MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCE CD 204: THEORY OF STRUCTURE 1

Date: 22/4/2016 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS

This paper consists of FIVE questions
Answer question one and other two questions in this paper

1. a) With a sketch, explain how a long column is bound to fail. (4 marks)

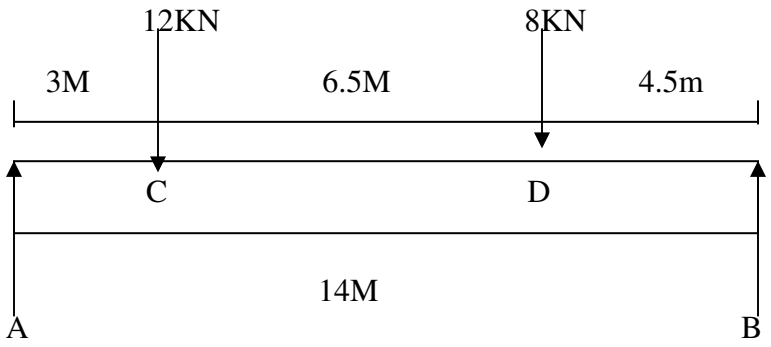
b) Explain the following:-

i) Crippling load

ii) Slenderness ratio

iii) Radius of gyration (6 marks)

c) A horizontal steel girder having uniform cross-section is 14M long and is simply supported at its ends. It carries two concentrated loads as shown.



Calculate the deflections of the beam under the loads C and D. Take a = 200N/MM^2

I = 160 x 10^6 MM^4 . (20 marks)

2. a) A hallow circular column having external and internal diameters of 300mm and 250MM respectively carries a vertical load of 100KN at the outer edge of the column. Calculate the maximum and maximum intensities of stress in the section. (10 marks)

b) Explain the four Euler's assumptions. (4 marks)

c) Determine the Euler's critical stress for a steel of diameter 40mm if the length between the pin joints is 4M. E=210KN/MM^2 . (6 marks)

3. a) A masonry pier of 3m x 4m supports a vertical of 80KN at an eccentricity of 1m from the Y-axis and 0.5m from the X – axis .

i) Find the stresses developed at each corner of the pier.

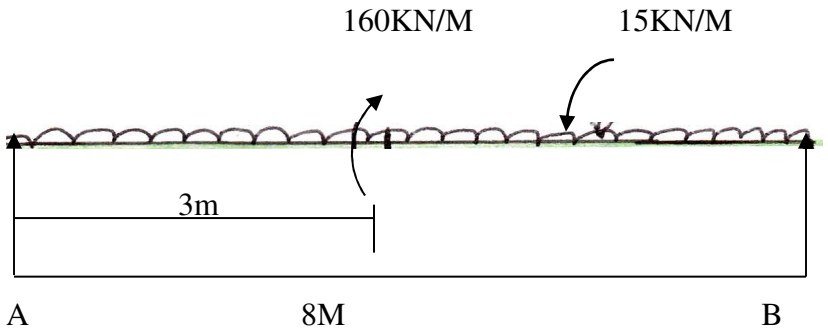
ii) What additional load should be placed at the centre of the pier, so that there is not tension anywhere in the pier section. (15 marks)

b) With a sketch, derive an expression to show that

$$ryy = \frac{b}{\sqrt{12}}$$

(5 marks)

4. a) A horizontal beam ABA is freely supported at A and B, 8m apart and carries a uniformly distributed load of 15 KN/m run. Clockwise moment of 160KN/M is applied to the beam at a point C, 3m from the left hand support A. Calculate the slope of the beam at C, if EI = 40 x 10^2 KN/M^2 .



(13 marks)

b) Determine the Euler's bucking load for a steel diameter 40mm if the length between the pin joints is 4m. [E = 210KN/mm^2].

