MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL

BCE CD 308: FLUID MECHNICS II

DATE: 4/8/2017 **TIME: 8;30 – 10:30 AM**

INSTRUCTIONS

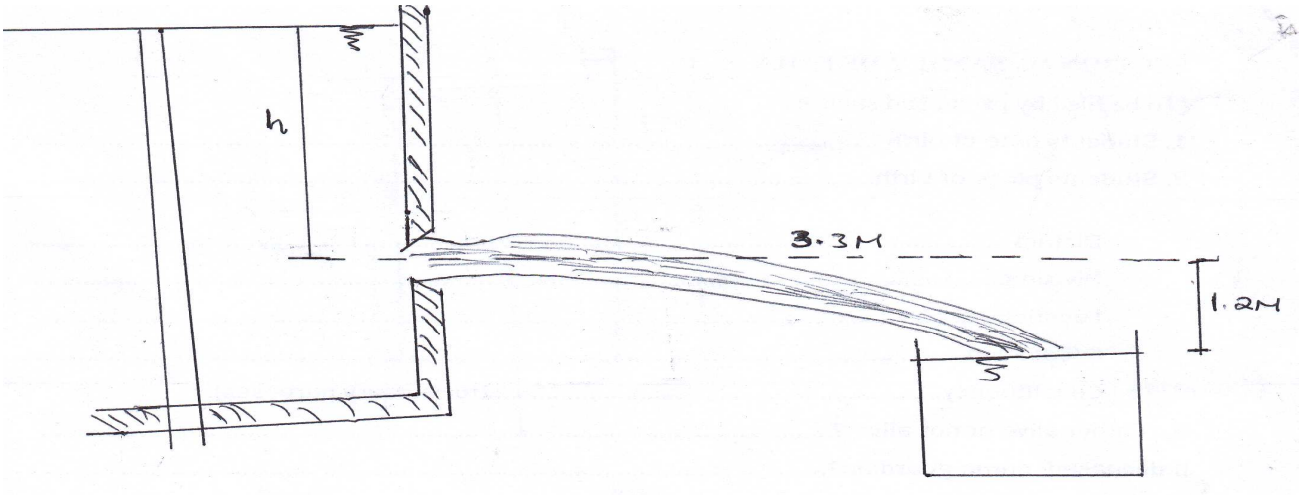
- **Question one is compulsory.**
- **Answer any other two questions.**

1. a) Define the term orifice (2 marks)

   b) With the aid of sketches, give five classifications of orifice.

   c) Differentiate between a large orifice and a small orifice. (4 marks)

   d) The figure below shows discharge through a small orifice. If the diameter of vena-contracta is 41mm.Cv = 0.97 compute the lead causing flow and then the discharge



2. a) With an aid of a diagram, show the free flow condition of a large orifice.

(4 marks)

b) A rectangular gate 3m x 7m high is introduced across an irrigation canal. The water level on the upstream side (u/s) is 1.2m. Compute the rate of flow if the gate is varied by 0.4m above the bottom level. cd=O.6. Compute the percentage increase in discharge if the velocity of approach is 1.2m/s. (16 marks)

3. A regulator gate 2.5m wide by 6.0m deep is introduced across a channel. This ill level is placed at + 1500.0m and the water level on the upstream side is constant at 1505.0m. It is required to raise the gate to deliver a discharge of 480m 1^{st} /min. Calculate the height through which gate must be raised.

4. A large rectangular orifice cd=0.63 of width 0.5m has the following particulars.
   - Floor level = +100.0m
   - U/s water level = +102.3m, when the gate is raised by 0.6m.
   - D/s water level = 100.4m

   Compute the rate of flow(discharge) (20 marks)

5. a) The head of water of an orifice of a diameter 40mm is 10m is 10m. Find the actual Discharge at the vena-contracta, given cd=0.6 and cv =0.98. (10 marks)

   b) The lead of water over the centre of an orifice of diameter 20mm is 1m. The Qa =0.85 Lt/s. Find the coefficient of discharge . (5 marks)

   c) A jet of water oozing form a sharp edged orifice under a constant head of 10m at a certain point has a horizontal and vertical coordinates measured from vena contracta as 20 and 10.5 respectively. Find the value of cv and cc if cd = 0.6. (5 marks)

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THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR DIPLOMA IN CIVIL ENGINEERING

BCE CD 304: REINFORCED CONCRETE AND MASONRY DESIGN

DATE: 27/7/2017 **TIME:11:00 – 1:00 PM**

INSTRUCTIONS

- Answer question one and any other two questions.

