

CT-1 on CE 341

(Environmental Engineering-I)

Full Marks: 20 Times: 20 Minutes

- | | | |
|-----|---|-------|
| Q.1 | Define Environmental Engineering. Explain the interrelationship between water, sanitation and health. | 02+04 |
| Q.2 | Describe the detail diagram of disease transmission and sanitation. | 10 |
| Q.3 | What are main difference between an environmental engineer and a doctor. → Ahsan vi chotha | 04 |

for resettlement of sands. Determine number, size of units and capacity of wash water tank.

Class Test on CE 3141

1. Discuss the activities involved in maintenance of water distribution of system. 10
2. Write down the factors that to be considered for designing a distribution system. 4
3. Write down the analysis of loop network by section method. 6

for resettlement of sands. Determine number, size of units and capacity of wash water tank.

Environmental Engineering – I

Mark: 20

Time: 20 mins

CT-2

- Q1. Describe the theory of filtration through sand-bed. 10
- Q2. Design a rapid sand filter unit for 6 mgd capacity with rate of filtration of 2 gpm/ft^2 , rate of washing of 15 gpm/ft^2 and length of filter run of 24 hrs including 5 min for washing the filter bed and 10 min for resettlement of sands. Determine number, size of units and capacity of wash water tank. 10

CT-1 on CE 341

(Environmental Engineering-I)

Full Marks: 20 Times: 20 Minutes

- | | | |
|-----|---|-------|
| Q.1 | Define Environmental Engineering. How can we improve public health? | 02+04 |
| Q.2 | Describe the detail diagram of disease transmission and sanitation. | 10 |
| Q.3 | Write the transmission and control of water related diseases. | 04 |

Marks: 20

Class Test on CE 3141

- Briefly describe the general classes of municipal consumption of water.
2. Enumerate the methods of population forecasts.
3. The census records of a city show population as follows

Present	Before one decade	Before two decades	Before three decades
120000	110000	90000	75000

Work out the probable population after one, two and three decades using geometric increase method

(Environmental Engineering-I)

Full Marks: 20 Times: 20 Minutes

- Q.1 What is fire hydrant? Explain briefly with neat sketch.
- Q.2 Describe logistic Curve Method.
- Q.3 The population of a community in 1950, 1960, 1970, 1980 and 1990 was 200, 230, 280, 350 and 450 respectively. Estimate the population of the community in the year of 2000 and 2010.

02+042

10

04 C

Full
marks
20

Class Test on CE 3141
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time
20 min

1. Describe different types of sanitation systems? (8)
2. Briefly discuss the elements of water supply system. (8)
3. What are the planning and design considerations of water supply system (4)

Full
marks
20

Class Test on CE 3141
Department of Civil Engineering
Rajshahi University of Engineering & Technology

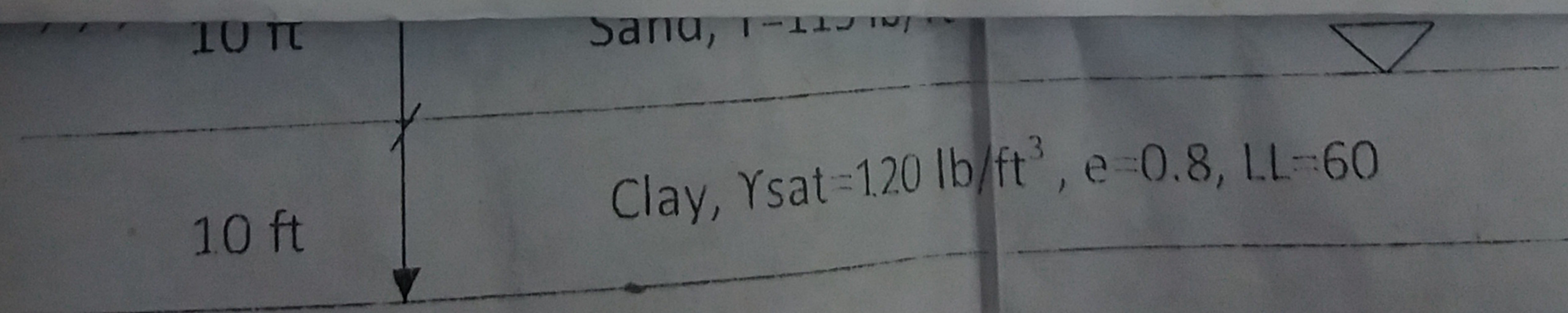
Time
20 min

1. What are the requirements of potable water? (5)
2. Briefly discuss the source and impacts of this items in water (15)
i) Colour ii) Turbidity iii) Suspended solids

Class Test-2, CE-3131

Time: 15mins

- Q1. Define Stress Paths. How will you calculate the c' and ϕ' using stress path method (use figures). 8
- Q2. How Skempton's pore water pressure co-efficients are used in Geotechnology? 5
- Q3. How you obtain the shear strength parameters using the unconfined compression test.(use figure)? 7



Time 15mins

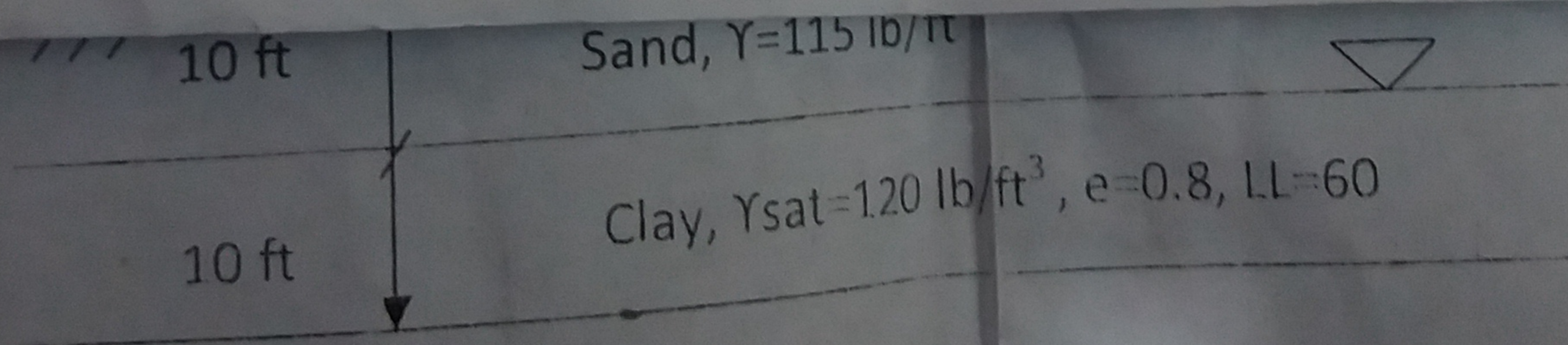
Class Test - 01

CE-3131

Marks 20

Q.1. For a given soil, show that, $\gamma_d = \frac{eS\gamma_w}{(1+e)w}$

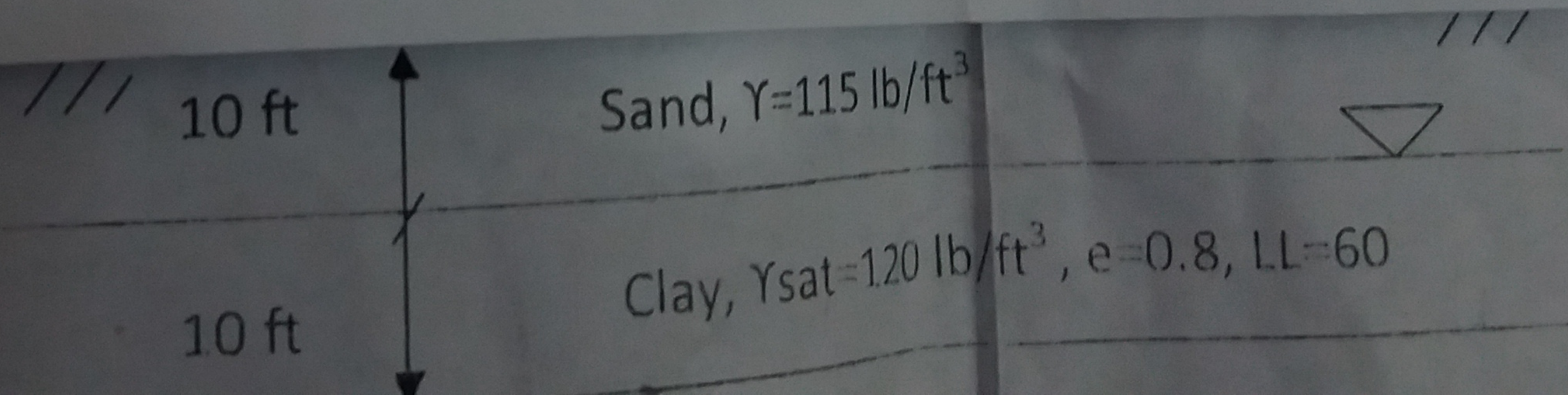
Q.2. A soil sample in its natural state has a weight of 5.05 lb and a volume of 0.041 ft³. In an oven-dried state, the dry weight of the sample is 4.49 lb. The specific gravity of the solids is 2.68. Determine the total unit weight, water content, void ratio, porosity, and degree of saturation.



