



# **TECHNICAL UNIVERSITY OF MOMBASA**

***Faculty of Engineering and Technology***

**DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING**  
***Faculty of Engineering and Technology in Conjunction with Kenya Institute of***  
***Highways & Building Technology (KIHBT)***

**HIGHER DIPLOMA IN TECHNOLOGY**  
**ELECTRICAL POWER ENGINEERING**

**EEP 3203: ELECTRICAL BUILDING SERVICES I**

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2016**

**TIME: 2 HOURS**

## **INSTRUCTIONS TO CANDIDATES:**

1. You should have the following for this examination
  - Answer booklet
  - Electronic calculator
  - Student ID
  - Examination pass
2. This paper consists of **FIVE** questions.
3. Answer **ANY THREE** questions.
4. All questions carry equal marks.
5. **Do not write on the question paper**  
This paper consists of **THREE** printed pages

## PAPER ONE

### QUESTION ONE

- (a) Define
- i. Lightning stroke
  - ii. Isokeraunic line
  - iii. Surge Arrestor (6mrks)
- (b) State
- i. The effects of lightning stroke (3mrks)
  - ii. The objective of lightning protection system (2mrks)
- (c) Explain
- i. The parts of a building that need lightning protection
  - ii. The zone of protection of a surge arrestor
  - iii. The reason to necessitate the overlap of zones of protection of surge arrestors in a building( use a diagram to illustrate your answer) (9mrks)

### QUESTION TWO

- (a) State
- i. The main difference between estimating and tendering.
  - ii. The technical factors which influence tender pricing
  - iii. Two advantages of clients estimates or cost planning for the implementation of a construction project (6mrks)
- (b) List in a table of advantages verses disadvantages for the following procedures
- i. Open tendering
  - ii. Selective tendering
  - iii. Package deal (6mrks)
- (c) Explain why profit calculations are spread over in the bills of quantities during the estimating process for inclusion in the tender sum. (6mrks)
- (d) Defined tender appraisal (2mrks)

### QUESTION THREE

- (a) State
- i. THREE factors affecting the value of utilization factors
  - ii. The TWO laws of illumination (5mrks)
- (b) Define the following terms as used in Illumination
- i. Glave
  - ii. Flicker
  - iii. Shadow
  - iv. Candela (6mks)
- (c) A 7m X 9m room is lit by an 800cd lamp emitting flux in the lower hemisphere only, placed 4m above the floor and directly above the Centre. Determine the illumination of a point on the floor:-
- i. In the middle of the shorter side
  - ii. At the corner of the room

**QUESTION FOUR**

(a) Using suitable sketches explain the organization of the following project planning tools.

- i. Work breakdown structures (WBS)
- ii. CPM/PERT Network
- iii. GANTT chart

(6mrks)

(b) Distinguish between the following concerning engineering profits

- i. Goal
- ii. Objective
- iii. Activities
- iv. Task

(c) An electrical sub-contract had activities, cost and precedence as shown as shown in the figure below;

ACTIVITY	PERIOD	COST (M)	PRECEDENCE
A	3	2	NONE
B	4	3.8	NONE
C	2	5	A
D	1	1	A
E	4	7.5	B
F	1	0.5	C,D,E
G	½	0.2	F

Construct the CPM/ PERT Network and determine:-

- i. Critical path time using CPM
- ii. Critical path time using PERT
- iii. The Total cost of the project

(10mks)

**QUESTION FIVE**

1. State;

- i. The initial design items to be known referred to as 'assessment of general characteristics' for an electrical installation (4mks)
- ii. The EIGHT steps required in the calculation part of an electrical installation design procedure. (4mks)

2. A 415, 3 phase, 150.1 KW balanced load operates at a power factor of 0.7 lagging and its fed from a distribution board 20m away by a three-core PVC insulated and armored cable having copper conductors installed single in defined conditions in air. The ambient temperature of

45°C and close excess current protection is provided by a circuit breaker. Determine the most economical conductor size of cable for this load using the factors in table 6M attached.

(12mks)