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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

COURSE NAME : BIOMEDICAL ENGINEERING AND APPLICATIONS
COURSE CODE : BEU 41503
PROGRAMME : BEJ
EXAMINATION DATE : JUNE / JULY 2018
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS AND THIS QUESTION PAPER MUST BE RETURNED

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

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- Q1**
- (a) Identify **THREE (3)** workplaces and job descriptions where one can practice biomedical engineering. (6 marks)
- (b) Provide **TWO (2)** benefits of joining a biomedical engineering professional society. (4 marks)
- Q2**
- (a) By giving examples, discuss the evolution of biotechnology from ancient to modern biotechnology. (7 marks)
- (b) Researchers have alternatively studied tissue explant cultures due to challenges associated with understanding fundamental mechanisms of cell behavior at the complex, in vivo level. Describe types of cell used in the cell culture. (6 marks)
- (c) Demonstrate the overall process involved for cell line derivation. Draw the flow process. (8 marks)
- (d) Flow cytometry is a biophysical technology used in biotechnology.
- (i) Identify the difference between a microscope and a flow cytometer. (4 marks)
- (ii) Summarise the operation principle of the flow cytometer. (6 marks)
- (e) Explain the genetic and physical characteristic that present in the living organism especially referred in molecular biology. (4 marks)
- (f) Cells have basic categories which can be referred on their shape and appearance. Identify these basic categories. (6 marks)
- (g) Justify what are the applications of cell culture and where is used. (10 marks)

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- Q3** (a) Identify an imaging system that can produce topographical images for surface analysis with nanometer resolution. Explain the principle imaging technique for the selected system with the aid of diagram. (6 marks)
- (b) Atomic force microscope (AFM) is a system that can perform high resolution imaging and unlike the standard optical microscope. Explain the available imaging methods supporting with the advantages and disadvantages of each method. (6 marks)
- (c) AFM is a powerful tool used in investigating the fine structure information of food materials.
- (i) In comparison with common forms of microscopy used by researchers in food science, AFM offers **FIVE (5)** unique features. Describe them. (10 marks)
- (d) Ultrasound is an example of imaging equipment which belongs to diagnostic group.
- (i) Define the benefits of ultrasound system (4 marks)
- (ii) State **TWO (2)** general limitations of Ultrasound imaging. (4 marks)
- (iii) Identify the area where ultrasound application can be used. (3 marks)
- (iv) Give **TWO (2)** example of medical conditions for each area identified in **Q3(d)(iii)**. (6 marks)

– END OF QUESTIONS–

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