5. a) A hollow rectangular pier is 1.2m x 0.8m wide and 150mm thick. A vertical load of 2MN is transmitted in the vertical plane bisecting 1.2m side of an `eccentricity of 100mm from the geometric axis of the section. Calculate the maximum and minimum stress intensities in the section. (10 marks)

b) A rectangular strut is 150mm thick. It carries a load 180KN at an eccentricity of 10mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in the section. (10 marks)

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SECOND SEMESTER EXAMINATION FOR DIPLOMA CIVIL ENGINEERING

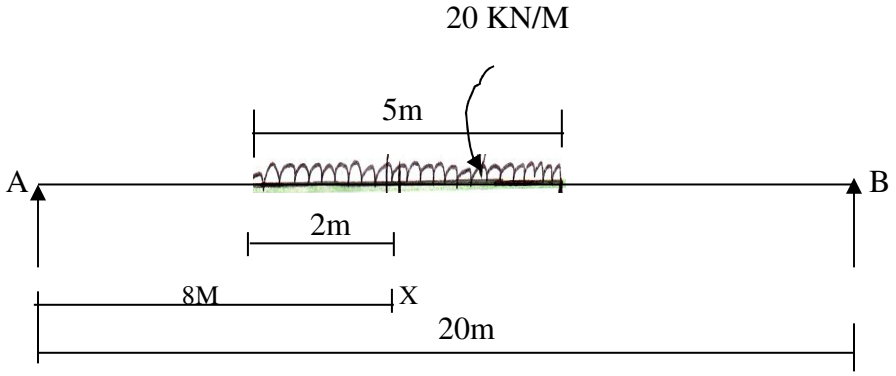
BCE CD 213: THEORY OF STRUCTURE II

Date: 22/4/2016 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS

This paper consists of FIVE questions
Answer question one and other two questions in this paper

1. a) A uniformly distributed load 20KN/M of 5M length cross a girder of span 20M from left to right with the help of influence lines, determine the values of shear force and bending moment at a point 8m from the left support, the head of the load is 11M from the left support.

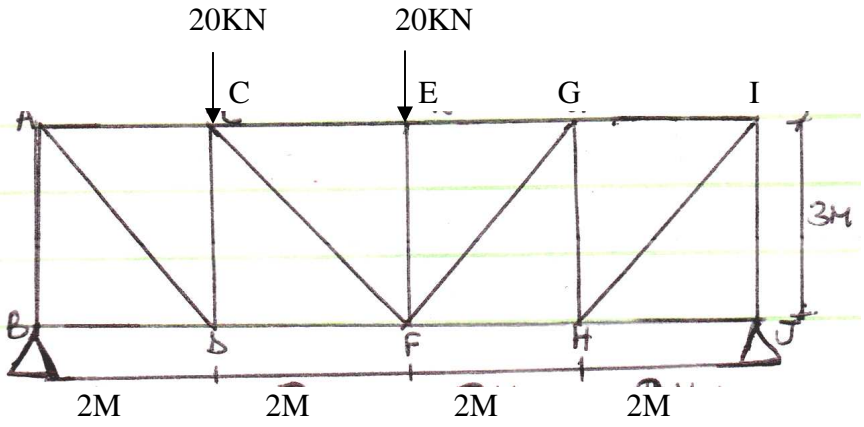


(20 marks)

b) Explain three importance of studying influence lines. (4 marks)

c) State four statically determinate structures. (4 marks)

2. a) Find the forces in AB, AD, AC and equilibrium EG, FG and FH on the right hand side.



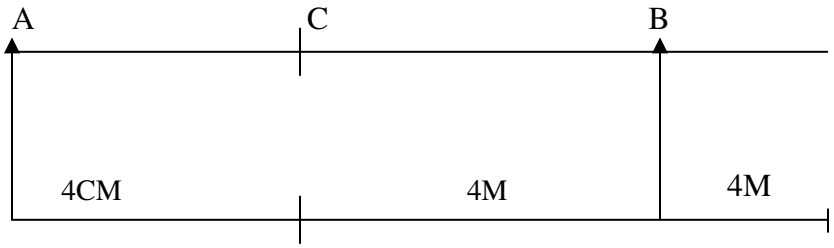
(20 marks)

3. a) Construct the influence line for:-

i) Reaction of A and B

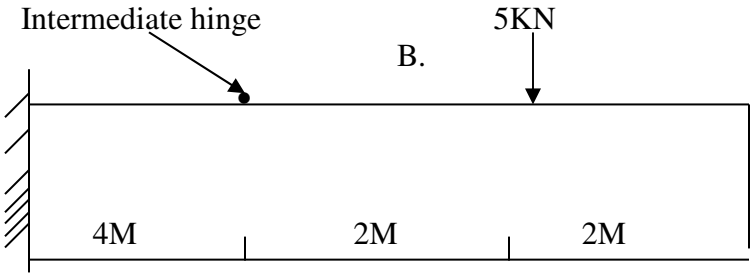
ii) Shear at point C

iii) Bending moment at point C in the following figure.



