

Uva Wellassa University, Sri Lanka
Faculty of Science & Technology
Science and Technology Degree Program
400 level 2nd Semester Examination – Dec /Jan 2018
SCT 446-2 Composites and Biomaterials



Instructions to candidate

Time allocation: Two (02) hours

Number of questions: Four (04) essay

Mark allocation: 150

Answer all questions

1.

- a. Compare and contrast the blends and composites.

(15 Marks)

- b. Explain why nanocomposites exhibit superior properties compared to conventional filler materials.

(15 Marks)

- c. Briefly describe pultrusion and filament winding fabrication processes. Use schematics if necessary. Discuss the advantages and disadvantages of each.

(20 Marks)

2. A continuous and aligned aramid fiber-reinforced composite consists of 35 vol.% aramid fibers having modulus of elasticity of 131 GPa and 65 vol.% special grade polycarbonate having modulus of elasticity of 2.4 GPa have been made for a special application.

- a. Determine the modulus of elasticity of the composite in the longitudinal direction.

(15 Marks)

- b. If the cross-sectional area of the composite beam is 325 mm^2 and a stress of 60 MPa is applied in the longitudinal direction, compute the magnitude of the load carried by each of the fiber and matrix phase.

(15 Marks)

- c. Determine the strain that is sustained by each phase when the stress of 60 MPa is applied.

(20 Marks)

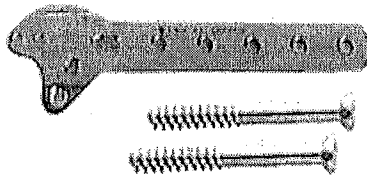
3.

a. What is Prosthesis? (05 Marks)

b. Give one example each for first, second and third generation implant. (06 Marks)

c. Give one example each for totally external, partially external and totally internal explant. (06 Marks)

d. i. Identify the implant in the figure below.



(02 Marks)

ii. What is the application of this implant? (03 Marks)

iii. Suggest suitable materials to fabricate it. (03 Marks)

4.

a. What are biocompatible materials? (03 Marks)

b. State four negative tissue responses, if the material that used to produce an implant is not biocompatible. (04 Marks)

c. Give four reasons how an implant could fail inside the human body. (08 Marks)

d. Give two examples each for metal, ceramic and polymer biomaterials. (06 Marks)

e. Give one advantage and one disadvantage of Bioceramics. (04 Marks)