Class Test on CE3131
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Total Marks 20 (7+8+5)

- Q.1. Briefly explain the different types of settlement and also write the causes of settlement.
- Q.2. Derive the equation of primary consolidation settlement for normally consolidated soil.
- Q.3. Draw the qualitative diagrams of e - $\log p$ curve and also write the uses of it.

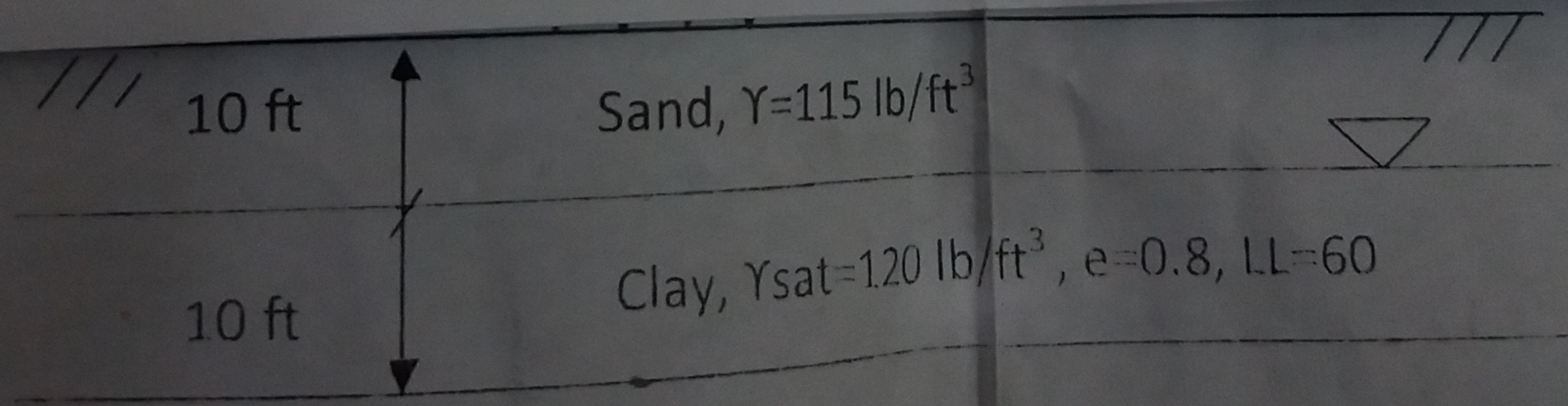


Class Test on CE331
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time: 20 M

Full Marks 20 (10+5+5)

- Q.1. Define compaction and explain the principle of compaction.
- Q.2. Mention some work sites where the compaction is needed.
- Q.3. Draw the qualitative diagrams of standard and modified Proctor test results on a single sheet.
1.42mm. Determine the suitability number. What would be its rating as a backfill material?



Class Test on CE331
Department of Civil Engineering
Rajshahi University of Engineering & Technology

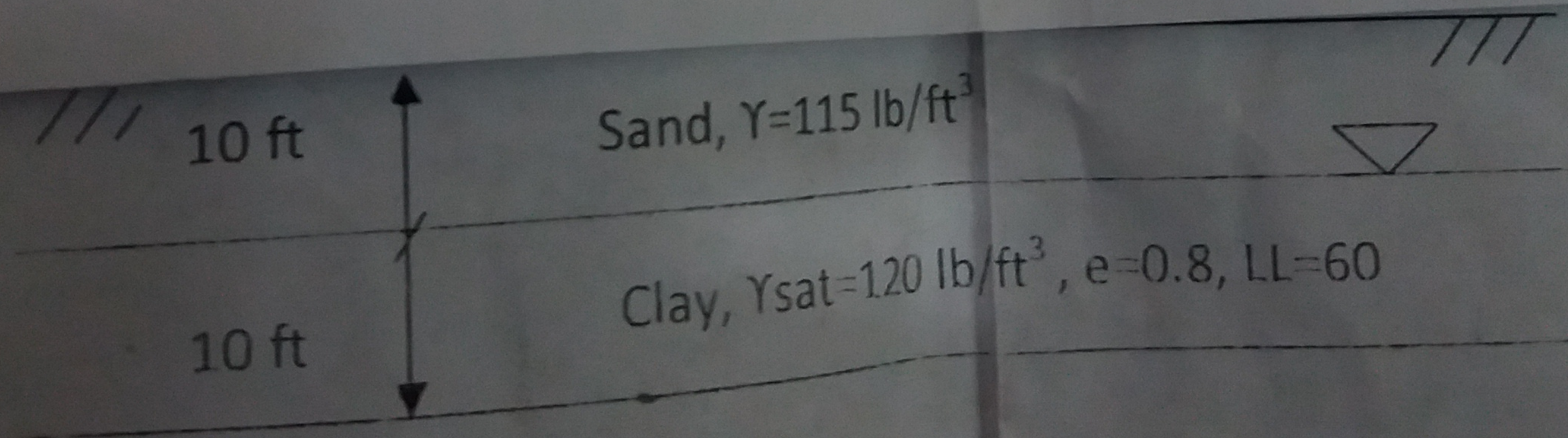
Time: 20 Min

Full Marks 20 (7+5+8)

Q.1. Explain the principle of compaction.

Q.2. Mention some work sites where the compaction is needed.

Q.3. Following are the details for the backfill material used in a vibroflotation project: D_{10} is 0.36mm, D_{20} is 0.52mm and D_{50} is 1.42mm. Determine the suitability number. What would be its rating as a backfill material?



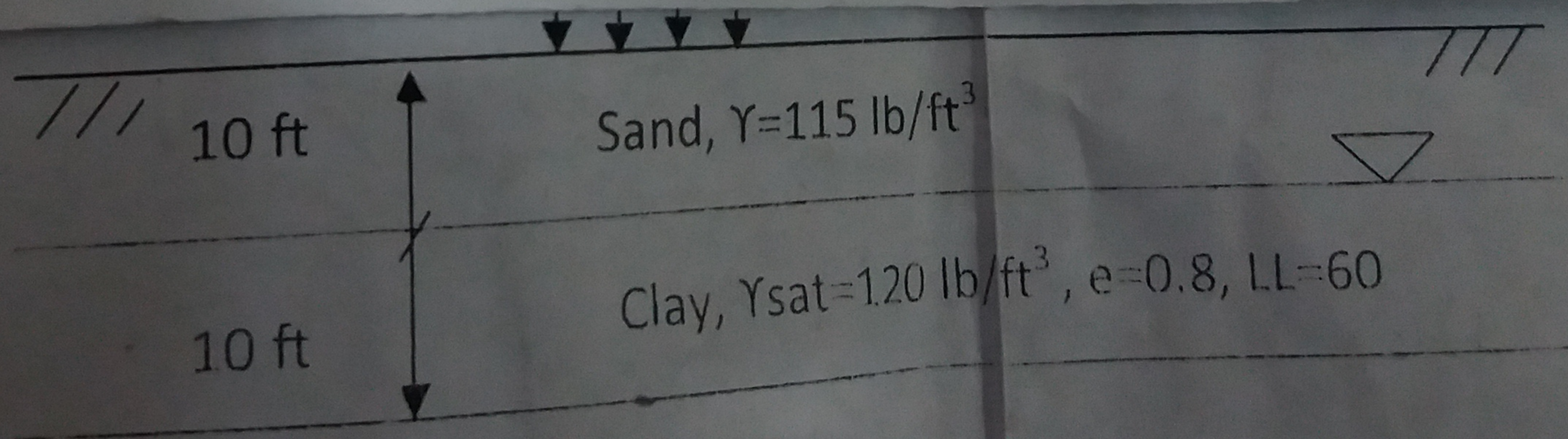
Class Test on CE331
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time: 20 Min

Full Marks 20

- Q.1. Briefly explains the Mechanical Weathering process of soil formation.
Q.2. What do you mean by "Diffuse double layer" of clay soil? Explain.
Q.3. Define silica sheet and gibbsite sheet and write short note on Illite.