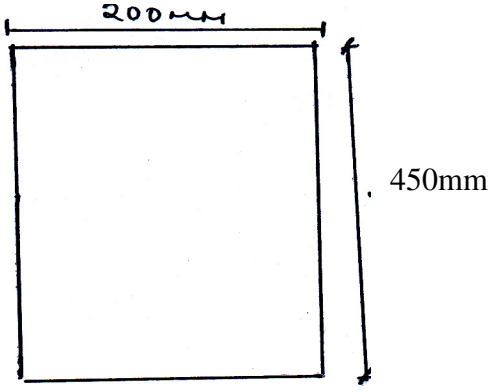
1. a) Explain three methods used in the design of concrete.

   b) Describe two types of limit state of concrete.

   c) Explain two types of loadings in a structure

   d) Sketch the stress-strain curve of concrete according to Bs-8110.

   e) A crosssection of a simple supported rectangular beam is as shown in the figure using the given data, determine the area of reinforcement required to resist an applied ultimate bending moment of 150KNM.



(12 marks)

$f$cu = 40N/mm^2
fy = 460N/mm^2

Exposure condition = moderate
Fire resistance = 2 Hours

2. a) Given six symbols and what the stand for in concrete design according to the Bs -8100. (12 marks)

b) With an aid of a sketch explain the following failure modes of a reinforced concrete.

i) Diagonal tension failure
ii) Diagonal compression failure. (8 marks)

3. A reinforced concrete beam which is 300 by 600mm deep is required to span 6m. The beam carries a dead and life loads of 25KN/m and 19KN/m respectively. Assume $f$cu=30N/mm^2, fy = 460N/mm $f$yv = 250N/mm^2, exposure condition = mild. Design the beam. (20 marks)

4. A 250mm thick simply supported R.C , state spans 5m. Design a suitable slab using grade 40 concrete and high yield reinforcement to support the following characteristics of loads.

i) Imposed loads = 4KN/m^2
ii) Finishes = 0.5KN/m^2
iii) Concrete density = 24 KN/m^2 (24000Kg/m^3) (20 marks)

5. a) With the aid of diagram, show four types of beam sections, also show the reinforcements. (8 marks)

b) Illustrate a beam and show the notations used in the design of the beam. (8 marks)

c) Give two characteristics of reinforced concrete. (2 marks)

d) Give two characteristics of steel. (2 marks)

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THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR DIPLOMA IN CIVIL ENGINEERING

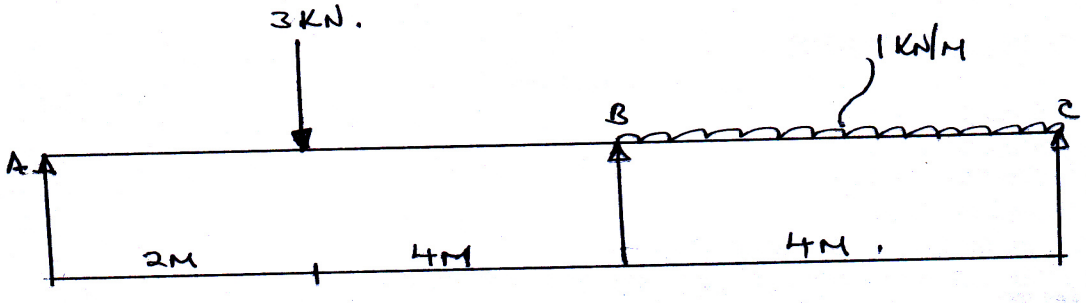
BCECD 302: THEORY OF STRUCTURES III

DATE: 25/7/2017 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

- Answer question one and any other two questions.

1. a) Describe a continuous beam with a sketch . (2 marks)
   b) Explain the theorem of three moments. (2 marks)
   c) A continuous A, B and C at the same level and is loaded as shown

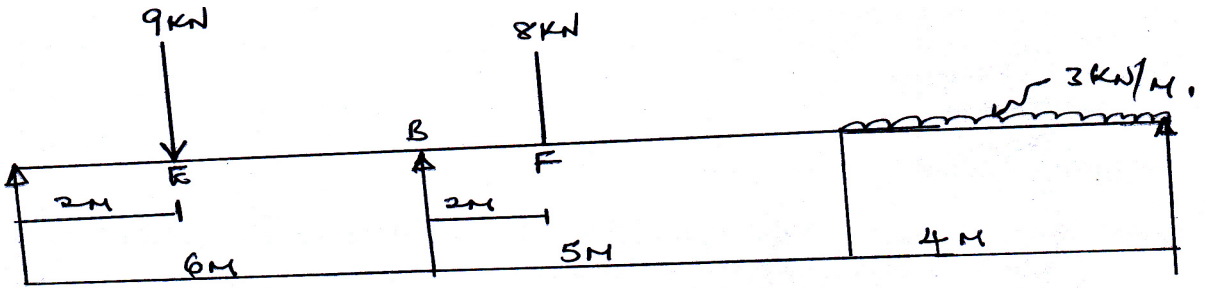


Determine the moments over the beam and draw the bending moment and force diagrams. Also calculate the reactions at the supports. (20 marks)

