

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : COMPOSITE
COURSE CODE : BDB 40703
PROGRAMME CODE : BDD
EXAMINATION DATE : DECEMBER 2017 / JANUARY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWERS FIVE (5) QUESTIONS ONLY

TERBUKA

THIS QUESTION PAPER CONSISTS OF **THREE (3) PAGES**

CONFIDENTIAL

CONFIDENTIAL

- Q1**
- (a) Identify TWO (2) main composite classification based on reinforcement. (2 marks)
- (b) There is always an interface between constituent phases in a composite material. Illustrate the composite with interface and interphase. (4 marks)
- (c) Compare the main reason of producing ceramic matrix composite (CMC) and metal matrix composite (MMC). (4 marks)
- (d) Suggest the mechanism of interfacial bonding that:
 i. Needs thermodynamic equilibrium between the two constituents
 ii. Have adhesive bonding with the physical coupling of surface irregularities.
 How can these bonding being promoted? (10 marks)
- Q2**
- (a) Identify TWO (2) function of matrix in composite materials. (2 marks)
- (b) Illustrate the composite under iso-strain and iso-stress as well as their equation. (4 marks)
- (c) Differentiate between fibers and whiskers. (4 marks)
- (d) The epoxy reinforced with 60%vol. of E-glass particles is under iso-stress and iso-strain condition. Suggest a suitable graph to visualize both behaviors. Given: $E_{\text{epoxy}} = 6.9 \text{ GPa}$, $E_{\text{E-glass}} = 72.4 \text{ GPa}$ (10 marks)
- Q3**
- (a) Explain the fracture process of fiber reinforced composites. (4 marks)
- (b) Sketch the possible stress-strain curve for composite contains of carbon fiber and clay. (4 marks)
- (c) Differentiate between single fracture and multifracture in composite. (6 marks)
- (d) If the crack size is 12mm and the fracture toughness of composite is $80 \text{ MPam}^{1/2}$. Predict the minimum stress that will trigger crack propagation. (6 marks)

TERBUKA

- Q4** (a) Explain briefly the process of hand-lay up method. (4marks)
- (b) Sketch the simple schematic diagram to explain the process of your suggested method in Q4(d). (4 marks)
- (c) A body boat can be fabricated by hand-lay up method or spray method. Differentiate between these TWO (2) methods. (6 marks)
- (d) Suggest the best fabrication method to produce composite pipe and explain the reasons. (6marks)
- Q5** (a) Explain briefly the lanxide process. (4 marks)
- (b) Illustrate the schematic of lanxide process. (4 marks)
- (c) Compare between powder consolidation and reaction bonding of CMC processing. (6 marks)
- (d) Justify the importance of milling process in CMC processing by reaction bonding. (6 marks)
- Q6** (a) Explain why the composite is important in aircraft application? (3 marks)
- (b) There are 4 types of fiber that common in composite fabrication; glass, carbon, kevlar and boron. Choose the best fiber should be used in fabrication of bullet proof jacket. Explain the reasons. (4 marks)
- (c) Compare between glass fiber reinforced composite and carbon fiber reinforced composite. (8 marks)
- (d) Evaluate the potential of carbon fiber reinforced composite to be used in aero engine. (5 marks)

TERBUKA**END OF QUESTION-**