... the major principal stress would have been if (a) $\phi = 30^\circ$ and (b) $\phi = 0^\circ$.

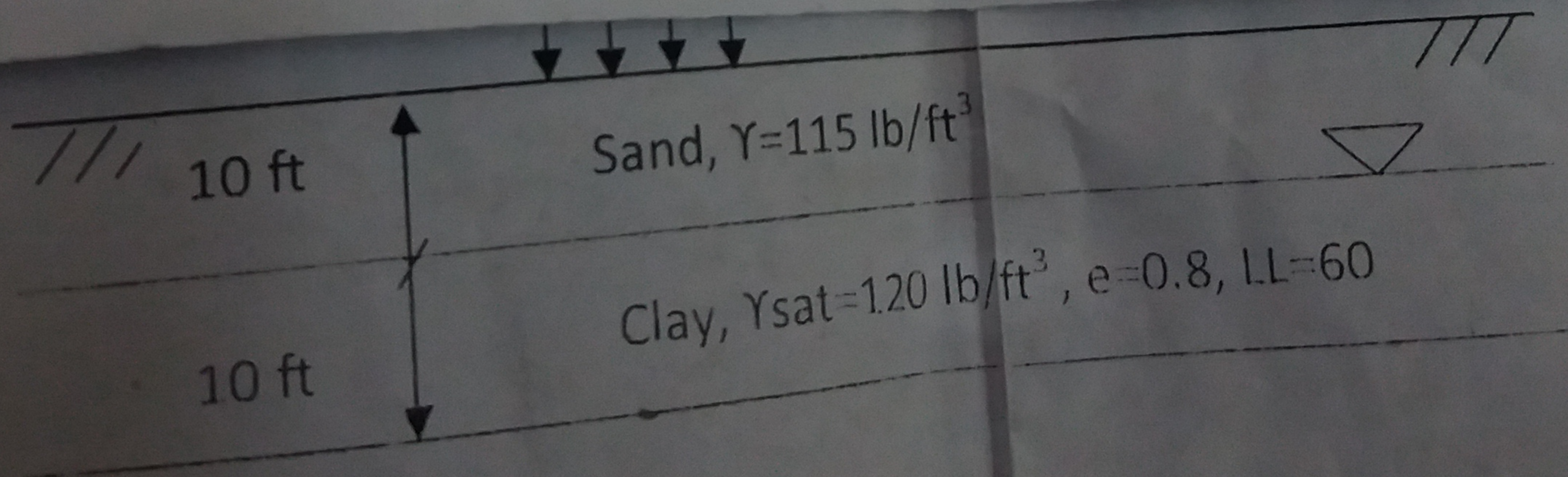


Class Test

CE-331

Time: 10 mins

Q. A particular soil failed under a major principal stress of 300 kN/m^2 with a corresponding minor principal stress of 100 kN/m^2 . If, for the same soil, the minor principal stress had been 200 kN/m^2 , determine what the major principal stress would have been if (a) $\phi = 30^\circ$ and (b) $\phi = 0^\circ$.



quiz

Full Marks 30

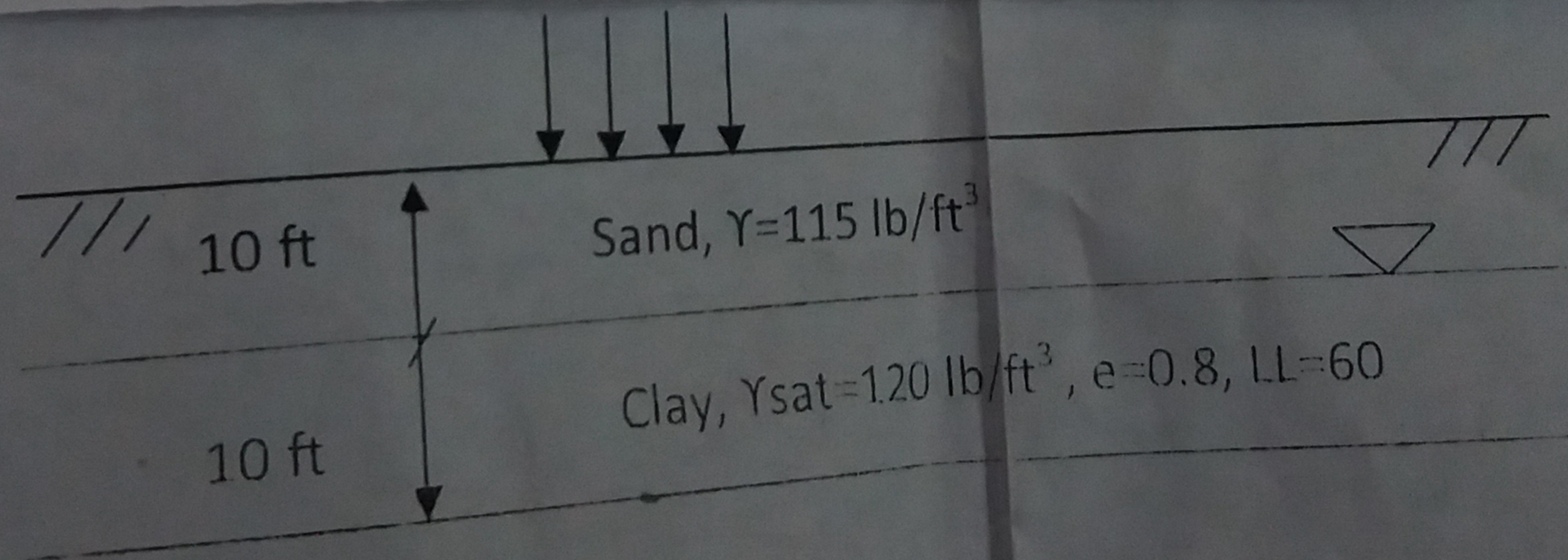
- Q.1. Draw the qualitative diagram of flow line of a soil and determine the liquid limit from it.
- Q.2. Define grain size distribution curve and draw the qualitative diagram of it. Also write the uses of it.
- Q.3. Defines optimum moisture content. Draw the qualitative diagram of standard proctor test and modified proctor test results on a single plot.

Quiz on CE3132

Department of Civil Engineering

Rajshahi University of Engineering & Technology

Time: 20

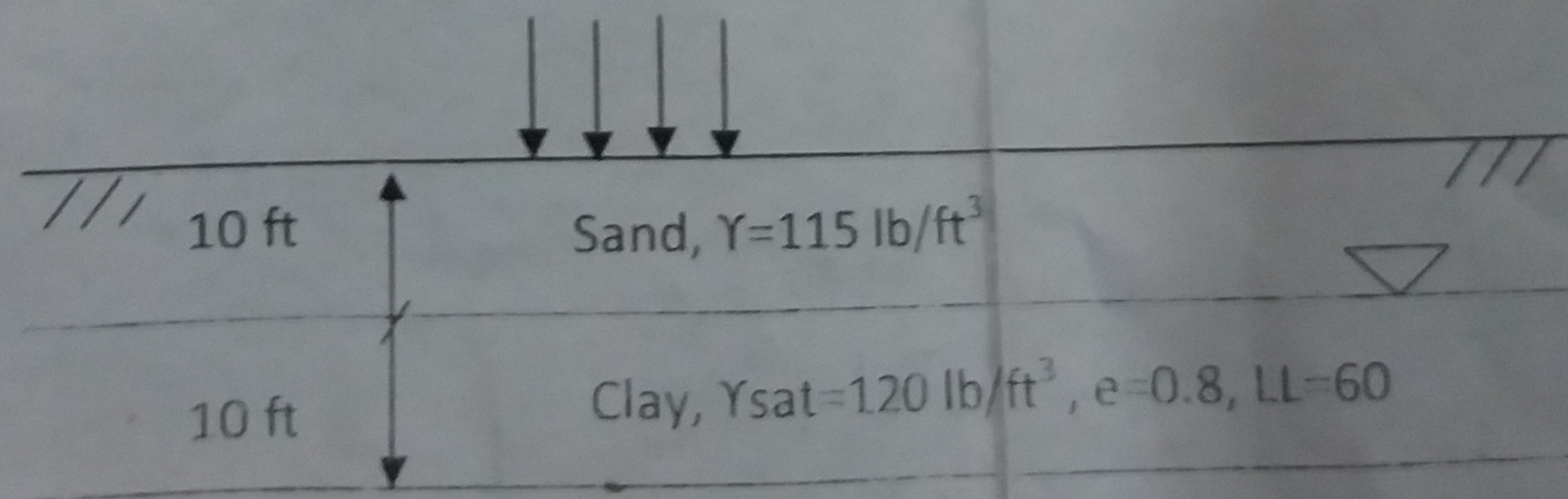


Class Test on CE3131
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time: 20 Mins