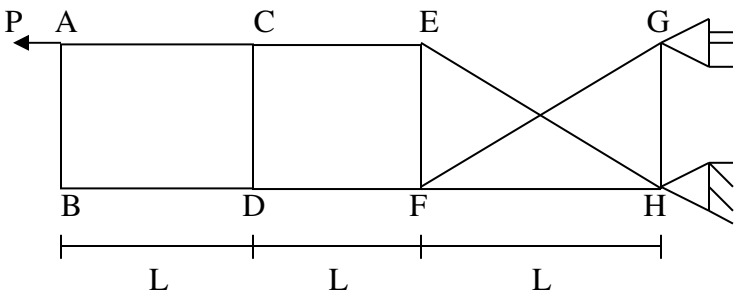
(10 marks)

b) Obtain the internal force diagram (SFD and BMD) for the beam.



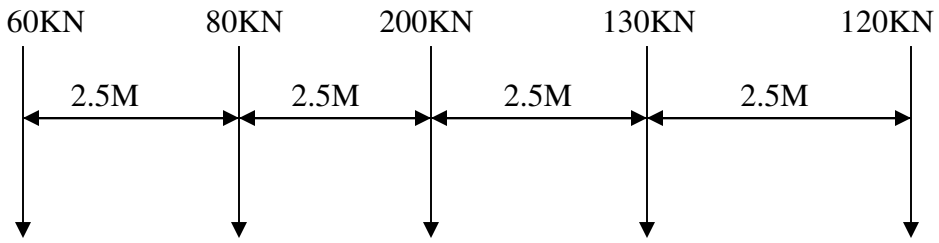
(10 marks)

4. a) Find the forces in all members in the figure.



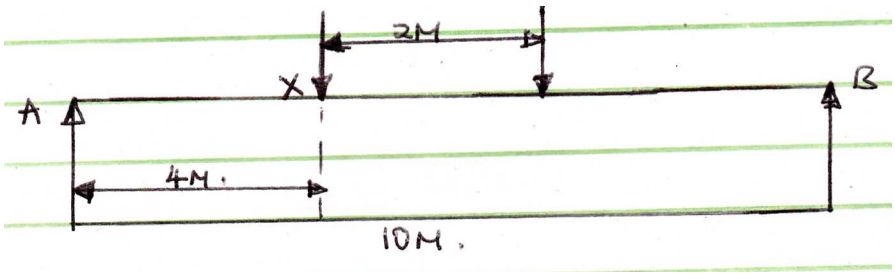
(10 marks)

b) A train of 5 wheel-loads as shown crosses a simply supported beam of span 22.5 metres.



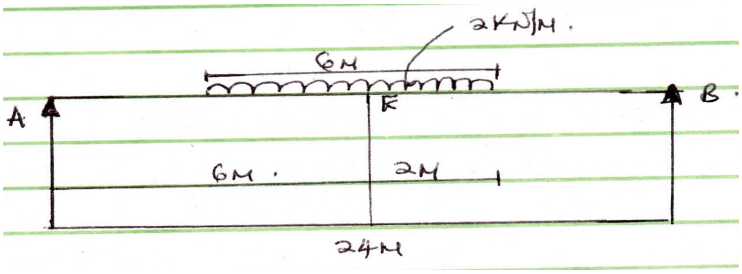
Calculate the maximum negative and positive shear force values of the centre of the span and the absolute maximum bending moment anywhere in span. (10 marks)

5. a) Two point loads of 50KN and 160KN spaced 2M apart, cross a girder of span 10m with the 80KN load leading from left to right. Draw the influence lines for shear force and bending moment and find the value of maximum shear force and bending moment at section 4m from the left end support.



(10 marks)

b) In the following diagram, width of 2KN/M, 6M long crosses a girder of span 24M. Determine:
The values of S.E and BM at a point E.



