UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UCTATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BET 3063
COURSE	: ECAD
SEMESTER/SESSION	: 2-2023/2024
DURATION	: 3 HOURS

Instructions:

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

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

THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Electronic packaging is a major discipline within the field of electronic engineering and includes a wide variety of technologies. Define electronic packaging. (2 marks)

b) Electronic packaging has six (6) levels of hierarchy. Describe all six (6) levels of hierarchy with a full description of each level. (10 marks)

c) Semiconductors are materials whose electronic properties are intermediate between those of Metals and Insulators. It is divided into two main categories, Intrinsic (pure) and Extrinsic (Impure) semiconductors. Describe both categories. (6 marks)

d) Based on the impurities present in the Extrinsic Semiconductors, they are classified into two categories, N-type and P-type semiconductors. Describe N-type semiconductor characteristics. (6 marks)

QUESTION 2

a) The minimum angle that any trace should be placed is 60 degrees. State why the statement needs to be fulfilled. (Refer to **Figure 1**). (3 marks)

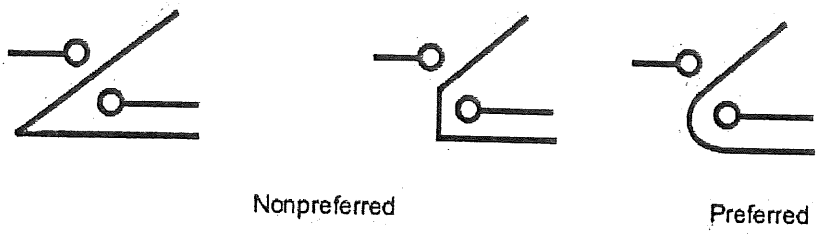

Figure 1

b) Printed circuit board classification is divided into three (3) classes according to the usage and applications, which **are consumer, professional** and **high-reliability** boards. Describe all three (3) classifications. (9 marks)

c) Double-sided boards have wiring patterns on both sides of the insulating material, i.e. the circuit pattern is available both on the components side and the solder side. Two types of double-sided boards are commonly used plated through-hole connection (PTH) and without plated through-hole connection (non-PTH). Describe both types of double-sided boards. (4 marks)

d) Three important considerations which form the basis for design rules for analog circuit PCBs are Component placement, Signal conductors, and Supply and ground line conductors. Describe the importance of :

i. Component placement (5 marks)

ii. Signal conductors (5 marks)

QUESTION 3

a) List five (5) considerations in schematic diagram development. (5 marks)

b) Describe 'Print and Etch' process. (2 marks)

c) Describe the single sided boards process below:

i. Artwork generation (3 marks)
ii. Image Transfer (photographic) (3 marks)
iii. Panel preparation (3 marks)
iv. Etching (3 marks)
v. Board drilling (3 marks)
vi. Testing (3 marks)

QUESTION 4

a) Define the meaning of a schematic diagram. (2 marks)

b) List five (5) important design elements before designing the PCB layout (5 marks)

c) Identify six (6) important performance parameters for PCB design. (3 marks)

d) In general PCB design, several things will be taken into consideration such as mechanical design, electrical design, functional design, and environmental design. Describe all four (4) considerations for faultless PCB design that can be produced. (12 marks)