Full Marks 20

- Q.1. Define e -log P curve. How can you find preconsolidation pressure from it? Explain.
- Q.2. The soil strata shown in shown figure below. Calculate the settlement at clay layer. Given: stress increase is 1000 lb/ft^2 and preconsolidation pressure is 1500 lb/ft^2 .

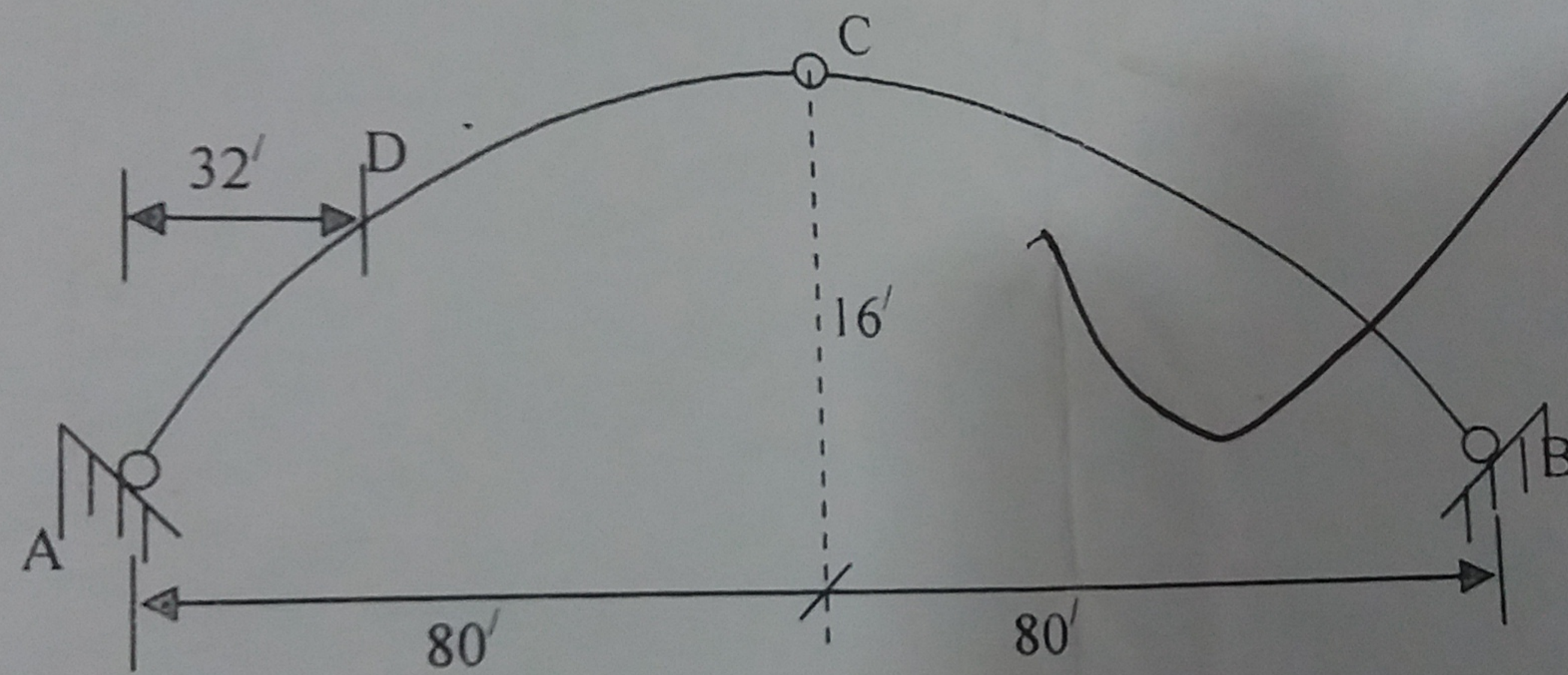


Time : 20 min

Class Test on CE-3111

Full marks: 20

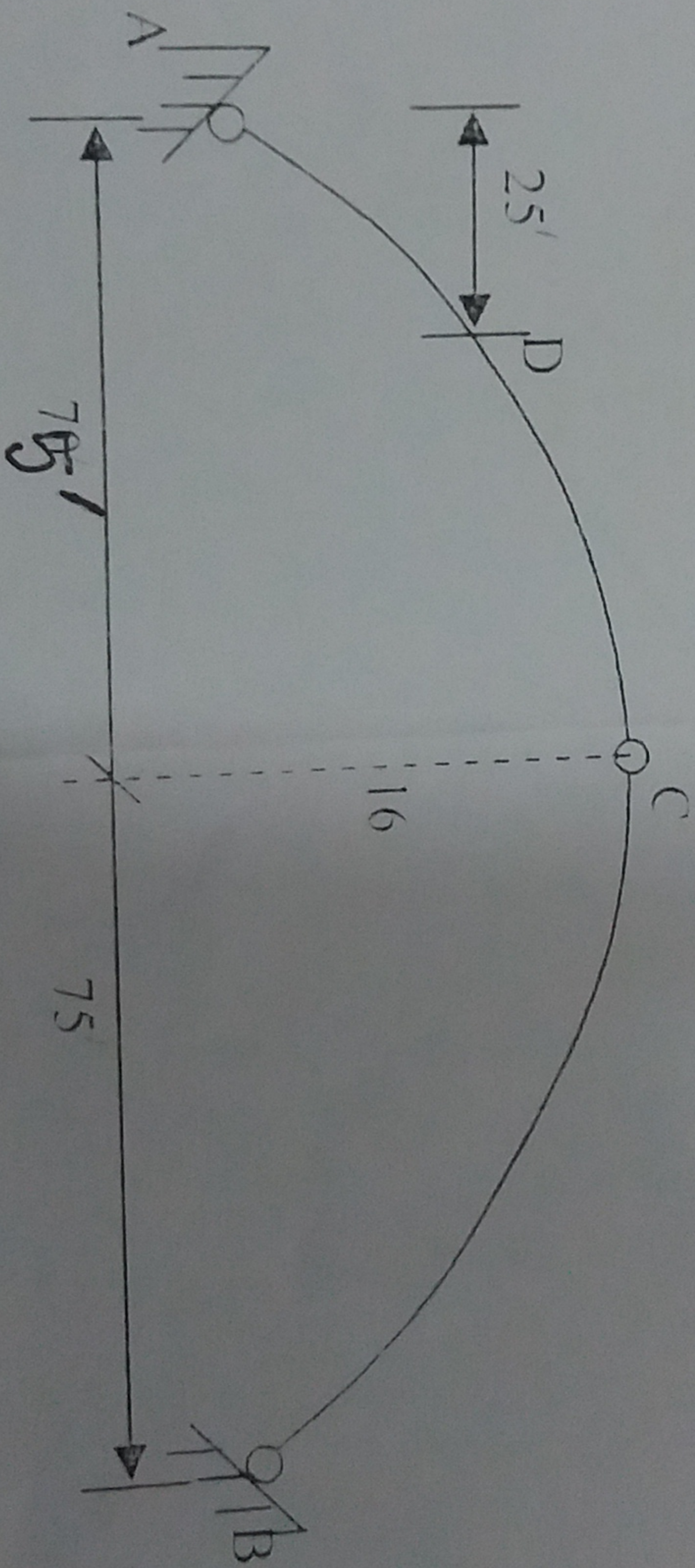
Q. 1. Draw influence lines for bending moment, shear force, and normal thrust at a section D of the following three hinged parabolic arch. Also obtain the maximum moment at section D for both H_{15} loading on whole arch and uniformly distributed load of $5k/ft$ at right side of arch from C to B.