(10 marks)

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SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA CIVIL ENGINEERING

BCECD309: CIVIL ENGINEERING CONSTRUCTION II

Date: 25/4/2015 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS
This paper consists of FIVE questions
Answer question one and other two questions in this paper

1. a) Describe five factors that will determine the choice of a type of dredging equipment. (10 marks)

   b) Give two functional requirements of an ideal material for sleepers. (4 marks)

   c) Give two problems encountered during tunnel construction. (4 marks)

   d) Explain two methods used in the maintenance of dams. (4 marks)

   e) The rulling gradient is 1 in 200 on a section of B.G track. If the track is laid on that place in a curve of 5^0, determine the allowable rulling gradient on the curve. (6 marks)

   f) Explain what is meant by a water front structure. (2 marks)

2. a) With the aid of sketches, describe the following water front structures. (12 marks)
      i. Sea wall
      ii. Break waters
      iii. Jetty

b) Give four reasons for dredging process. (8 marks)

3. a) Give five functional requirements of an ideal fish plate. (10 marks)

b) With an aid of a sketch, describe the cast iron, iron pot type of chairs. (4 marks)

c) With an aid of a sketch, describe the moles water front structure. (6 marks)

4. a) With an aid of a sketch, explain any joint involved in rigid pavement construction. (4 marks)

b) Give four objectives of soil stabilization during road construction. (4 marks)

c) With a sketch, explain the heading and benching method of tunnel construction. (6 marks)

d) Explain the following as in railways. (6 marks)

i. Turnout

ii. Cross-over

iii. Diamond crossing.

5. a) With a sketch, describe a fish plate fastening. (6 marks)

b) With the aid of sketches, differentiate bull leaded rails from double leaded rails. (6 marks)

c) Explain briefly the procedure involved during reclamation process. (6 marks)

d) Explain what is meant by super elevation in rails. (2 marks)

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DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD118 BUILDING TECHNOLOGY I

Date: 26/4/2016 **Time: 2:00 – 4:00 PM**

INSTRUCTIONS
This paper consists of FIVE questions
Answer question one and other two questions in this paper

1. a) Give **six** environmental considerations considered before any construction process. (6 marks)

b) Describe briefly the following processes.
   i. Site Investigation
   ii. Site Clearance. (4 marks)

c) i) Describe with a sketch the isolated pad foundation. (4 marks)
   ii) Give **six** functional requirements of roofs. (6 marks)
   iii) With a sketch, describe the open newel stair. (4 marks)
   iv) Give **two** functional requirements of doors. (2 marks)

d) i) State **two** types of scaffoldings. (2 marks)
   ii) With a sketch, describe the closed couple roof. (2 marks)

2. a) Give **three** functional requirements of a foundation. (6 marks)

b) With an aid of a sketch, explain how timbering is done on loose soils. (6 marks)

c) Explain **two** methods of foundation excavation. (4 marks)

d) Explain **two** functional requirements of walls. (4 marks)

3. a) With aid of sketches, describe two types of doors. (8 marks)

b) Give **four** reasons for shoring. (8 marks)

c) Define a subsoil. (2 marks)

4. a) With an aid of sketches, describes the following scaffold. (8 marks)

i. Independent scaffold

ii. Put-log scaffold

b) Explain three reasons for timbering. (6 marks)

c) With an aid of a sketch, describe timbering in firm soils. (6 marks)

5. a) With the aid of sketches, describe the following foundations. (8 marks)

i. Deep strip foundation

ii. Wide strip foundation

b) Give four factors affecting the selection of equipment for excavation. (4 marks)

c) State two types of mechanical plant for excavation. (2 marks)

d) With an aid of a diagram, describe a dog leg type of stairs. (6 marks)

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SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCE CD 103: ECONOMICS 1

Date: 21/4/2016 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS
This paper consists of FIVE questions
Answer question one and other two questions in this paper

1. a) Define the following economic concepts. (8 marks)
   i. Scale of preference
   ii. Opportunity cost
   iii. Choice
   iv. Utility

   b) i) With a graph, show a shifting supply curve. (2 marks)
   ii) List the factors that will cause supply of a product to shift. (4 marks)

   c) i) Give four situations in which monopoly would arise. (8 marks)
   ii) Explain briefly two methods used in the determination of National Income Accounting. (4 marks)
   iii) Explain two characteristics of firms operating in oligopoly. (4 marks)

2. a) Describe five importance of international trade. (10 marks)

b) Explain the theory of comparative advantage. (2 marks)

c) Describe four limitations of having monopolistic competition. (8 marks)

3. a) Explain three uses of national income statistics. (6 marks)

b) Explain the following terms. (8 marks)

i) Fiscal policy

ii) Income policy

c) With a graph, explain the law of diminishing marginal utility. (6 marks)

