Reg. No. :

Question Paper Code: 1215087

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Fifth Semester
Biomedical Engineering
U20BM502 – BIOMECHANICS
(Regulation 2020)

Time: Three Hours   Maximum: 100 Marks

Answer ALL questions

PART – A   (10 x 2 = 20 Marks)

1.   How will you relate the power and energy relationship in mechanics?

2.   Write a short note on the kinematic concept of human motion.

3.   List out the functions of the intrinsic fluid property.

4.   How will you relate viscous and turbulent shear stress?

5.   Draw the block diagram of functional adaption for bone remodeling.

6.   Mention the implants to be used for bone fractures.

7.   State the significance of synovial joint.

8.   Identify the characteristics of gait pattern analysis.

9.   What are the challenges faced during hand-transmitted vibration?

10.   What is meant by the term MSD? How will it relate to the working environment?

PART – B   (5 x 16 = 80 Marks)

11. (a) Explain in detail about the angular kinematic relationship between linear and angular motion. (16)

(OR)

(b) Derive the expression of constitutive equation for Newtonian, Non- Newtonian and Hookean elastic solid. (16)

12. (a) Describe the working principle of the cylindrical and cone viscometer in detail. (16)

(OR)

(b) Compare the mechanics of prosthetic heart valves in cardiovascular system. (16)

13. (a) (i) Derive the expression of Maxwell and Voight's model of viscoelasticity Kelvin-Voight empirical viscoelastic model. (8)
(ii) Summarize the hill's mathematical modeling of skeletal muscle. (8)

(OR)

(b) With a neat sketch, describe the structure, function, material properties, and modeling of tendons and ligaments in detail. (16)

14. (a) Illustrate the biomechanical analysis of elbow and knee joints. (16)

(OR)

(b) Analyze the significance parameters of human gait patterns and describe the concept of motion analysis using the video camera. (16)

15. (a) Explore, how the finite element analysis method is applied in the design of the lumbar spine modeling. (16)

(OR)

(b) Design a comfortable computer workstation using key components based on ergonomic factors and principles. (16)

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