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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	:	IC PACKAGING
COURSE CODE	:	BED 41103
PROGRAMME	:	BEJ
EXAMINATION DATE	:	JUNE / JULY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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Q1 (a) Electronic products began shifting from vacuum tubes to the transistors in 1950s and into the integrated circuits (IC) in the 1960s. Continued advances in reducing the size of transistors allowed the progressive integration of tens, hundreds and thousands on a single IC.

(i) State the definition of IC.

(2 marks)

(ii) Name **TWO (2)** types of IC.

(2 marks)

(iii) Analyse **ALL** integration level of IC technologies.

(4 marks)

(b) Packaging is needed in all IC, which are classified into Through-Hole Technology (THT) and Surface Mount Technology (SMT). Both packages have their own unique packaging process flow.

(i) State **FOUR (4)** requirement of IC packages

(4 marks)

(ii) Name **TWO (2)** types of the IC packages

(2 marks)

(iii) State **TWO (2)** mounting differences between THT and SMT

(4 marks)

(iv) State **FOUR (4)** advantages of Surface Mounting Technology (SMT)

(2 marks)

Q2 (a) Wire bonding is the process of providing electrical connection between the silicon chip and the external leads of the semiconductor device using very fine bonding wires.

(i) Sketch and label the ball/wedge connection.

(2 marks)

(ii) Sketch and label the wedge/ball connection.

(2 marks)

(iii) Explain advantages of ball/wedge over wedge/ball technique in wire bond interconnections.

(4 marks)

(iv) Explain **TWO (2)** important parameters in wirebonding process.

(4 marks)

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(v) Sketch and label a schematic diagram to show interconnection of wire between bond pads to lead frame for thermosonic wire bonding technology.

(8 marks)

Q3 (a) Tape Automated Bonding (TAB) has been developed in early 1970s, which is applied to variety of consumer, medical, security computer, peripheral, telecommunication, automotive and aerospace products:

(i) Define Tape Automated Bonding (TAB)

(2 marks)

(ii) Sketch and label the schematic of TAB (Tape Automated Bonding)

(4 marks)

(iii) TAB interconnection has **FOUR (4)** tape structures design. Sketch and label all of the structures.

(8 marks)

(iv) Discuss **THREE (3)** the advantages and disadvantages of Tape Automated Bonding (TAB).

(6 marks)

Q4 (a) Failure mechanisms in an electronic product are major problem in production line. They are caused by thermo-mechanical, electrical, chemical and environmental mechanisms. Analyse **FIVE (5)** thermomechnical fundamentals.

(10 marks)

(b) The symptoms of failure in electronic devices are always observed at the system level. Understanding the mechanism that causes components failure is the key to make reliable microelectronic package.

(i) Components are connected to the printed wiring boards (PWBs) by an array of relatively larger solder balls. Name one of the technique nowadays.

(1 mark)

(ii) State **THREE (3)** failure mechanisms.

(3 marks)

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(iii) Explain in detail the failure mechanisms in **Q4(b)(i)**.

(6 marks)

Q5 (a) Encapsulation and sealing are two major protecting functions of IC packaging. They are used to protect IC devices from adverse environmental and mechanicals effect.

(i) Define encapsulation and sealing process.

(4 marks)

(ii) Compare the mechanism process of encapsulation and sealing.

(4 marks)

(b) Encapsulation provides both chemical and mechanical protection of IC, such that a reasonable life expectancy can be achieved under filed conditions in automotive, telecommunications, computer, consumer, medical and other industries. Encapsulation also can be considered as the middle process in IC packaging.

(i) Discuss the effect of encapsulation on the performance of electronic packaging.

(8 marks)

(ii) Differentiate between hermetic and non-hermetic material.

(4 marks)

- END OF QUESTIONS -

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