



MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATIONS 2024/2025

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

**FIFTH YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR
OF SCIENCE IN CIVIL ENGINEERING**

ECU 500: ENGINEERING PRACTICE AND ETHICS

Date:

Time :

INSTRUCTIONS

- *This paper comprises of **FIVE** questions. Answer **THREE** questions*
- *Question one is **Compulsory** and carries 30 marks*
- *Answer any other **TWO** questions*

Question One – Compulsory (30 marks)

- a) Discuss the primary aims of occupational health and safety (OHS) regulations in civil engineering projects. [6 Marks]
- b) Discuss the ethical principles typically associated with Engineers [4Marks].
- c) You are part of a design team working on a public infrastructure project funded by a government agency. The project is behind schedule, and there is pressure to cut corners to meet deadlines and stay within budget. How should you ethically respond to this situation? [6 Marks]
- d) You are tasked with designing a new road bridge over a river in an urban area. The bridge must accommodate two lanes of traffic and have a minimum clearance height of 5 meters above the water level. Discuss the key engineering and environmental considerations that would influence your bridge design. [6 Marks]
- e) Your company is negotiating a contract with a subcontractor for the supply of construction materials. What are the key considerations you would advise the

company to address in the contract negotiation process? [5 Marks]

f) Discuss 3 responsibilities and 3 challenges of Engineers as consultant [3 Marks]

QUESTION TWO (20 MARKS)

- a) Giving relevant illustrations, describe the concept of sustainable engineering and its importance in civil engineering projects. [6 Marks].
- b) Describe the typical consequence of unethical behaviour in engineering [4 Marks]
- c) A labour dispute has arisen between the construction workers' union and the project management team regarding overtime pay rates on a road construction project in Kenya. The union claims that workers are entitled to higher overtime rates according to their collective bargaining agreement, while management argues that the project budget cannot accommodate the increased costs. Discuss the potential implications of this labour dispute for the project and outline the steps you would take to resolve the conflict through arbitration or negotiation, considering Kenyan labour laws and practices. [10 Marks]

QUESTION THREE (20 MARKS)

- a) Following a series of workplace accidents on a civil engineering construction site, workers' safety representatives have raised concerns about the adequacy of safety protocols and procedures. Management has initiated discussions with the union to address these concerns and improve safety standards. Discuss the potential benefits of collaborative labour-management efforts in promoting workplace safety and outline the key elements of an effective safety improvement plan that could be developed through collective bargaining. [10 marks]
- b) A civil engineering project involves the renovation of an existing bridge. During the demolition phase, workers discover asbestos-containing materials (ACMs) in the bridge structure. Discuss the health risks associated with asbestos exposure and outline the procedures that should be followed to safely remove and dispose of ACMs in compliance with OHS regulations. [10 marks]

QUESTION FOUR (20 MARKS)

- (a) A construction company is hired to build a seven-storey residential building. After completion of the project, the client alleges that the building's design does not meet the specified safety standards and refuses to make final payment. The construction company argues that the bridge was built according to the approved plans and specifications. Outline the steps that could be taken to resolve this dispute, including any legal considerations and potential remedies. [10 Marks]
- (b) A civil engineering firm is contracted to build a new highway interchange. During construction, the client requests several design changes, leading to cost overruns and delays. The client accuses the engineering firm of breach of contract, while the firm claims the changes were necessary to meet evolving project requirements. Discuss the potential dispute resolution methods that could be employed to resolve this conflict, considering the interests of both parties. [10 Marks]

QUESTION FIVE (20 MARKS)

- a) You are a civil engineer hired as a consultant to provide design services for a public infrastructure project. The client has requested revisions to the design specifications midway through the project, which will require additional work and resources. How would you address the client's request for design revisions while ensuring compliance with contractual obligations? [12 Marks]
- b) You are a civil engineer working on a construction project for a new office block building. During the planning phase, you discover that the contractor intends to use substandard materials to cut costs, which could compromise the structural integrity of the building. What ethical considerations should you take into account, and how would you address this situation? [8 Marks]