



MACHAKOS UNIVERSITY

University Examination 2019/2020

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
FIRST YEAR THIRD SEMESTER EXAMINATION FOR

DIPLOMA IN BUILDING TECHNOLOGY

DIPLOMA IN CIVIL ENGINEERING

2705/2707/103 STRUCTURES 1

DATE: 16/12/2020

TIME: 2.30-5.30 PM

INSTRUCTIONS

Answer all questions

1. a) Draw the shear force and Bending moments diagrams for the overhanging beam carrying U.D.L of 2KN/M over the entire length and a point load as of 2KN/M as shown in **Figure 1**. Locate the point of contra-flexure. (12 marks)
- b) A hollow cylindrical steel tube of with an outer diameter of 200mm is to carry a vertical load of 200KN. If the axial stress in the steel is not to exceed 100N/Calculate the minimum thickness of the wall of the tube (8 marks)
2. a) State the four assumptions in simple bending theory (8 marks)
- b) With a diagram, derive the expression of simple bending (12 marks)
3. a) Define the following terms
- i. Parallel axis theorem
- ii. Centroid
- iii. Neutral axis
- iv. Moment of resistance (8 marks)

- b) A flitched beam consists of a wooden joist 10cm wide and 20cm deep strengthened by two steel plates. 10mm thick and 20cm deep as shown in **Figure 2**; if the maximum stress in the wooden joist is 7N/mm^2 , find the corresponding maximum stress attained in steel. Find also the moment of resistance of the composite section. Take young's modulus for steel as $=1 \times 10^3 \text{ N/mm}^2$ and for wood $=1 \times 10^4 \text{ N/mm}^2$ (12 marks)
4. A simply supported beam is loaded as shown in **Figure 3**:
- Determine the reactions
 - Sketch the shear force diagram indicating values at critical points
 - Sketch the bending moment diagram indicating values at critical points
 - Determine the magnitude and position of the maximum bending moment
 - Determine the point of contra-flexure. (20 marks)
5. a) A horizontal cantilever beam 3m long has a cross section as shown in **Figure 4**. If the beam carries a uniformly distributed load of 10KN/M along its entire length. Calculate:
- The maximum tensile stress
 - the maximum compressive stress (8 marks)
- b) For the compound section show in **Figure 5**; determine:
- The centroid on both axes
 - The second moment of area on both axes
 - The radius of gyration
 - The section modulus (12 marks)

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2705/2707/104: SURVEYING 1

DATE: 15/12/2020

TIME: 8.30-11.30 AM

INSTRUCTIONS

ANSWER ALL QUESTIONS

1.
 - a) Distinguish between plane surveying and geodetic surveying (5 marks)
 - b) Describe five types of surveys in common use (15 marks)
2.
 - a) Define the term ranging as used in chain surveying (1 mark)
 - b) Outline the ranging process in a small hilly area (7 marks)
 - c) With a diagram, describe how to chain a cross, with building as an obstacle (12 marks)
3.
 - a) Give four applications of leveling (4 marks)
 - b) Illustrate the cross section of a dumpy level (5 marks)
 - c) Describe the temporary adjustments done to leveling machine (6 marks)
 - d) With a diagram, describe the procedure of leveling (5 marks)
4.
 - a) State four characteristics and four uses of contours (6 marks)
 - b) Using the rise and fall method, book the following surveying data in **figure 1**. Carry out all the necessary checks (10 marks)

Examination Irregularity is punishable by expulsion

BS	IS	FS	DISTANCE(m)	REMARKS
1.5			0	TBM (60.5) 1A
	2.5		30	2A
	4.0		50	3A
3.0		2.0	70	C.P 4A (1B)
	5.5		95	2B
6.0		1.0	120	C.P 3B (1C)
		3.0	160	TBM (65.1) 2C

Figure 1

- c) Explain the term parallax in leveling and how to eliminate it (4 marks)
5. a) Using the height of collimation method, book the surveying data in **figure 1**. Carry out all the necessary checks. (10 marks)
- b) Define the following surveying terms (10 marks)
- i. Change point
 - ii. Datum
 - iii. Permanent bench mark
 - iv. Ordinance benchmark
 - v. Main survey station
 - vi. off-set
 - vii. Baseline
 - viii. Check line
 - ix. Intermediate survey station
 - x. Tie line