode-rating micro-climate. (05)

4. (a) Describe the processes of heat loss in various climatic situations. (20)
   (b) Can you explain what must have happened in the process of human body heat exchange with necessary sketches? (15)

Section – B

5. (a) In how many ways the earth's surface releases heat to the atmosphere? Discuss with illustrations. (15)
   (b) What are the major characteristics of tropical climate? (10)
   (c) "Of all the types of climates the tropical climates are of maximum importance for the built-from designers" – Do you agree with the opinion? Give reasons. (10)

6. (a) What is site climate? Elaborate the factors of site climate. (20)

(b) What do you understand by 'temperature inversion'? Discuss with example. (15)

7. (a) What is thermal comfort? How does the human body produce and release heat to the environment? (20)

(b) Outline the various subjective variables by which our thermal preferences are influenced. (05)

(c) What is 'effective temperature'? Discuss its limitations. (10)

8. (a) Distinguish between 'passive' and 'active' means of thermal control. To ensure the best possible indoor thermal conditions which one do you prefer as a BECM professional? (10)

(b) What is periodic heat flow? Discuss time-lag and decrement factor. (10)

(c) Write short notes on: i. Specific Heat Capacity vs Thermal Capacity ii. U-value iii. Solar gain factor. (15)

Khulna University of Engineering & Technology

Department of Building Engineering and Construction Management

B. Sc. Engineering 3rd Year 1st Term Regular Examination, 2018

CE 3111

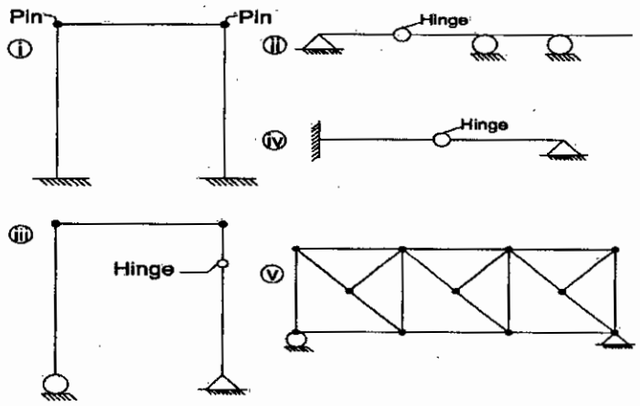
(Structural Analysis and Design-I)

Full Marks: 210 Time: 3 hrs

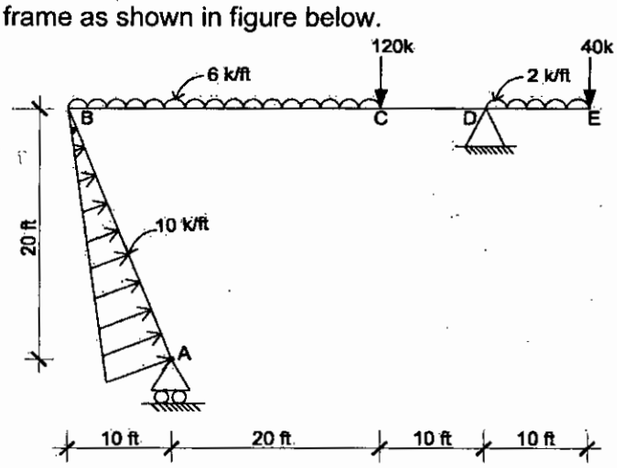
N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

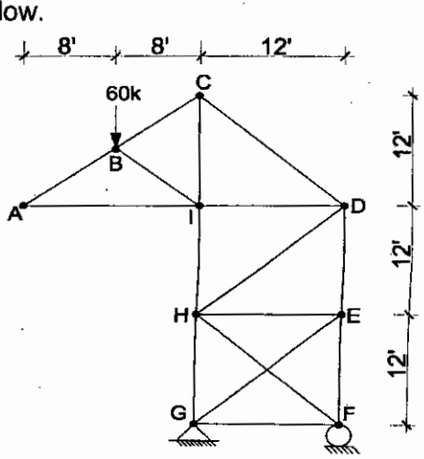
1. (a) What are the purposes of zero force member in trusses? Classify the structures as shown in figure below whether stable or unstable and statically determinate or indeterminate. (12)



