Student Exam No:

GANPAT UNIVERSITY

B.Tech. Semester VII (BM&I) Regular Examinations Nov/ Dec 2013

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) Write a short note on loads on the knee joint. 4

(b) Explain all transverse plane and frontal plan movements in detail with neat diagram. 5

(c) Write a short note on muscle power. 3

OR

Q.1

(a) Draw and explain different types of mechanical loads on the human body. 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) Write a short note on loads on the hip joint. 4

Q.2

(a) Define moment arm. How does moment arm affect the ability of a force to rotate a segment? 4

(b) Explain the isometric contraction and eccentric contraction in detail. 4

(c) How much torque is produced at the elbow by the biceps brachii inserting at an angle of 80° on the radius when the tension in the muscle is 500N? (Muscle attachment to the radius is 2.5 cm from the centre of rotation of the elbow joint) 3

OR

Q.2

(a) How much tension may be developed in muscles with the following cross sectional areas: i) $1cm^2$ ii) $10cm^2$ The tension generating capability of muscle tissue is 100 N/ cm^2 4

(b) How much force must be produced by biceps brachii attaching at 90° to the radius at 3cm from the centre of rotation at the elbow joint, to support a weight of 80N held in the hand at a distance of 25 cm from the elbow joint? Calculate the force at 30°and 110°. Write your comment for both these angles considering physiological relevance. 7

Q.3

(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. 5

(b) Enlist the types of lever. Explain each type with neat diagram and example. 7

SECTION-II

Q.4

(a) Draw and explain the different phases of GAIT cycle.. 6

(b) Explain in detail the factors that affect the generation of muscle force. 6

OR

Q.4

(a) What is musculotendinous unit? Explain all the behavioral properties of the musculotendinous unit. 6

(b) Draw and enlist the different muscles in the body. 6

Q.5

(a) Draw the structural organization of skeletal muscle. Explain what happens at sarcomere level when muscle contracts. 6

(b) Explain structure of shoulder in detail. 5

OR

Q.5

(a) Write a short note on types of fracture. 6

(b) Draw and explain the loads on the shoulder joint. 5

Q.6

(a) Write a short note on types of joint in the body. 6

(b) Draw and explain the movement of shoulder joint. 6

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