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W1-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

**UNIVERSITY EXAMINATION 2017/2018**

**FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF ARCHITECTURAL TECHNOLOGY**

**ABA 2107: STRUCTURES FOR ARCHITECTS**

**DATE: AUGUST 2018 TIME: 2 HOURS**

INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY

OTHER TWO QUESTIONS

**QUESTION ONE**

a. State the expressive definition of Architecture according to Marcus Vitruvius Pollio and state which arms are connected to the study of Architecture and structures. (4 marks)

b. What is a:-

i. Bending moment. (2 marks)

ii. Building structure. (2 marks)

c. Identify and briefly discuss the major building techniques as used in building structures. (8 marks)

d. Differentiate between:-

i. Direct and indirect load path. (2 marks)

ii. Static and dynamic load. (2 marks)

e. Lateral loads are caused by wind and seismic movement and in general are considered to act horizontally. Using neat sketches, illustrate how both wind and seismic loads result to base shear and bending.

(4 marks)

f. Discuss four structural materials that are predominant in the Kenyan market. (6 marks)

**QUESTION TWO: 20 MARKS**

a. Discuss the two main components of a building structure and mention the materials used for their construction. (6 marks)

b. i. What is a free body diagram. (1 mark)

ii. Draw free body diagrams for the following beams:-

1. Hinged and Roller support. (2 marks)

2. Cantilevered beams beams. (2 marks)

3. Beams supported on roller and Rocker. (2 marks)

c. Why is it so hard to determine beauty in structures. (2 marks)

d. Describe the concept of strength and stability in structures. (5 marks)

**QUESTION THREE: 20 MARKS**

a. What is your understanding of framed structures. (2 marks)

b. Write short notes on the following:-

i. Six advantages of framed structures. (3 marks)

ii. Principle factors affecting choice of:-

1. Production consideration. (3 marks)

2. Architectural design consideration. (3 marks)

3. Structural design consideration. (3 marks)

c. Structural characteristics of steel construction. (3 marks)

d. Construction challenges of steel construction. (3 marks)

**QUESTION FOUR: 20 MARKS**

a. State the qualities that the reinforcement materials need to have for a strong, ductile and durable construction. (5 marks)

b. Briefly describe the three physical characteristics that give reinforced concrete its special structural properties. (6 marks)

c. With the aid of neat sketches, describe the following structural systems:-

i. Post and Beam. (2 marks)

ii. A-Frame (2 marks)

iii. Portal Frame. (2 marks)

iv. Pin-Jointed Arches. (2 marks)

d. Using neat sketches, describe the following types of stresses:-

i. Tension. (1 mark)

ii. Compression. (1 mark)

iii. Shear. (1 mark)