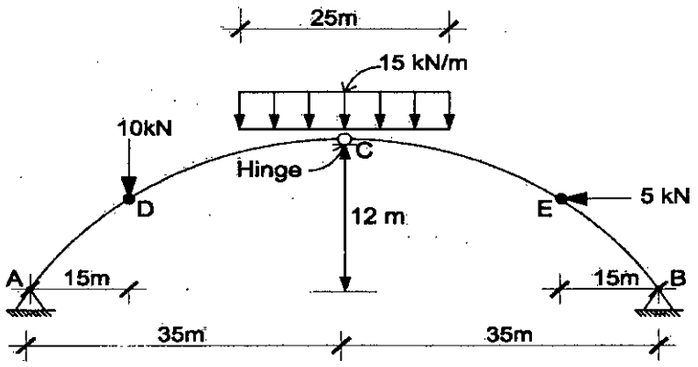
(b) Determine the support reactions, and draw the shear force and bending moment diagrams of the frame as shown in figure below. (23)



2. (a) Using the method of section, find the axial forces in members AB, BC and BI for the truss shown in figure below. (15)



(b) Determine the bending moment at 30 m from the right hand support of the three - hinged parabolic arch as shown in figure below. (20)



3. (a) Calculate the earthquake load at each floor level for a five-storied residential reinforced concrete building for the following data: (17)

- Height of each floor = 3.5 m
- Plan area = 25 m x 35 m
- Seismic zone co-efficient = 0.075
- Structural importance co-efficient = 1.5
- Response modification co-efficient = 8.0
- Site co-efficient for soil characteristics = 2.0
- Seismic dead load = 2500 kN/floor

(b) Calculate the design wind load at each floor level for a five-storied building by using the following data: (18)

- Height of each floor = 3.5 m
- Structural importance co-efficient = 1.5
- Exposure category = B
- Basic wind = 210 km/hr
- Pressure coefficient = 1.5

Table: Gust response factors and combined height and exposure co-efficient

Height above ground level (m)	G_h/G_z	C_z
0-4.5	1.32	0.80
6	1.29	0.87
9	1.26	0.97
12	1.23	1.06
15	1.22	1.13
18	1.20	1.19

The plan of the building is shown in figure below.

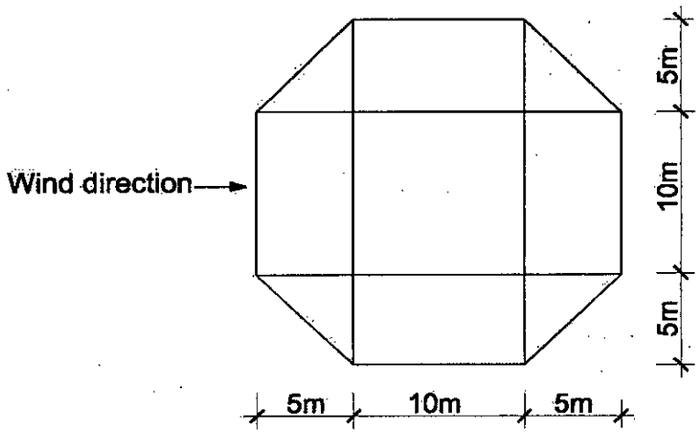
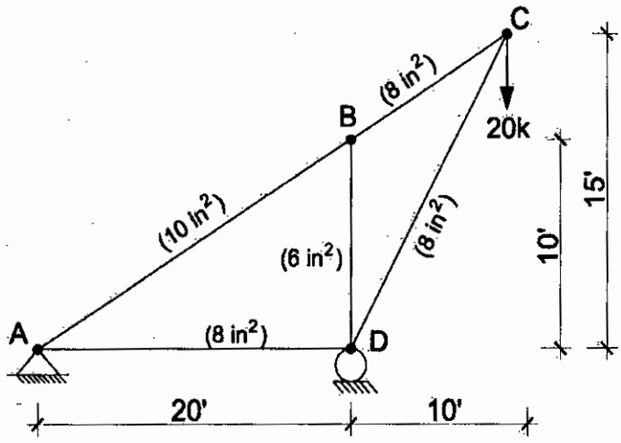


