UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	:	BET 3023
COURSE	:	ELECTRICAL INSTALLATION AND PROTECTION
SEMESTER / SESSION	:	01 – 2024/2025
DURATION	:	3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **ALL**.
2. All answers should be written in the answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hand and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 4 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) State **four (4)** schemes in selecting Low Voltage Distribution. (4 marks)

b) List **three (3)** acts of wiring regulation that need to be followed by electrical contractor. (3 marks)

QUESTION 2

a) A shop has the following single-phase loads, which are balanced as evenly as possible across the 415V three-phase supply.

2 x 6 kW and 3 x 2 kW thermostatically controlled water heaters
2 x 4 kW instantaneous water heaters
2 x 3 kW and 1 x 4 kW cookers
14 kW of discharge lighting (Sum of tube ratings)
8 x 30A ring circuit feeding 13A sockets.

Compare for each current of the loads, assuming that diversity can be applied. Calculations will be based on Appendix 1 (7 marks)

QUESTION 3

a) Explain protection in electrical system (2 marks)

b) You are deciding to change the protection device at substation. Identify **five (5)** criteria that you have to consider for upgrading the system protection performance. (5 marks)

QUESTION 4

a) State **three (3)** the most important protective devices used on MV lines in lighting protection. (3 marks)

b) List **four (4)** major factors when the seriousness of an electric shock. (4 marks)

c) Describe **four (4)** stages of the effect of a current flow through the body. (4 marks)

d) Classify the value resistivity according type of the earth in Table 3 below

Table 3

Types of earth	Resistivity / ohm-meter
Wet organic soil	
Moist soil	
Dry soil	
Bed rock	

(4 marks)

e) Explain the method of planting earth electrode with the diagram of earth electrode. (4 marks)

.....END OF QUESTION.....

APPENDIX 1: Allowance for diversity

Note the following abbreviations :
X is the full load current of the largest appliance or circuit
Y is the full load current of the second largest appliance or circuit
Z is the full load current of the remaining appliances or circuits

Type of final circuit		**Type of premises**	
	Households	Small shops, stores, offices	Hotels, guest houses
Lighting	66% total demand	90% total demand	75% total demand
Heating and power	100% up to 10 A + 50% balance	100%X + 75%(Y+Z)	100%X + 80%Y + 60%Z
Cookers	10 A + 30% balance + 5 A for socket	100%X + 80%Y + 60%Z	100%X + 80%Y + 60%Z
Motors (but not lifts)		100%X + 80%Y + 60%Z	100%X + 50%(Y+Z)
Instantaneous water heaters	100%X + 100%Y + 25%Z	100%X + 100%Y + 25%Z	100%X + 100%Y + 25%Z
Thermostatic water heaters	100%	100%	100%
Floor warming installations	100%	100%	100%
Thermal storage heating	100%	100%	100%
Standard circuits	100%X + 40%(Y+Z)	100%X + 50%(Y+Z)	100%X + 50%(Y+Z)
Sockets and stationary equip.	100%X + 40%(Y+Z)	100%X + 75%(Y+Z)	100%X + 75%Y + 40%Z