



First Semester Examination  
2021/2022 Academic Session

February/March 2022

**EPP351 – Advanced Manufacturing Process**

Duration : 3 hours

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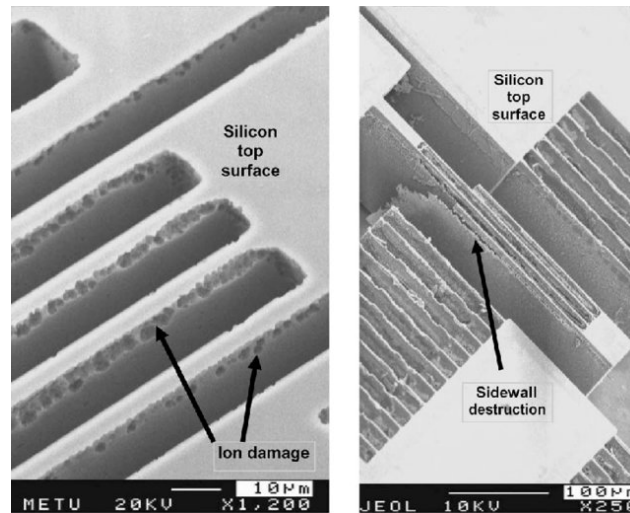
Please check that this examination paper consists of THREE[3] printed pages before you begin the examination.

**INSTRUCTIONS** : Answer **ALL FOUR[4]** questions.

In the event of any discrepancies, the English version shall be used.

1. [a] CERMAT Sdn. Bhd. is a company specializing in production of ceramic products ranging from small size dinnerware to large product such as flower pot. The company needs to increase production and at the same time maintain lower cost of production. Select the appropriate process for production of dinnerware and flower pot. Justify your choice.
- (40 marks)
- [b] Using diagram, illustrate the complete process of powder metallurgy starting from the metal powder preparation until finished product is obtained. Justify why each stage in the process is crucial for good quality product and give TWO (2) examples of powder metallurgy products.
- (60 marks)
2. [a] As Malaysia strive to achieve developed nation status by 2020, the dependent on manufacturing based economy remain relevant but must adapt to new competitive environment in a highly connected world. Give your justification and analysis on why sustainable manufacturing should be adopted in the future.
- (50 marks)
- [b] Component failure in high speed machinery often associated with tiny cracks which propagate into larger cracks. Surface treatment of component may be used in order to minimize the risk of premature failure. Identify, explain the process and justify an appropriate treatment method that can be used to treat the component.
- (50 marks)
3. [a] Fabrication of microelectronic devices requires series of processes starting from preparation of single crystal silicone ingot. Give an analysis of the critical process in microelectronic devices fabrication.
- (60 marks)
- [c] Differentiate between wet etching and dry etching and analyse their advantages and disadvantages.
- (40 marks)

4. [a] Figure 4.1 shows the structure of MEMS devices.
- (i) Identify a main difference in role and examples of the sacrificial and structural layer in MEMS devices.
  - (ii) Explain TWO (2) possible root causes of MEMS structural imperfection shown below.



(30 marks)

- [b] A capacitor serving as an accelerometer is shown in Figure 4.2.

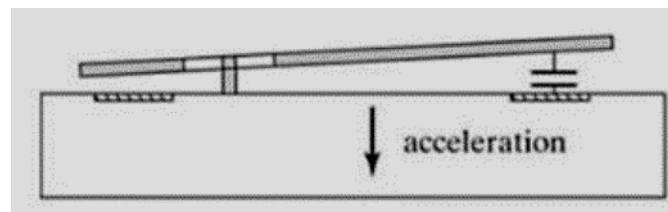


Figure 4.1

- (i) Describe the working principles of this accelerometer.
- (ii) With the aid of cross-section diagrams and suitable materials, develop and explain the fabrication process flow to create the final structure of the above sensor.

(70 Marks)