Fig: Plan of the building

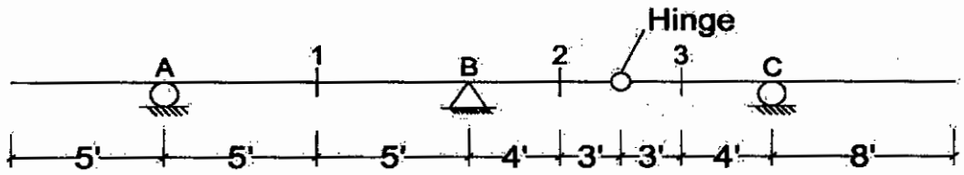
4. (a) Prove that the deflection at a point of a beam $\Delta = \int_0^L \frac{mM}{EI} dx$, by unit load method, where the symbols bear their usual meaning. (12)

(b) Determine the vertical deflection at joint C in the truss shown below. Assume that E = 29000 ksi and the area of each bars is given in parenthesis (in^2). (23)

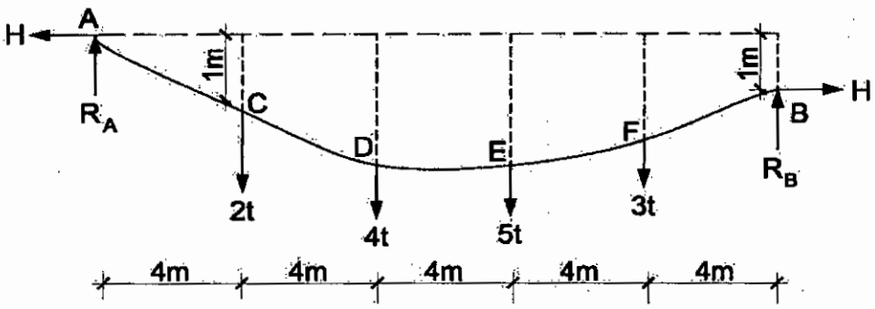


Section – B

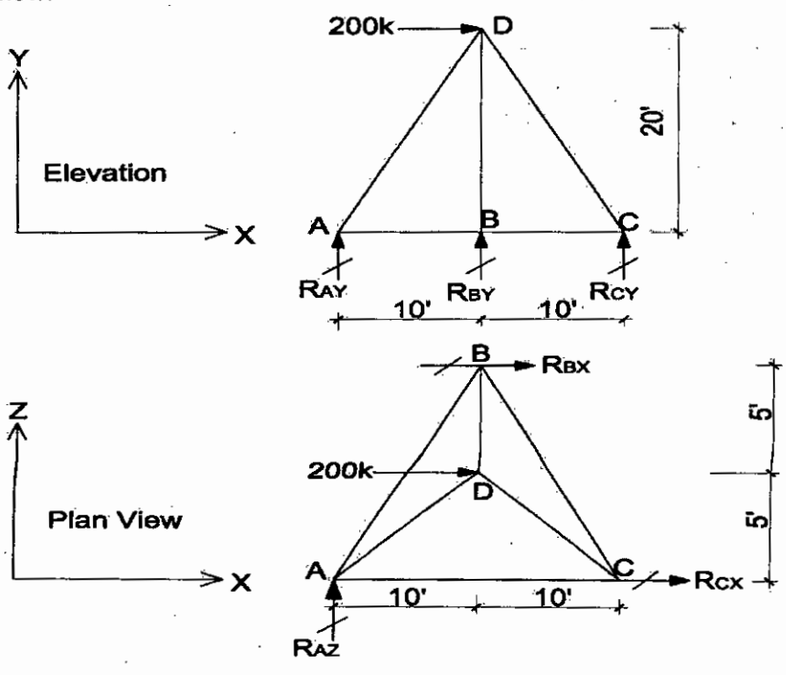
5. (a) Draw the influence lines with ordinate for the following structure. (20)
   (i) Vertical reaction at C and B.
   (ii) Shear at 1, 2, and 3.