$12 @ 25' = 300'$

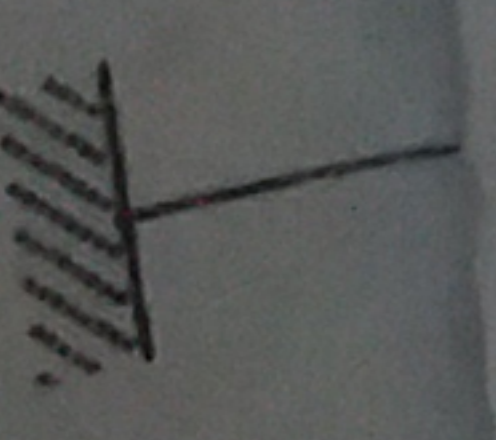
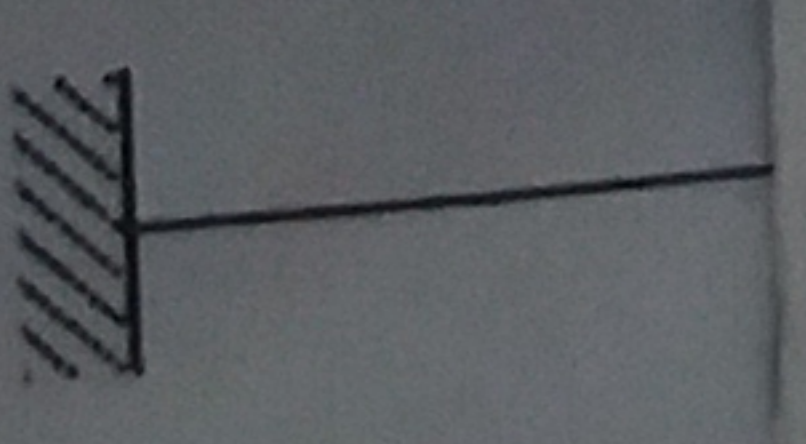
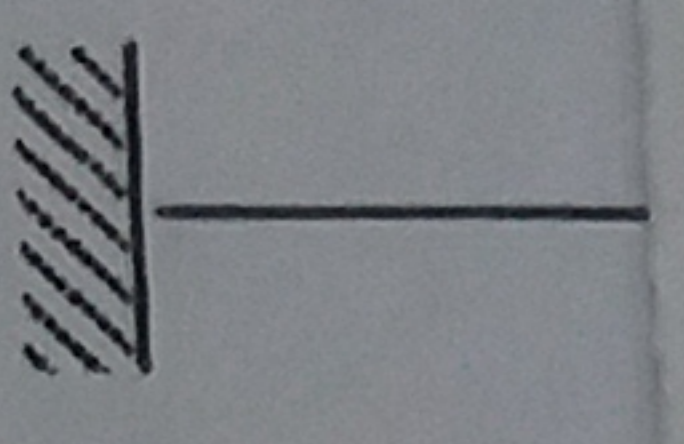
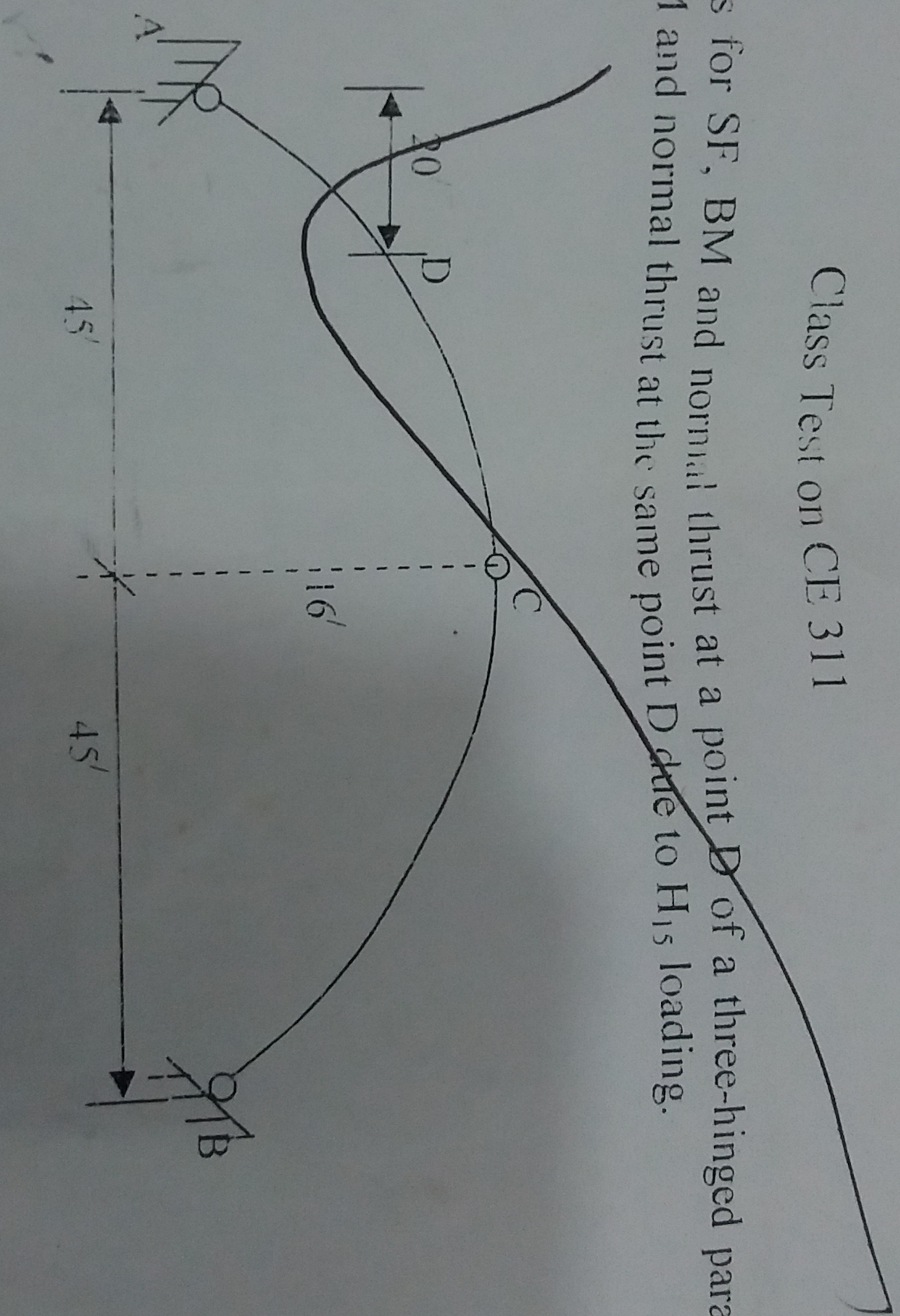
Class test on: CE 3111

- Q.1 Define arches. Mention advantages and disadvantages of arches. 03.00
- Q.2 Draw influence lines for bending moment, shear force, and normal thrust at a section D of the following three hinged parabolic arch. Also obtain the maximum moment at section D for H_{15} loading. 17.00