4. a) Explain four types of inflation in economics. (8 marks)

b) Explain four measures which may be used to curb inflation. (8 marks)

c) With a graph, show a shifting demand curve. (4 marks)

5. a) Describe four roles of the central bank in Kenya. (8 marks)

b) Give six main objectives of the fiscal policy. (6 marks)

c) Explain three factors affecting the production cost of a commodity. (6 marks)

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SECOND SEMESTER EXAMINATION FOR DIPLOMA CIVIL ENGINEERING

BCE CD 215: ENGINEERING GEOLOGY

Date: 26/4/2016 **Time: 2:00 – 4:00 PM**

INSTRUCTIONS

This paper consists of FIVE questions
Answer question one and other two questions in this paper

1.	a)	Give three geological importance of folding.	(3 marks)
	b)	Explain six roles of a geologist in construction industry.	(6 marks)
	c)	Give four factors affecting the choice of site of a dam construction.	(4 marks)
	d)	Explain five igneous rock textures.	(10 marks)
	e)	Describe with sketches two methods of tunnel construction.	(4 marks)
	f)	Briefly describe biological weathering process.	(3 marks)
2.	a)	Give four factors affecting igneous rock texture.	(4 marks)
	b)	Describe briefly chemical weathering process.	(4 marks)
	c)	Explain three agents affecting metamorphic process.	(6 marks)
	d)	Give four importance of studying geology.	(4 marks)
3.	a)	Explain six geological significance of faulting.	(12 marks)
	b)	Explain four factors affecting metamorphic rock textures.	(8 marks)

4. a) Differentiate chemical weathering from biological weathering. (4 marks)

b) Describe three factors that will affect the structure of igneous rocks. (6 marks)

c) Describe with sketches any three types of faults. (10 marks)

5. a) Explain five geological problems in dam construction. (10 marks)

b) Describe two metamorphic rock textures. (4 marks)

c) Describe briefly the following minerals. (6 marks)

i) Apatite

ii) Diamond

iii) Granite.

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SECOND SEMESTER EXAMINATION FOR DIPLOMA CIVIL ENGINEERING

2707/303: GENERAL BUILDING CONSTRUCTION III AND TRANSPORTATION II

Date: 8/4/2016 **Time: 8:30 – 11:30 AM**

INSTRUCTIONS

This paper consists of EIGHT Questions
Answer three questions in section A and Two questions in Section B

SECTION A
Answer any THREE questions from this section

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

   b) Briefly explain the following terms as applied in stairs,

      i. Flight
      ii. Hand-rail
      iii. Balusters (9 marks)
      iv. Riser
      v. Tread
      vi. Nosing

   c) State two functions of a stair (4 marks)

2. a) With aid neat sketches show two methods of fixing a baluster on the step (8 marks)

   b) Make neat sketches to show any two typical sections of hand rails (7 marks)

3. a) Outline three objectives fire registration (6 marks)

b) Briefly the following terms as related to fire

i. Fire prevention

ii. Fire protection

iii. Fire load

iv. Fire intensity (8 marks)

c) Define the term balustrade (1 mark)

4. Make neat sketches in plan form the following types of stairs

a) Bifurcated stair

b) Winder turn stair

c) Quarter turn stair (15 marks)

d) Half turn stair

e) Straight flight

5. a) Design a private stairway given the following information;

Horizontal distance- 2900mm

Vertical height – 2100mm

b) Outline three reasons as to why fire protection is important in building elements (3 marks)

c) State two factors affecting fire resistance (2 marks)

SECTION B:

ANSWER ANY TWO QUESTIONS

6. a) Explain six factors that will be considered in choosing the type of a dredger. (12 marks)

b) Describe four functional requirement of an ideal material for sheepers. (8 marks)

7. a) With the aid of a sketch, describe the following dredging equipments.

i. Cutter suction dredger.

ii. Trailing suction hopper dredger. (12 marks)

b) With the aid of a sketch, describe a fish plate fastening to rail. (6 marks)

c) Give two reasons for soil stabilization during road construction. (2 marks)

8. a) Describe with a sketch, any joint to a rigid pavement. (6 marks)

b) Explain briefly the procedure of executing earth work operations. (6 marks)

c) Explain briefly the procedure of construction of a flexible pavement. (6 marks)

d) Give two bituminous binders. (2 marks)