



**UNIVERSITY COLLEGE TATI (UC TATI)**

**FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE : BET 3063

COURSE : ECAD

SEMESTER/SESSION : 2-2024/2025

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**

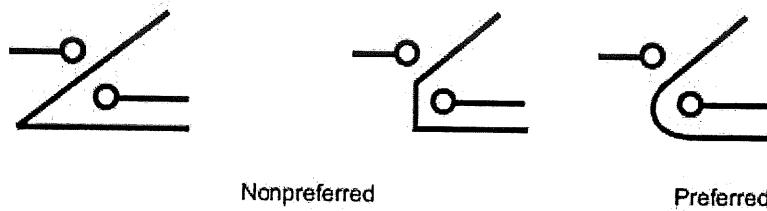
**THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE**

**QUESTION 1**

- a) Electronic packaging is a major discipline within the field of electronic engineering and includes a wide variety of technologies. List 4 (four) basic requirement of an electronic packaging.
- (2 marks)
- b) A section of an electronic structure that protects an electrical or electronic element is called an electronic packaging. List the 4 (four) functions that an electronic package of an electronic component must provide.
- (2 marks)
- c) First level interconnection is defined as the interconnections between the devices and circuits. It can divide into three categories of interconnection. Describe:
- i) First Level Packaging (2 marks)
  - ii) Wire Bonding (3 marks)
  - iii) Flip-Chip Bonding (3 marks)
- d) 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)
- e) Based on the impurities present in the Extrinsic Semiconductors, they are classified into two categories, N-type and P-type semiconductors. Describe P-type semiconductor characteristics.
- (6 marks)

**QUESTION 2**

- a) List the 3 (three) different types of circuit boards that are available  
(3 marks)
- b) The minimum angle that any trace should be placed is 60 degrees. Refer to Figure 1, describe why the statement needs to be fulfilled.

**Figure 1**

(3 marks)

- c) 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.  
(6 marks)
- d) 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)
- e) 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 three (3) considerations in schematic diagram development. (3 marks)
  
- b) Describe two (2) differences between photographic and photoresist process. (4 marks)
  
- c) Describe the single sided boards process below:
  - i. Artwork generation (3 marks)
  - ii. Panel preparation (3 marks)
  - iii. Image Transfer (3 marks)
  - iv. Etching (3 marks)
  - v. Board drilling (3 marks)
  - vi. Inspection and testing (3 marks)

**QUESTION 4**

- a) Define the meaning of a block diagram. (2 marks)
- b) List five (5) factors must be defined before the board can be designed. (5 marks)
- c) To ensure proper conductive cooling, heat dissipation can be achieved by all three types of heat transfer, i.e. conduction, convection and radiation. Describe:  
i) Removal of heat by conduction (3 marks)  
ii) Cooling through convention (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)