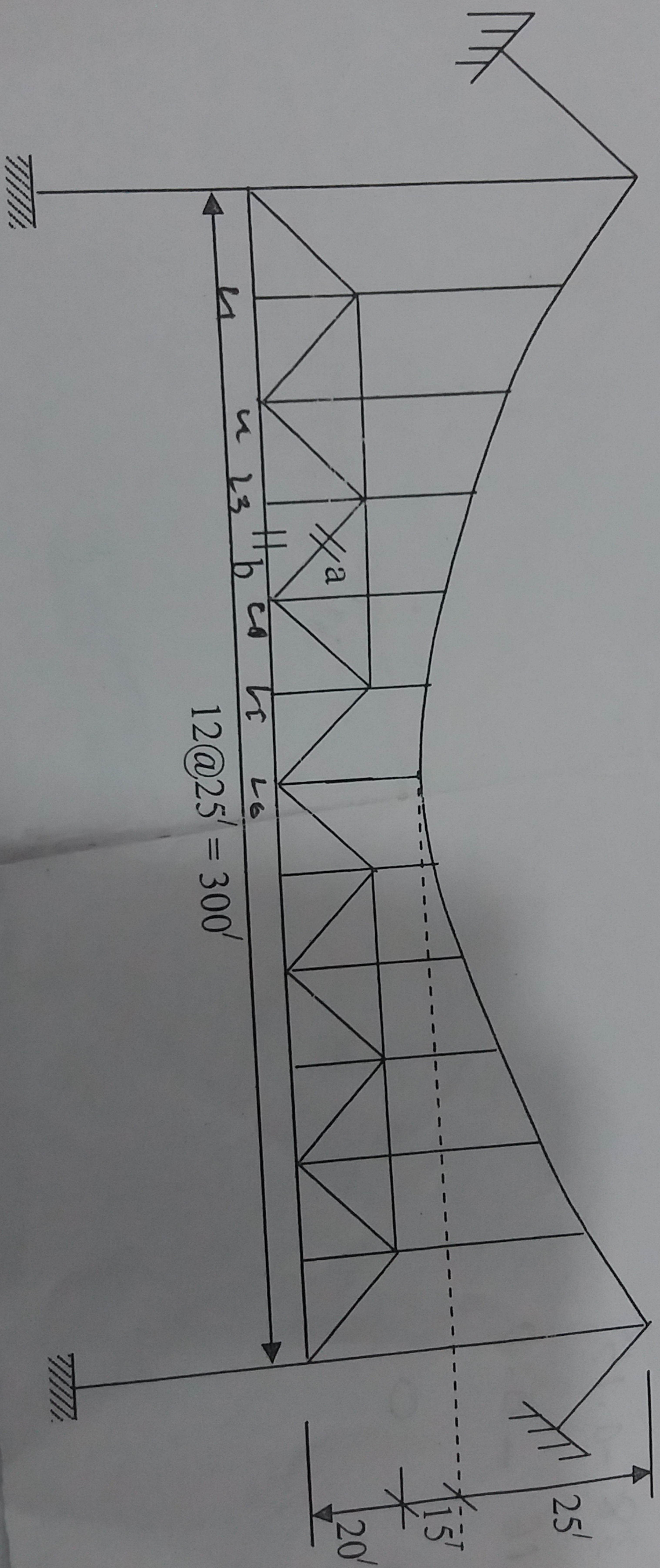
Class Test on CE 311

Q.1 Draw influence lines for SF, BM and normal thrust at a point D of a three-hinged parabolic arch. Compute the SF, BM and normal thrust at the same point D due to H_{15} loading.



Class Test on CE 3111

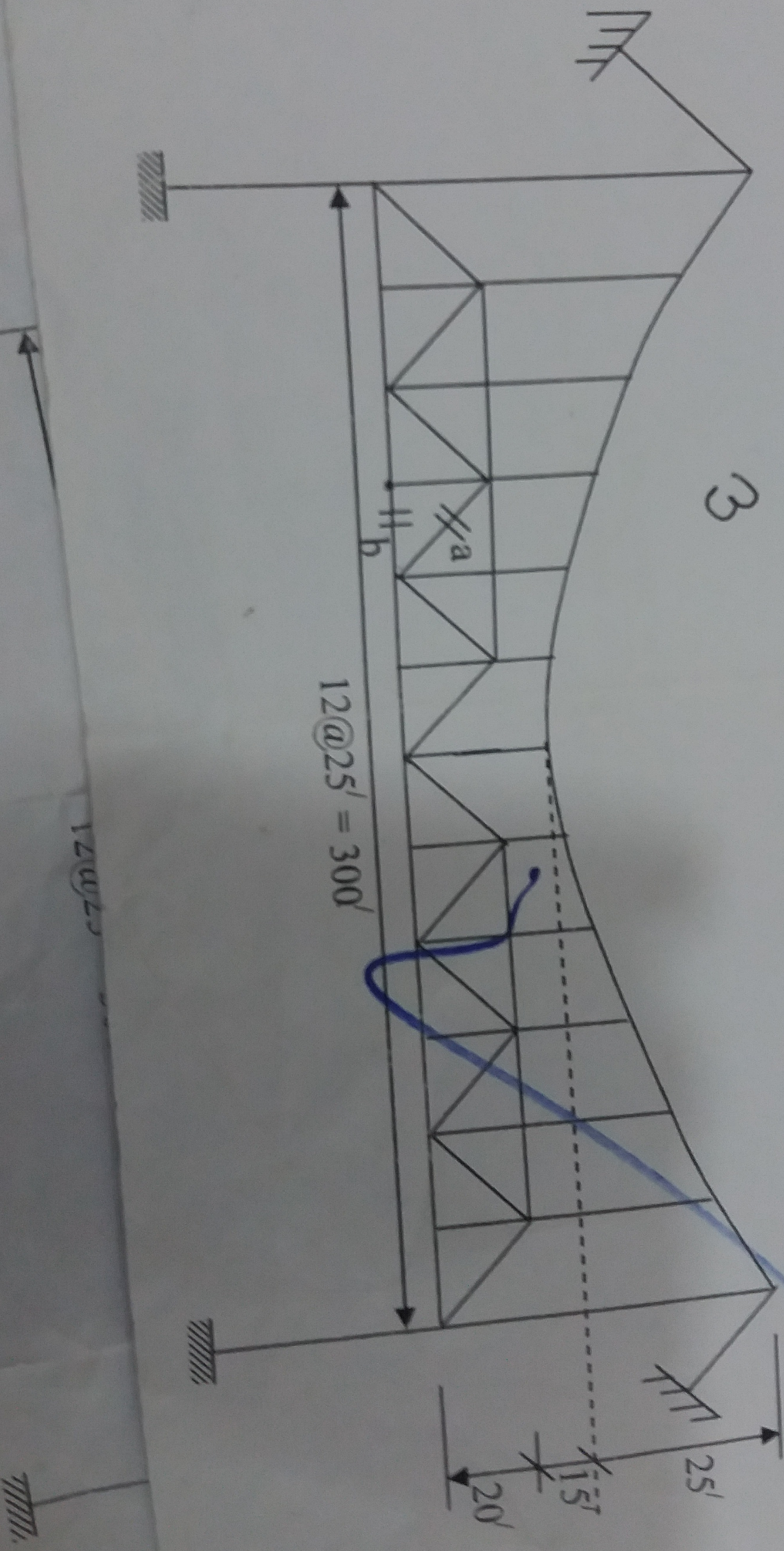
Q.1 Draw the influence lines for hanger tension, maximum cable tension and stress in the member 'a' & 'b' of the suspension bridge shown in figure below. Calculate the maximum stress of the same member due to a uniform load of 2 k/ft with a concentrated load of 15 k.



Class Test on CE 311

Q.1 Draw the influence lines for hanger tension, maximum cable tension and stress in the member 'a' & 'b' of the suspension bridge shown in figure below. Calculate the maximum stress of the same member due to a uniform load of 8 k/ft with a concentrated load of 20 k.

