

1. Define different types of efficiencies in a centrifugal pump.
2. 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 liters per minute ii) speed iii) blade angle at outlet iv) diameter of the impeller at inlet.

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

Q.1(a) What is hydrostatic law of pressure distribution? Draw pressure distribution diagram at a straight and curved flows over a spillway.

(b) Prove that energy loss in a horizontal hydraulic jump is $\Delta E = (y_2 - y_1)^2 / 4y_1y_2$

Q.2(a) How you will interpret hydraulic jump with specific energy and specific force diagram?

(b) Prove that at the critical state of flow the discharge is maximum for a given specific energy.

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 10

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. 10

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

Class Test on CE 3115

Full Marks:20

Time: 25min

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.

Class test on CE 3115

Time: 20 min

Full Marks: 20

Q.1 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 beam 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.

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 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)

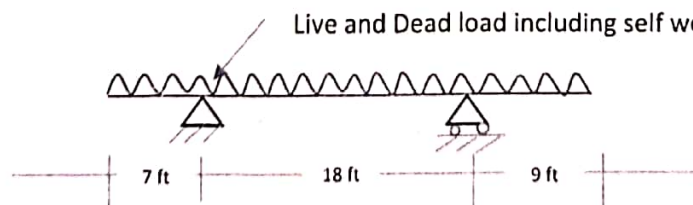
Class Test On CE 3115

Full Marks: 20

Time: 30 min

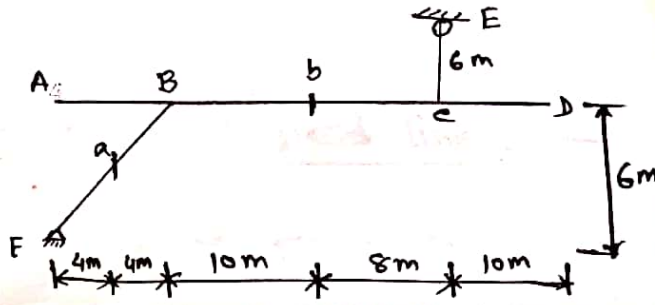
Q. (a) Define factor of safety for structural design. Why do you consider factor of safety for the design of any structural part?

Q. (b) Design the beam as shown in figure below assuming the concrete strength $f_c' = 3000$ psi, and $f_s = 24000$ psi.



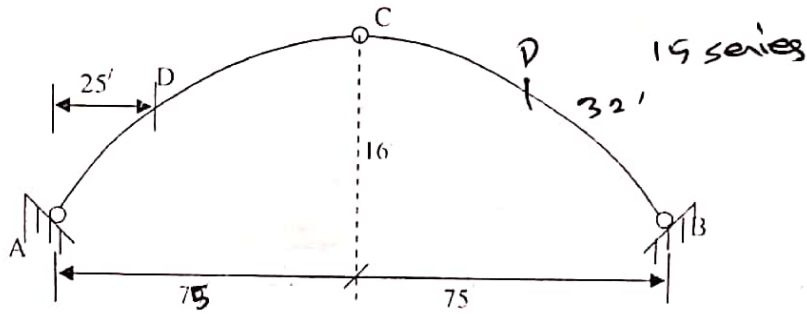
CT-1 ON CE 3111 (14 series)

Draw IL for V_a, M_a, V_b, M_b as unit load moves from A to D.



