

GANPAT UNIVERSITY

B.Tech. Semester VII (BM&I) Regular Examinations Nov/ Dec 2015
2BM 702 Biomechanics

Time:- 3 Hours

Marks:- 70

Instructions:

1. Answer to the questions must be written in separate answer books.
2. Figure to the right indicate marks.
3. Assume data, if needed.
4. Conventional terms / notations are used.
5. All the questions are compulsory.

SECTION-I

Q.1

- | | | |
|-----|-------------------------------------------------------------------------|---------|
| (a) | Explain the isometric contraction and eccentric contraction in detail. | 12 4 |
| (b) | Draw and explain different types of mechanical loads on the human body. | 5 |
| (c) | Write a short note on muscle endurance. | 3 |

OR

Q.1

- | | | |
|-----|-------------------------------------------------------------------------------------------|---------|
| (a) | Write a short note on loads on the knee joint. | 12 4 |
| (b) | Define moment arm. How does moment arm affect the ability of a force to rotate a segment? | 4 |
| (c) | Explain all transverse plane and frontal plan movements in detail with neat diagram. | 4 |

Q.2

- | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| (a) | Write a short note on loads on the hip joint. | 11 4 |
| (b) | Construct a chart listing all muscles crossing the knee joint according to whether they are anterior, posterior, medial or lateral to the joint centre. | 4 |
| (c) | How much tension may be developed in muscles with the following cross sectional areas: i) 2cm^2 ii) 12cm^2 The tension generating capability of muscle tissue is 200 N/cm^2 | 3 |

OR

- Q.2** 11
- (a) How much compression acts on the patella femoral joint when the quadriceps exerts 200N of tension and the angle between the quadriceps and the patellar tendon is 120° and 50° ? 5
- (b) How much torque is produced at the elbow by the biceps brachii inserting at an angle of 60° on the radius when the tension in the muscle is 700N? (Muscle attachment to the radius is 2 cm from the centre of rotation of the elbow joint) 6

- Q.3** 12
- (a) Draw the structural organization of skeletal muscle. Explain what happens at sarcomere level when muscle contracts. 6
- (b) Enlist the types of lever. Explain each type with neat diagram and example. 6

SECTION-II

- Q.4** 12
- (a) Write a short note on types of joint in the body. 6
- (b) Draw and enlist the different muscles in the body. 6

OR

- Q.4** 12
- (a) What is centre of gravity of a human body? Explain the reaction board method to locate the centre of gravity of a human body. 6
- (b) Explain in detail the factors that affect the generation of muscle force. 6

- Q.5** 11
- (a) Explain Gait flow chart in detail. With necessary figures. 3
- (b) Describe the loads acting on the shoulder. 4
- (c) Explain the movements at the shoulder complex 4

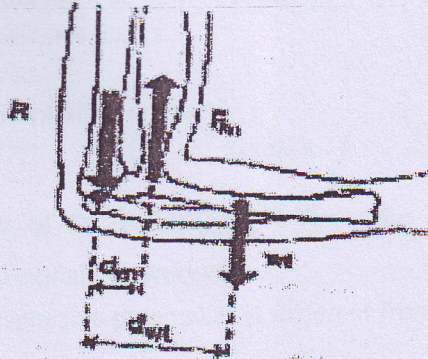
OR

- Q.5** 11
- (a) Give the names of methods of gait cycle. Explain each of them 5
- (b) Explain the forces associated with gait cycle. 4
- (c) Give the names of common injuries at the elbow. 2

Q.6

12

- (a) Give the names of common gait abnormalities and explain them. 6
- (b) How much force must be produced by the brachioradialis and biceps (F_m) to maintain the 15N forearm and hand in the position shown below given moment arms of 7cm for the muscles and 20 cm for the forearm/hand weight? What is the magnitude of the joint reaction force? 5



- (c) What are the prime flexors of glenohumeral joint? 1

----- END OF PAPER -----