3

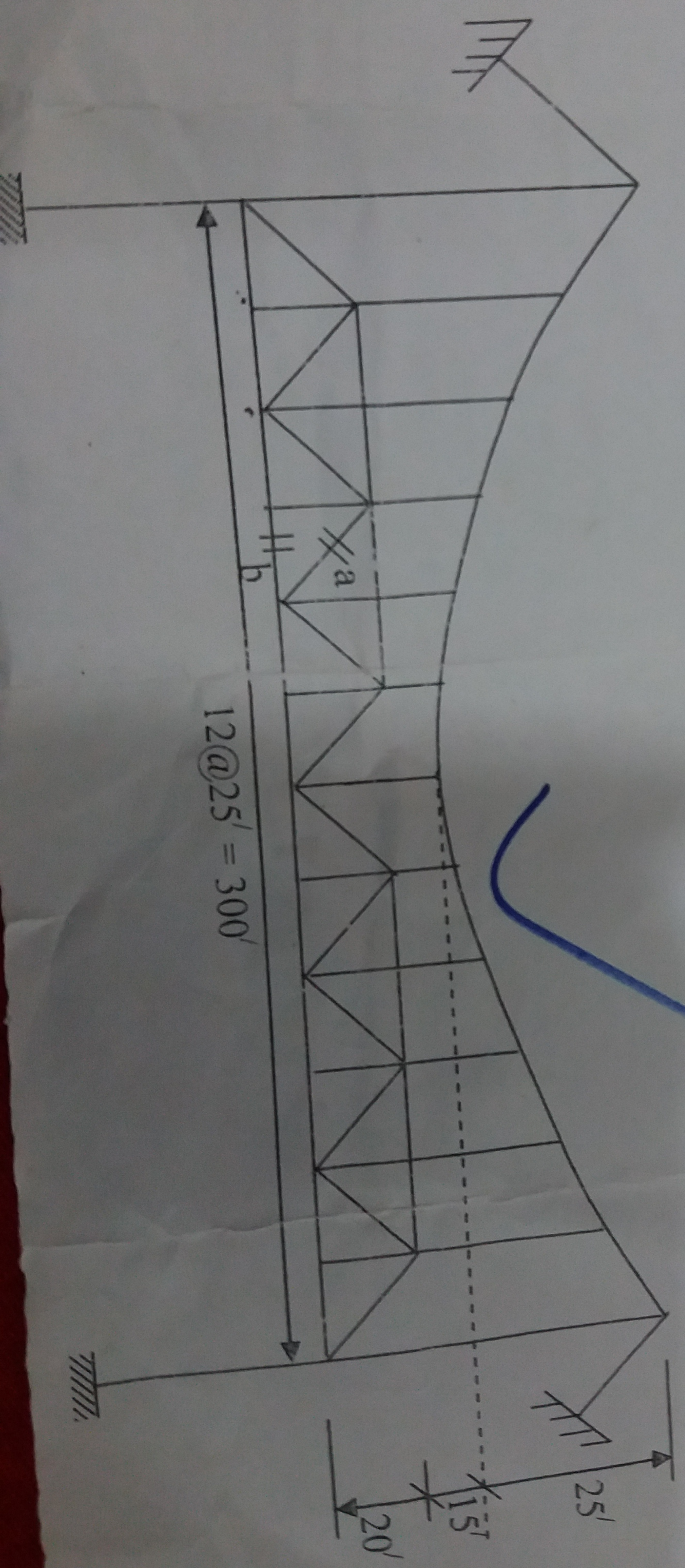


Full Marks: 20

Class Test On -3111

Time: 20 min

Q.1 Draw the influence lines for hanger tension, maximum cable tension and stress in the member 'a' & 'b' of the suspension bridge shown in figure below. Calculate the maximum stress of the same member due to a uniform load of 3 k/ft with a concentrated load of 20 k.



Class test on CE 3121, Full marks: 20 and Time: 30 mins.

Q.1(a) Show that the tractive force ratio is a function of the angle of the sloping surface and the angle of repose of the channel materials. (b) A trapezoidal channel with $b=20\text{ft}$, $z=2$, $S=0.0016$ and $n=0.025$ carries a discharge of 300 cfs. Find the section dimension

Q.2.(a) Show that for most efficient trapezoidal section the half of top width of water surface is the length of the sloping surface. (b) An irrigation channel of trapezoidal section having side slopes of 3 horizontal to 2 vertical is to carry a flow of 20 cumecs on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction co-efficient in Manning's formula is $n=0.012$. Design most economical channel section.

varied now, where γ is

CT-01

Time-20 minutes

CE 3121

- Q.01 Write short notes on i) Backwater curve and ii) Drawdown curve. 04
- Q.02 Sketch the possible flow profile for the following and mention the type of flow- 06
- i) Flow from reservoir into mild slope channel.
 - ii) Flow from reservoir into steep slope channel.
- Q.03 Water is flowing under the sluice gate in a horizontal rectangular channel that is 6 ft wide. The depth y_0 and y_1 are 65 ft and 1 ft respectively. What will be the horse power lost in the hydraulic jump? Assume energy loss is negligible. 10

$Q = BD$
 $bq = Q$

varied flow, where symbols

Class test on CE 321, Full marks: 20 and Time: 30 mins.

Q.1(a) Explain why a uniform flow cannot occur i) in a frictionless channel and ii) in a horizontal channel? **(b)** A trapezoidal channel with $b=20\text{ft}$, $z=2$, $S=0.0016$ and $n=0.025$ carries a discharge of 300 cfs. Compute the normal depth and velocity. 10

Q.2.(a) Write four conditions for most economical trapezoidal section. **(b)** An irrigation channel of trapezoidal section having side slopes of 3 horizontal to 2 vertical is to carry a flow of 10 cumecs on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction co-efficient in Manning's formula is $n=0.012$. Find the dimension of the most economic section of the channel. 10

The speed of the pump is 1 r.p.s and delivers 16.5 l/sec of water against a suction head of 5 m and a delivery head of 20 m, find the Q_{th} , C_d , S , % of S and the power required to drive the pump in HP, where symbols carry the usual meaning.

varied flow, where symbols

CT-03

Time-20 minutes

CE 3121

- Q.01 A metal plate of 10 mm thickness and 200 mm square is hung so that it can swing freely about the upper horizontal edge. A horizontal jet of water of 20 mm diameter impinges with its axis perpendicular and 50 mm below the edge of the hinge, and keeps it steadily inclined at 30° to the vertical. Find the velocity of jet if the specific weight of the metal is 75.54 KN/m^3 10
- Q.02 A single acting reciprocating pump has a plunger of diameter 25 cm and stroke of 35cm. If the speed of the pump is 1 r.p.s and delivers 16.5 l/sec of water against a suction head of 5 m and a delivery head of 20 m, find the Q_{th} , C_d , S , % of S and the power required to drive the pump in HP, where symbols carry the usual meaning. 10

varied flow, where symbols have their usual meaning.

CT-01

Time-20 minutes

CE 321

- Q.01 Write short notes on i) Backwater curve and ii) Drawdown curve. 04
- Q.02 Sketch the possible flow profile for the following and mention the type of flow- 06
- i) Flow from reservoir into mild slope channel.
 - ii) Flow from reservoir into steep slope channel.
- Q.03 Define gradually varied flow. Derive the governing equation of the gradually varied flow, where symbols indicate the usual meaning. 10

CT-03

Time-20 minutes

CE 321

Q.01 Determine the number of impellers required for a multistage pump to lift 84000 08 liters/hour against a total head of 289 m, at a speed of 8500 r.p.m. The specific speed is not to exceed 1500.

Q.02 Find the power required to drive a centrifugal pump which delivers 80 litres of 12 water per second to a height of 40 m through a 200 mm diameter and 150 m long pipeline. The overall efficiency of pump is 80% and Darcy's $f = 0.05$ for the pipeline. Assume inlet losses in suction pipe equal to 0.39 m

Class test on CE 321 Full marks: 20 Time: 30 min.

Q.1(a) What do you know about critical tractive force? Draw the diagram for the distribution of tractive force in trapezoidal channel section. (b) Design most economical trapezoidal section of a canal to carry a discharge of $35 \text{ m}^3/\text{s}$ on a slope of 1 in 5000. Assume side slope to be 2H:1V and $n=0.013$. 10

Q.2. Compute the discharge in an overflowed highway gutter having a depth of flow of 3in. and a longitudinal slope of 0.03. The gutter is made of concrete with $n=0.017$ and has a triangular section with a vertical curbside, a sloped side of $z=12$ and a top width of $T=2\text{ft}$. The overflowed soil aggregate pavement has a cross slope of $z_1=24$ and $n_1=0.020$. 10

- iv) Steep-Mild-Mild
- v) Mild-Critical-Steep

CT-01

Ass test on CE 321 Full marks: 20 Time: 30 min.