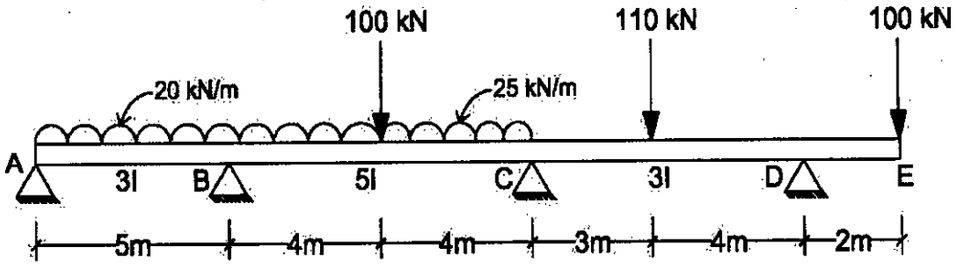
(b) A suspension cable is supported at two points A and B as shown in figure below. Find out the maximum tension in the cable. Find also the length of cable. (15)



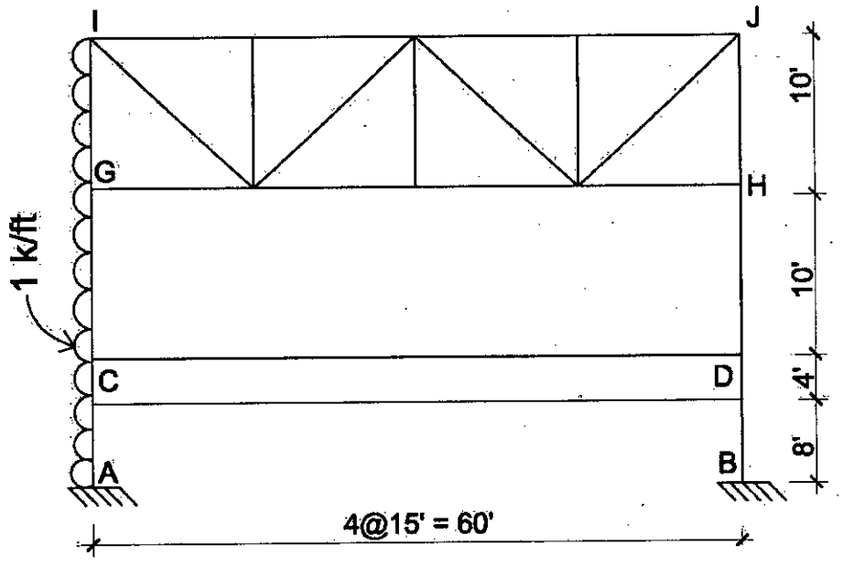
6. (a) Define space truss. What are the methods available for the solution of space truss problems? Find out the reactions and bar forces of the space truss as shown in figure below. (19)



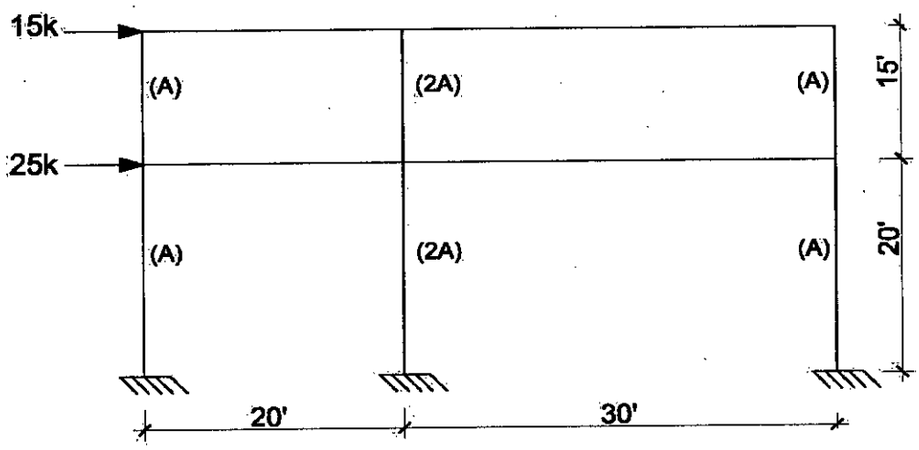
(b) Analyze the continuous beam by applying three - moment equation and draw the shear force and bending moment diagrams. (16)



