UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BPE 3243
COURSE	: SPECIALTY ENGINEERING POLYMERS
SEMESTER/SESSION	: 1 - 2022/2023
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 4 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 4 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Outline two (2) chemical methods for polymeric coating. (4 marks)

b) Grafting co-polymers is one of polymeric coating method. Define grafting process. (3 marks)

c) Explain on how flame treatment works on altering polymer surface. (6 marks)

d) Discuss three (3) important ingredients for coating and their functions. (6 marks)

e) Ebonite is a brand name for a very hard rubber. Justify three (3) advantages of using ebonite as coating material. (6 marks)

QUESTION 2

a) Outline three (3) reasons why polymers are widely used in medical field. (6 marks)

b) Predict three (3) biomedical applications of synthetic derived polymers. (3 marks)

c) Differentiate the meaning of in-vitro, in-vivo and in-silico experiment. (6 marks)

d) Interpret Figure 1 and explain three (3) tools for tissue engineering. (6 marks)

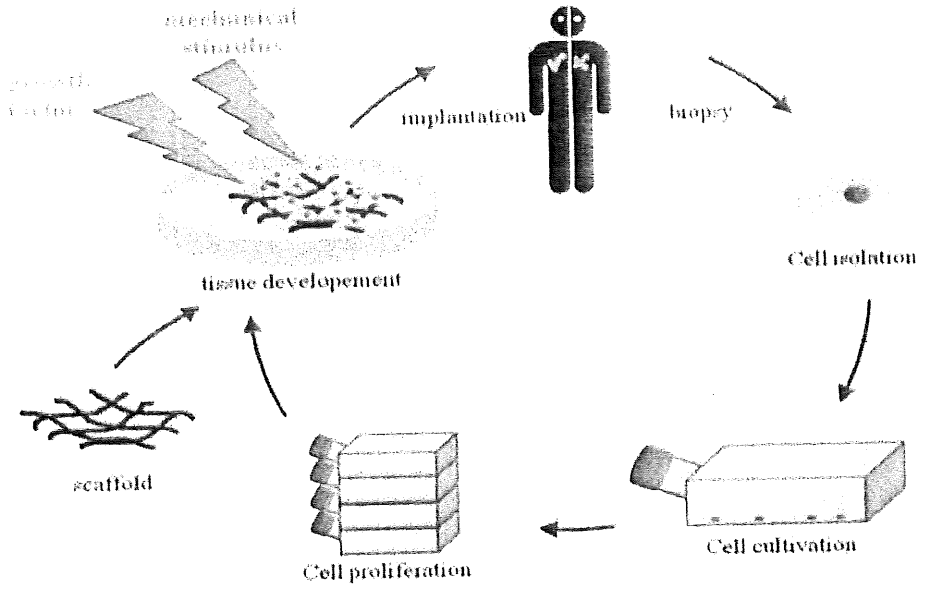

Figure 1

e) Hydrogel are three-dimensional network of hydrophilic cross-linked polymer that do not dissolve but can swell in water. Based on this property, identify two (2) applications of hydrogel in biomedical field. (4 marks)

QUESTION 3

a) Water-soluble polymers are organic polymers that dissolve, disperse, or swell in water. Categorize three (3) types of water-soluble polymer. (6 marks)

b) Give three (3) examples of natural water-soluble polymers. (3 marks)

c) Discuss three (3) application of water-soluble polymer in food processing. (6 marks)

d) Define polymer electrolytes. (4 marks)

e) The main application of polymer electrolytes is in energy conversion and storage devices such as batteries and fuel cells. Distinguish three (3) types of polymer electrolytes. (6 marks)

QUESTION 4

a) Identify five (5) factors in selecting a plastic material for heavy engineering use. (5 marks)

b) Silicones or polysiloxanes are inorganic-organic polymers with the chemical formula $[R_2SiO]_n$.

(i) Construct the molecule structure of silicones. (3 marks)

(ii) Justify three (3) the advantages of using silicones in heavy engineering. (6 marks)

c) Poly-ether-ether-ketone (PEEK) contains aromatic structure are widely used in high temperature of heavy engineering applications.

(i) Sketch the molecule structure of poly-ether-ether-ketone (3 marks)

(ii) List four (4) appropriate material characteristic of poly-ether-ether-ketone. (8 marks)

----------End of question----------