Q.1(a) Draw and discuss Pressure Distribution Diagram in a channel section. (b) The velocity distribution in a wide rectangular channel may be approximated by the equation $u=0.4+0.6y/h$ m/s. Find U , α and β If $h=1$ m 10

Q.2(a). Prove that At critical state of flow, Froude's number is equal to unity.(b). Derive a relationship between the initial depth and sequent depth of a hydraulic jump on a horizontal floor in a rectangular channel. 10

- iv) ~~Mild-Critical-Steep~~ Steep-Mild-Milder
- v) Mild-Critical-Steep

72-8

4-0

8-7g

12-3.5g

10-5.1g

30-41.5g

50-39g

70-40g

100-13

200-

CT-01

Time-20 minutes

CE 3121

Q.01 Sketch the possible flow profile in the following serial arrangement of Channels. 5*4
The flow is from left to right. Also mention the type of flow-

- i) Reservoir-Mild
- ii) Reservoir-steep
- iii) Mild-Milder-Steep
- iv) Steep-Mild-Milder
- v) Mild-Critical-Steep

0 mins.

Class Test on CE 3121

Marks: 20

Define different types of efficiencies in a centrifugal pump.

05

A centrifugal pump operates against a manometric head of 30 m with a manometric efficiency of 75%. The pressure rise through the impeller is 65% of the total head developed by the pump. The radial velocity of flow which is constant is 3 m/s. The outer diameter of the impeller is 400 mm and the width at outlet is 15 mm. The blades at inlet are curved backwards at 60° to the wheel tangent. Calculate i) the discharge in litres per minute ii) speed iii) blade angle at outlet iv) diameter of the impeller at inlet.

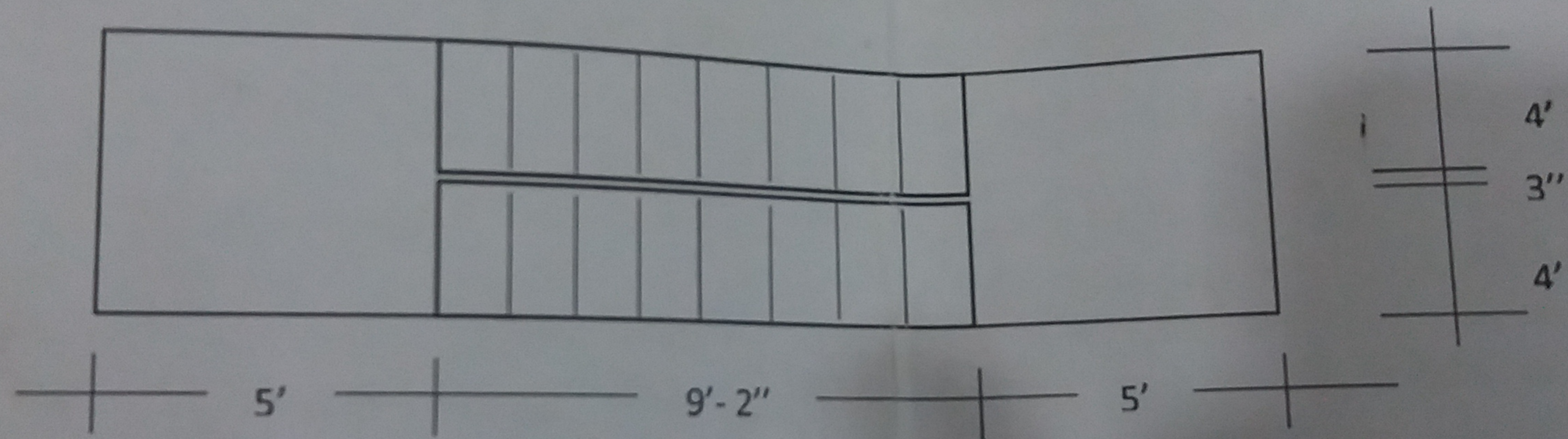
15

Full Marks: 20

Class Test On CE 3115

Time: 30 min

Q. Design the staircase shown in the figure below with the given data $f_c' = 3000$ psi, $f_y = 50000$ psi live load 80 psf, riser = 6 inch & thread = 10 inch.



Heaven's Light
Department of Civil Engineering
Rajshahi University of Engineering & Technology

CLASS TEST

Time : 20 mins

- Test on CE 3115
1. What is web reinforcement? Why is it used? What are its advantages?
 2. A simply supported RC beam with $b = 14$ in. and $d = 20$ in. is subjected to a uniformly distributed load of 1.5 k/ft on a 30 ft. simple span. Assume concrete strength is 4000 psi and steel yield strength is 60 ksi and that of stirrup is 40 ksi. Design the beam for shear.

Time: 25min

The beam is supported by two supports and consists of two equal spans, each with a clear span of 15 ft. Design the beam for shear. Assume concrete strength is 4000 psi and steel yield stress equal to 60000 psi. Design the beam for shear.

Heaven's Light is Our Guide
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time : 20 mins

CLASS TEST on CE 3115

Full Marks : 20

1. What is web reinforcement? Why is it used? What are the possible configurations of web reinforcement?
2. A simply supported RC beam with $b = 11$ in. and $d = 22$ in. is carrying a DL of 1.5 k/ft and LL of 1.9 k/ft on a 30 ft. simple span. Assume concrete strength is 3500 psi and yield strength of steel of flexural reinforcement is 60 ksi and that of stirrup is 40 ksi. Design the beam for shear (Follow USD method).

17 ft.
n the

Class Test on CE 3115

Time: 25min

Full Marks:20

Q.1 A reinforced concrete slab is built integrally with its supports and consists of two equal spans, each with a clear span of 17 ft. The service live load is 100 psf and 4000 psi concrete is specified for use with steel with a yield stress equal to 60000 psi. Design the slab using USD method.

Heaven's Light is Our Guide
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Full Marks : 20

Time : 25 mins

CLASS TEST on CE 315

1. Explain the terms Web-Shear Crack and Flexure-Shear Crack.
2. Narrate the ACI code provisions for the flexural shear design of beams by WSD and USD.
3. Use the USD Method to design the vertical stirrups for simply supported RC beam (Span = 20 ft, LL = 1 k/ft and DL 1 k/ft excluding self weight) [Given: $b = 10$ in $h = 20$ in and $d = 17.5$ in, $f'_c = 3$ ksi, $f_y = 50$ ksi,]. (12)

Class Test on CE 3115

- Q.1 Why is concrete the most widely used engineering materials? (4)
- Q.2 Draw the stress and strain diagrams at different significant stages of a reinforced concrete beam loaded to failure. (4)
- Q.3 A RC beam with $b = 10\text{in}$ and effective depth $= 25\text{ in}$ is reinforced with 3 No. 9 bars. Determine (i) the working moment capacity of the beam (ii) the amount of uniformly distributed load that can be applied on the beam for a simply supported span of 20 ft. Assume $f'_c = 4000\text{ psi}$ and $f_y = 60,000\text{ psi}$. (12)

Heaven's Light is Our Guide
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Time : 25 mins

CLASS TEST on CE 315

Full Marks : 20

1. Explain the necessity of using shrinkage reinforcements? Write the ACI Code Specifications for distributed reinforcement.
2. A one-way slab is to be designed on a 18 ft simple span to carry a service live-load of 40 psf and superimposed dead load (excluding self weight) of 50 psf. Design the slab using $f_c = 5000$ psi and $f_y = 60,000$ psi. Assume any other missing data.

Department of Civil Engineering

Class Test3 on CE315

Q.1 A beam of 12 in. width and effective depth of 18 in. simply supported on 20 ft. span is carrying a total factored load of 7.5 kip/ft. If $f'_c = 4000$ psi, through what part of the beam is web reinforcement theoretically required? Using #3 bar as stirrup, find spacing of stirrup at a distance of 4 ft. from support. Assume $f_y = 60,000$ psi.

spacing shall be taken 5 in. less than the total depth. In addition to its weight, each T beam must carry a superimposed dead load of 50 psf and service live load of 225 psf. Material strengths are $f_y = 60000$ psi and $f'_c = 4000$ psi. Determine the required tensile steel area and select the reinforcement needed for a typical member.

Class test on CE 3115

Full Marks: 20

20 min

A concrete floor system consists of parallel T beams spaced 10 ft on centers and spanning 32 ft between supports. The 6 in. thick slab is cast monolithically with T webs having width $b_w = 14$ in. and total depth, measured from the top of the slab, of $h = 28$ in. The effective depth will be taken 3 in. less than the total depth. In addition to its weight, each T beam must carry a superimposed dead load of 50 psf and service live load of 225 psf. Material strengths are $f_y = 60000$ psi and $f'_c = 4000$ psi. Determine the required tensile steel area and select the reinforcement needed for a typical member.