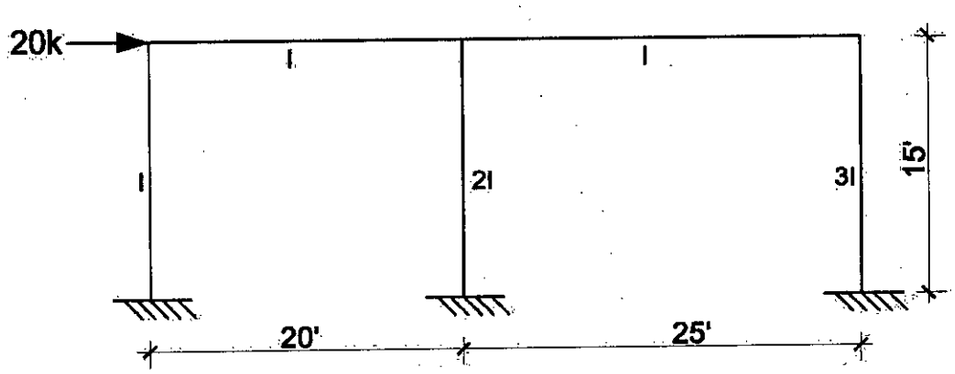
7. (a) Write down the importance of influence line diagrams in building engineering aspects. Draw the shear force and bending moment diagrams of the leg ACGI as shown in figure below. (17)



(b) Analyze the building frame shown in figure below subjected to lateral loads by cantilever method. Area in parenthesis is shown in the figure for each member. (18)



8. Analyze the frame as shown in figure below by factor method and draw the shear force and bending moment diagrams. (35)



Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 3rd Year 1st Term Regular Examination, 2018
CE 3113
(Reinforced Concrete Structures-I)

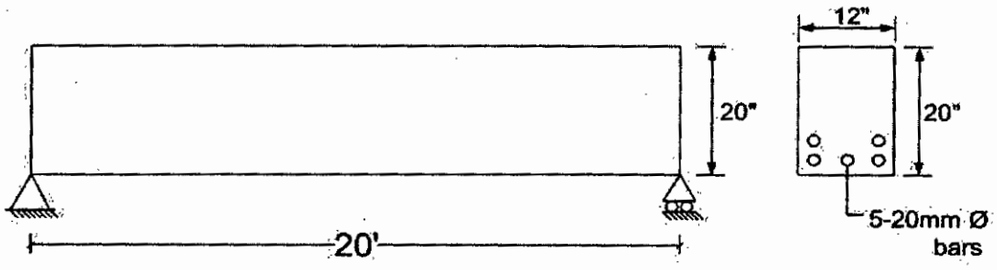
Full Marks: 210 Time: 3 hrs

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 meant by under reinforced, over reinforced and balanced design? What type of design is preferable and why? (10)

   (b) A simply supported beam of 20 ft span length is shown in figure below. Determine the flexural capacity, steel stress and actual concrete size of the beam. (25)



2. (a) Why does the ACI code specify that a certain minimum percentage of reinforcing be used in beam design? (05)

   (b) Explain the purpose of the minimum cover requirements for reinforcing specified by the ACI code. (05)

   (c) A rectangular beam that must carry a service live load of 2.5 kips/ft and a calculated dead load of 1.25 kips/ft on an 22 ft simple span is limited in cross section for architectural reasons to 12 inch width and 22 inch total depth. It is reinforced for compression bars in one row, the center of which is 2.5 inch from upper surface of the beam, and for tension with bars in two rows, the center of the lowers row being 2.5 inch above the lower surface of the beam. If f_y = 60,000 psi and f_c' = 3500 psi, what steel areas must be provided? Design the beam by USD method and show reinforcement details. (25)

3. (a) Explain the fundamental propositions on which the mechanics of reinforced concrete is based. (05)

   (b) What factors affect the selection of the dimensions of T- beam stems? (05)

   (c) A tensile reinforced T- beam is to be designed to carry a uniformly distributed load on a 24 ft simple span. The total ultimate moment at mid-span due to all loads is 6500 kips-inch. Concrete dimensions as governed by web shear and clearance conditions are b = 47 inch, b_w = 11 inch, hf = 3 inch and d = 20 inch. What tensile reinforcement is required at mid-span if f_c' = 3500 psi and f_y = 60,000 psi. Design the beam by USD method and show reinforcement details. (25)