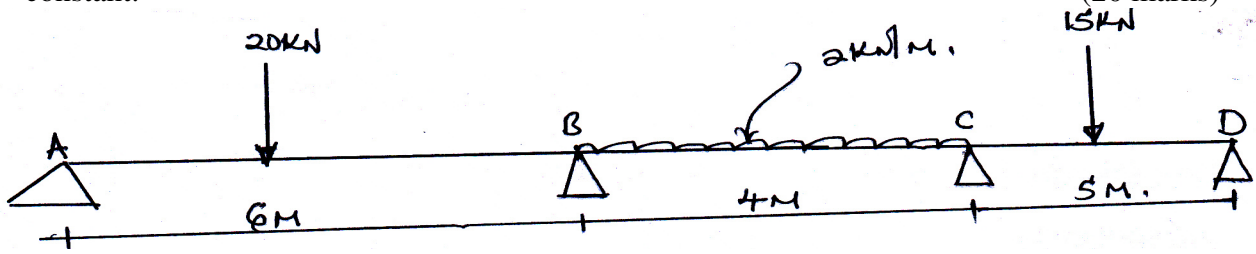
   d) Describe with a sketch a portal frame. (2 marks)
   e) Give two types of portal frames. (2 marks)
   f) Describe the following;
      i) Carry over factor
      ii) Stiffness factor (2 marks)

2. A continuous beam ABCD, simply supported at AB, C and D is loaded as shown in the figure. Find the moments over the beam and draw bending and shear force diagrams.

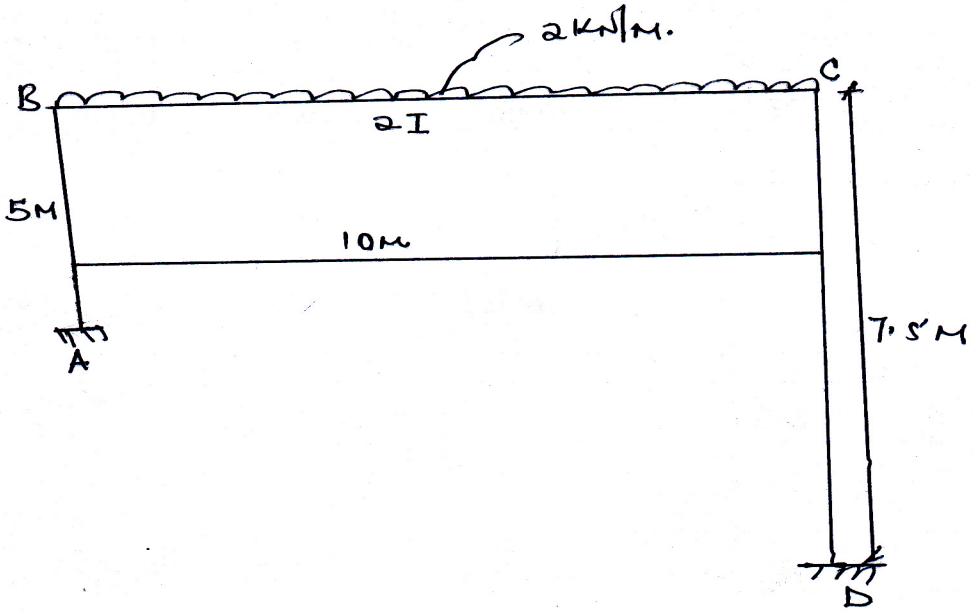
(20 marks)



3. The figure ABCD is loaded as shown below. Determine the moments and reactions at the supports A, b, C and D. Also draw the bending moment and shear force diagram. Take EI = constant. (20 marks)

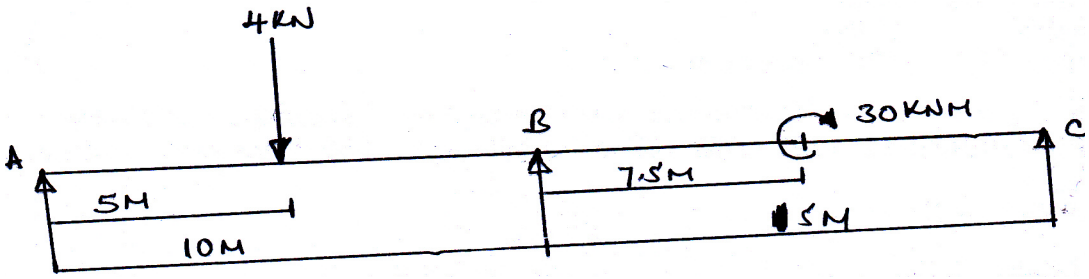


4. A portal frame ABCD fixed at A and D is loaded as shown in the figure.



Analyze the portal frame and also draw the bending moment diagram. (20mks)

5. A continuous beam ABC of constant moment of inertia is simply supported at A, B and C. The beam carries a central load of 4KN in span AB and a central anticlockwise couple of moment 3QKN/M in the span BC as shown in the figure.



Find the support moments and plot the shear force and bending moment diagrams. (20 marks)