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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER III
SESSION 2013/2014**

COURSE NAME : CELL CULTURE & TISSUE
ENGINEERING
COURSE CODE : DAK 22203
PROGRAMME : DAK
EXAMINATION DATE : AUGUST 2017
DURATION : 2 1/2 HOURS
INSTRUCTION : A) ANSWER ALL QUESTIONS IN
SECTION A
B) ANSWER TWO (2)
QUESTIONS ONLY IN
SECTION B

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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SECTION A

- Q1**
- (a) Vector is known to act as a ‘vehicle’ to carry foreign genetic material to another cell. State **FOUR (4)** examples of vector. (4 Marks)
 - (b) Describe **FOUR (4)** properties of an ideal vector (4 Marks)
 - (c) X vaccine research institute wish to produce a recombinant vaccine for Q disease using *Escherichia coli*. Given the size of Q disease antigen gene is 8-15kb. Predict the best vector to be used for this activity and describe the characteristics of the vector chosen. (6 Marks)
 - (d) Sketch and explain the process of transfection using calcium-phosphate technique. (6 Marks)
 - (e) Demonstrate the process of gene transfer in plant. (5 Marks)

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- Q2**
- (a) Define the importance of aseptic technique. (1 Marks)
 - (b) Imagine you are working on an experiment involving plant cell culture in laboratory. Schedule step by step on how to conduct a good aseptic technique. (5 Marks)
 - (c) Foam may form during cell culture procedure. Predict the effect of foaming onto cell culture. (5 Marks)
 - (d) Routine maintenance check should be executed to maintain animal cells in media. Demonstrate the steps required for this purpose. (9 Marks)
 - (e) List the disadvantageous of serum in cell culture media. (5 Marks)

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SECTION B

- Q3** Sketch the process of glucose metabolism. (25 Marks)
- Q4** (a) List and elaborate the components involve in animal cell culture media and plant culture media. (20 Marks)
- (b) List **FIVE (5)** desired criteria of a suitable vessel for cell culture. (5 Marks)
- Q5** (a) Based on **Figure 1**, produce a complete diagram of the tricarboxylic acid (TCA) cycle. (9 Marks)
- (b) From region labeled A to G, distinguish **FOUR (4)** regions where energy in the form of NADH are produced. (4 Marks)
- (c) Define metabolism and demonstrate the difference between catabolism and anabolism. (3 Marks)
- (d) In the mitochondria, energy is produced in the form of Adenosine triphosphate (ATP) where glucose are converted into pyruvate consequently forming oxaloacetate. Compute the amount of net ATPs produced by these metabolism processes. (5 Marks)
- (e) Explain the purpose and effects of metabolism in cell. (4 Marks)

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- Q6** (a) Define the term cell death and list **THREE (3)** causes of cell death. (4 Marks)
- (b) Apoptosis is one type of cell death. Explain the mechanism of apoptosis. (9 Marks)
- (c) In a fed batch system, substrate are fed intermittently into the system. Discuss the effects of the increasing concentration of glucose and glutamine uptake in cell culture. (5 Marks)
- (e) Z cells is grown in a continuous reactor system where the concentration of substrate in feed, substrate in reactor and viable cells are 60 mM, 55 mM and 100 cell mL⁻¹ respectively. Given the dilution rate is 73 h⁻¹, calculate the specific substrate consumption rate, q_s (mmol cel⁻¹h⁻¹). (3 Marks)
- (e) The use of embryonic cell in cell culture procedure cause an uproar among the ethicist and the society. Discuss the reasons why they are against this method. (4 Marks)

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- END OF QUESTIONS -

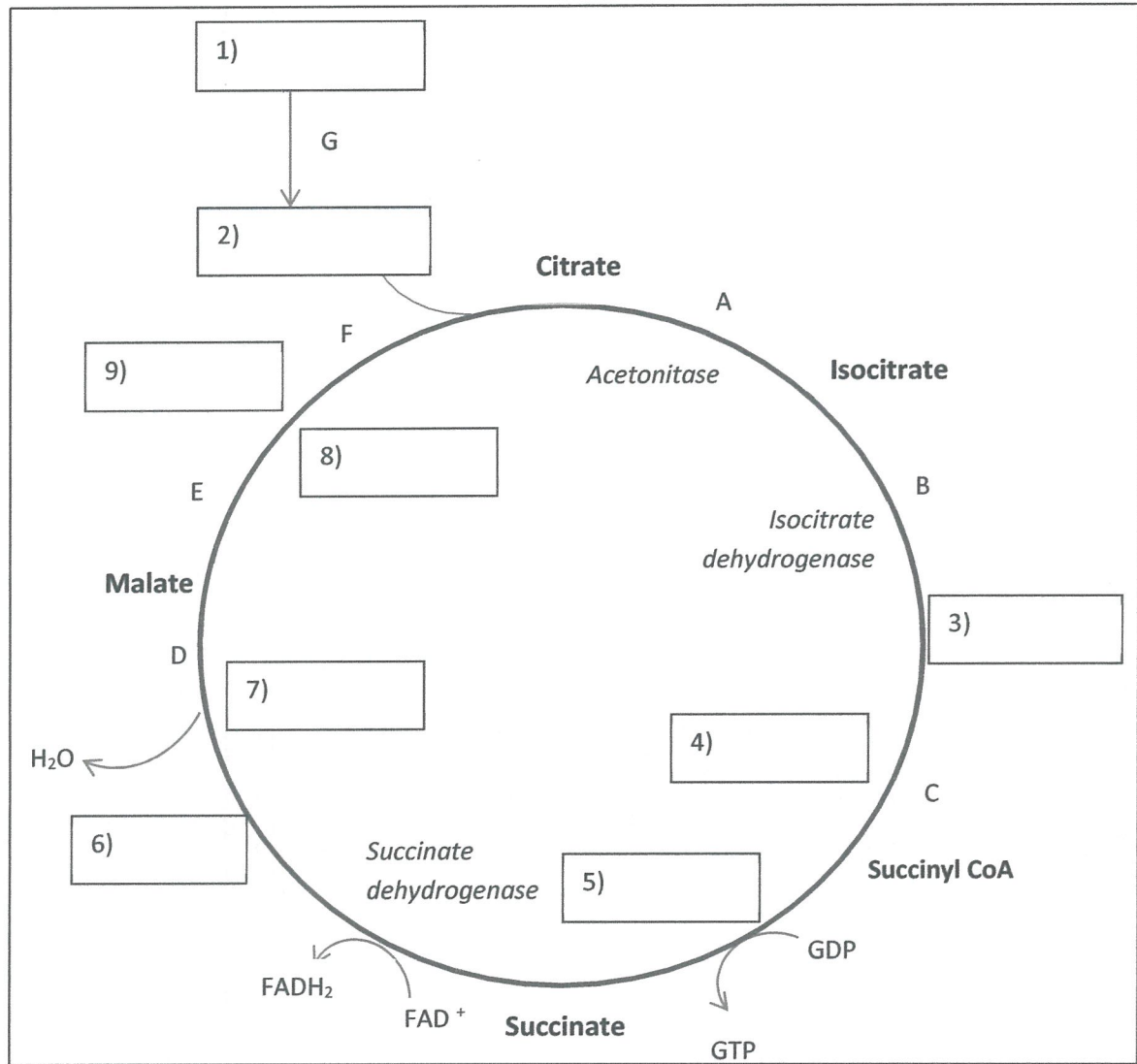


Figure 1

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