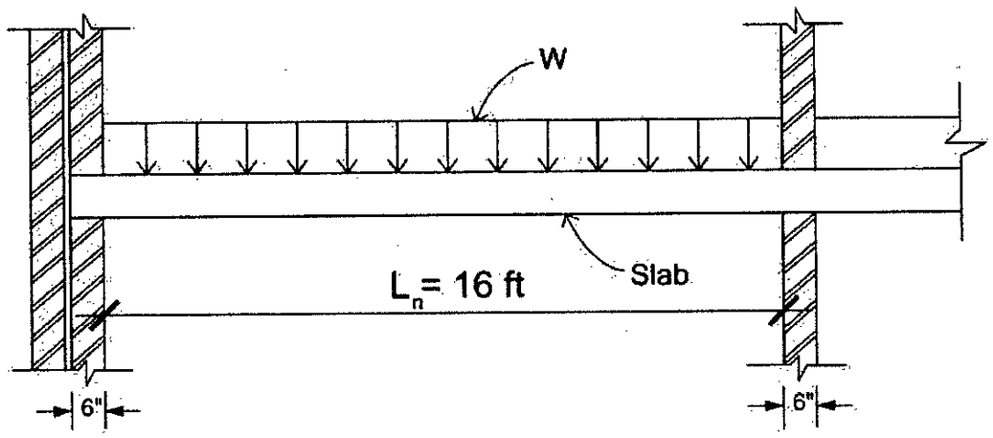
4. (a) Design a lintel over a window 6'-0" wide. The wall is 10 inch thick. The height of the wall above the lintel is 6 ft. If f_c' = 2500 psi and f_s = 24000 psi. (15)

   (b) A rectangular beam must carry a uniformly distributed live load of 600 plf and support the dead load of wall weighing 800 plf, in addition to its own weight on a simple span 20 ft. Design the beam for flexure, using intermediate grade steel at a working stress of 24000 psi and 3000 psi concrete at a working stress of 1350 psi. Design the beam by WSD method and show reinforcement details. (20)

Section – B

5. (a) Describe the importance and ACI code provisions of distribution reinforcement in one-way slab. (08)

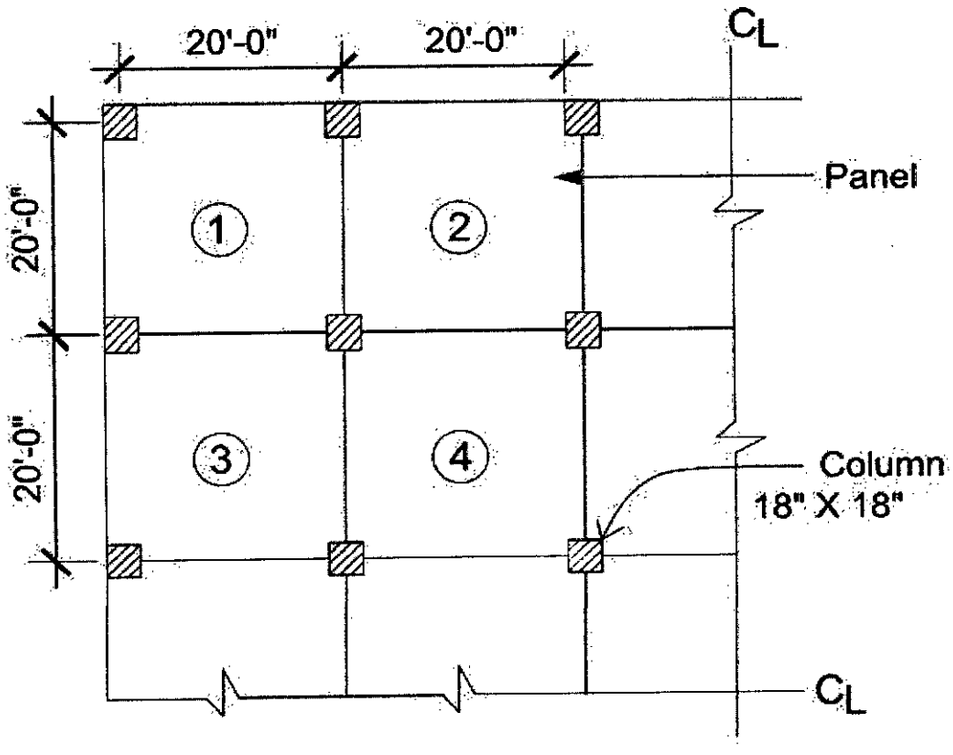
(b) Design the end span of a one-way solid slab which continuous over four spans that is to be used as a suspended floor in a block of the townhouse as shown in figure. The floor is to support a live load of 80 psf and a floor finish of 25 psf in addition to its self weight. The slab is supported by 6 inch wide parallel walls with a clear separation of 16 ft. Use f'_c = 4000 psi and f_y = 60,000 psi, and also the ACI moment co-efficient. Solve it by WSD method and also show the reinforcement detailing in a neat sketch. (27)



