

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)  
ORGANISATION OF ISLAMIC COOPERATION (OIC)  
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Semester Final Examination  
Course Number: IPE 4873  
Course Title: Biomedical Engineering

Summer Semester: 2022-2023  
Full Marks: 150  
Time: 3 hours

Answer all the 6 (six) questions below. The distribution of marks and the CO-PO mapping are given in brackets.

Q1. (a) Differentiate biomaterial from biological material and state the properties of an ideal biomaterial. Classify of different types materials used as biomaterials and identify their pros and cons, and applications in various biomedical engineering field. [15] (CO1, PO1)

(b) Discuss the application of biomaterial in oral and cardiovascular systems. [10] (CO1, PO1)

Q2. (a) Define with examples the orthopedic prosthesis and orthosis. Make a short note on the fundamental considerations needed for the designers of orthotic and prosthetic devices. Analyze the following figure (Fig. 1) and provide a discussion in the context of the application of biomaterial in rehabilitation engineering. [12] (CO1, PO1)

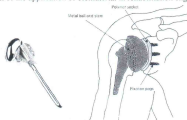


Figure 1

(b) Briefly describe the different compositions of blood. Mention the normal range of blood pressure and identify different symptoms of high and low blood pressures. Given that the stroke volume is 73 cm<sup>3</sup> and the heart rate is 75 bpm, calculate the cardiac output. [13] (CO1, PO1)

Q3. (a) Define tissue regeneration and the steps in tissue engineering process. Describe with a schematic figure the electrospinning process for tissue engineering scaffold. [10] (CO1, PO1)