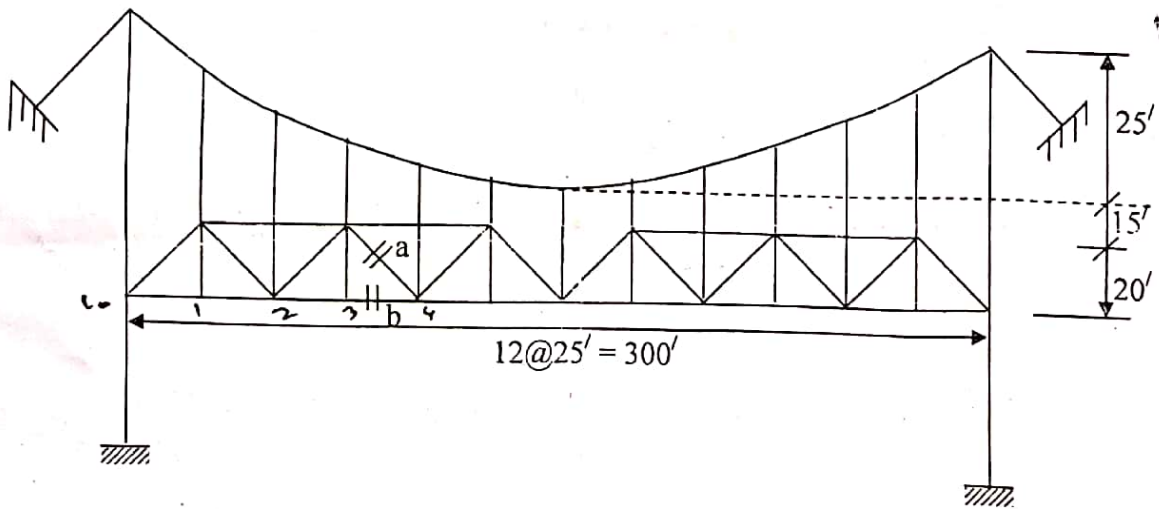
Class test on: CE 3111

- 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



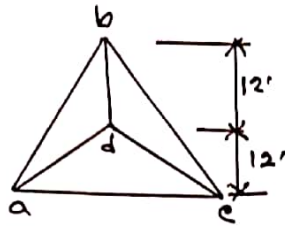
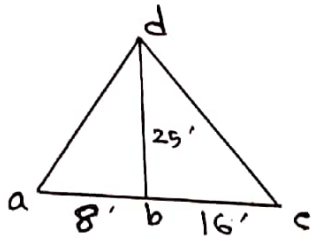
Class Test on CE 3111

- 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.

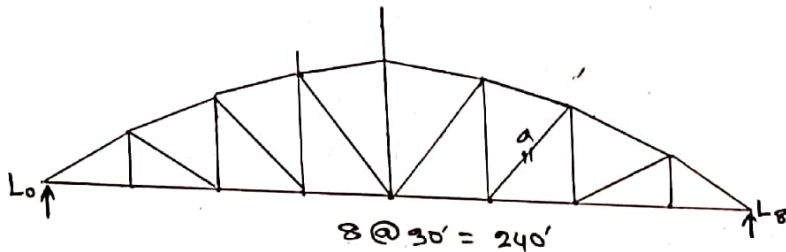


C.T. ON CE 3111
(TWA SIS)

1. Calculate the member force of ad, bd, cd of the following structure.



2. Calculate the positive and negative maximum stress of member a of the following structure due to H₂O loading.

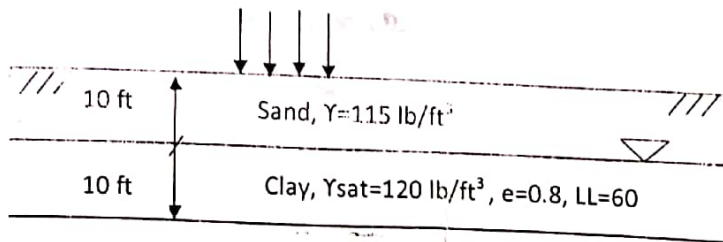


Class Test on CE3131
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Full Marks 20

Time: 20 Mins

- 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/ft² and preconsolidation pressure is 1500 lb/ft².



more soil is subjected to stress

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.

CT-1 on CE 3131 (14 series)

1. Discuss about the soil formation.
2. Discuss the principle of soil compaction.

Solution: *Soil formation is the process of soil development from parent material and climate over time.*

CT-3 on shear strength

- Q-1: Write short note on unconfined compression test - 20

CT-2 on CE 3131 (14 series)

Q-1: Prove $\gamma = \frac{\gamma_w(G_s + e)}{1 + e}$

- Q-2: Write down the 5 important points of plasticity chart. What is the use of it in geotechnical engineering.

- Q-3. Volume of container, $V_c = 2.83 \times 10^{-3} \text{ m}^3$
Weight of container, $W_c = 9.8 \text{ N}$
Weight of container + dry soil, $W_T = 52.5 \text{ N}$
Given, $G_s = 2.7$.
Find values of n and e . Is the sand loose or hard?