6. (a) What is the importance of corner reinforcement in slab? Explain with simple sketch. (07)

(b) Design the panel "**3**" of the two-way slab system shown in figure. The floor consists of six panels in each direction, with a panel size of 20 × 20 ft. All panels are supported on 18 × 18 in. columns, 10 ft long. The slabs are supported by 14" width beams along the column lines. The service live load is to be taken as 120 psf, and the superimposed dead load consists of 25 psf of floor finish in addition to the slab weight. Use normal-weight concrete with f'_c = 4 ksi, f_y = 60 ksi, and USD method. Show the reinforcement detailing of slab in a neat sketch. (28)

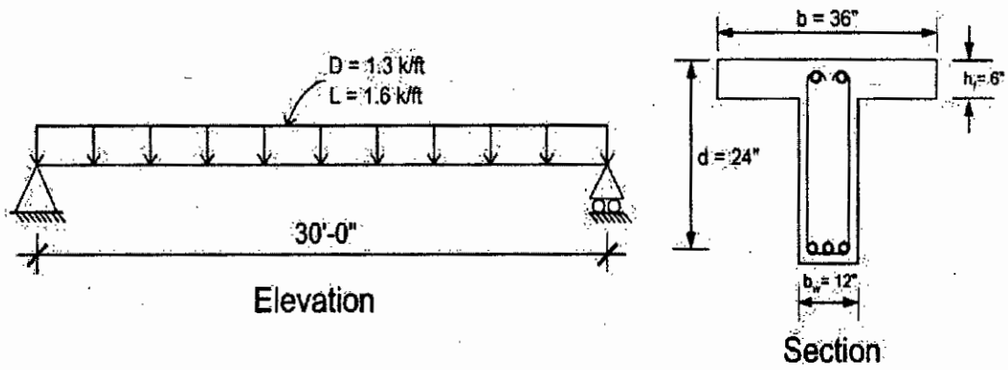
Ca (-ve) = Cb (-ve) = 0.05, *Ca (+ve) DL = Cb (+ve) DL* = 0.027
Ca (+ve) LL = Cb (+ve) LL = 0.032



7. (a) Define diagonal tension. Describe the different diagonal tension cracking in a reinforced concrete beam. (06)

(b) Which region of the beam is required by web reinforcement to prevent shear failure? Explain briefly. (04)

(c) Figure shows the cross section of a simply supported T-beam. This beam supports a uniformly distributed service (unfactored) dead load of 1.3 kips/ft, including its own weight, and a uniformly distributed service live load of 1.6 kips/ft. Design vertical stirrups for this beam. The concrete is normal weight with a strength of 4000 psi, the yield strength of flexural reinforcement is 60,000 psi, and that of the stirrups is 40,000 psi. It is assumed that the longitudinal bars are properly detailed to prevent anchorage and flexural failures. (25)



8. (a) Show dimensional details of hooks used for main reinforcement and stirrups according to ACI code. (08)

(b) Show the cut off and bend points for rebars in approximately equal spans with uniformly distributed loads according to ACI code. (07)

(c) The required reinforcing steel area for the lightweight concrete cantilever beam is 2.88 in^2. The cross-section of the beam is shown in figure below. The #8 top bars shown in figure are uncoated. Compute development lengths if f'_c = 3500 psi and f_{yt} = 60,000 psi. Clear spacing between bars is equal to one inch. Given values are α =1.3, β = 1.0, Υ =1.0, λ = 0.75. (20)

(i) Using the full ACI Equation with the calculated value of K_{tr}.
(ii) Using ACI Equation with K_{tr} = 0.