Birla Institute of Technology & Science, Pilani

Introduction to Sports Engineering, ME F340

Comprehensive examination, Sem –I, 2022-23, December 2022

CLOSEDBOOK

Weightage: 35 **Duration: 120 min.**

Answer all parts of a question in continuous sequence

Use pencil and drawing instrument for any sketch or line diagram

---

Q1) Write in a few bullet points:

a) What are the differences and advantages of filled over unfilled pitches?
b) What is a hybrid pitch?
c) What are its various layers and their functions?
d) what is grass root aeration technology used for?
e) Explain in brief about the flooring system varieties of a multi-purpose sports hall
f) Explain the construction and working of ball bounce and ball roll apparatus, their usage?
g) If the hockey ball is dimpled, what will happen?
h) Name three important properties of sports surface
i) Name methods to measure the above three important properties of sports surface
j) What is a HANS device?

[10*1.5 = 15]

Q2) Elaborate the following:

a) What essentially is the purpose of running shoe testing, what are the parameters we want to determine?
b) Discuss with sketch two different engineering tests carried out on a running shoe?
c) What ergonomic principles goes into a sports shoe design?
d) What characteristics you will look for in a mountain bike vs a long distance racing bike?
e) How do we define mechanical advantage in an exercising machine, how it is useful? Explain with a specific example.

[5*2=10]

Q3) Answer to the point:

a) What are the components that contributes to the stability of a knee joint?
b) What is/are the planes of motion of a knee joint.
c) What are the degree of freedom of knee joint and typical ROMs?
d) What is the liver arrangement in knee joint?
e) What are the natural dispositions in knee joint?
f) How can gait analysis be used to detect painful condition in knee, which stage(s) of walking gait will be important to get such information?
g) Explain ground reaction force and force balance during a single leg stance.
h) Where is the maximum bending moment in leg during a single leg stance?
i) Which set of muscles are involved in flexion and extension of knee joint?
j) What is an open kinematic chain exercising of leg muscles?

[10*1=10]