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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year I Semester Supplementary Examinations June 2019**

**ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS**

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

**UNIT-I**

- 1 a Give examples of engineering problems and designs, where the physical properties are necessary. 8M  
b What are the differences between the bulk and true densities? 4M
- OR**
- 2 a What are three different methods for determining the sphericity? 10M  
b Define apparent density? 2M

**UNIT-II**

- 3 a Generally, thermal conductivity of the low-moisture foods is very low when compared to the liquid foods. How this behavior influence the heat transfer process? 6M  
b Between ice and water, which has higher thermal conductivity? How the physical states of the water in food influence the heat transfer? 6M
- OR**
- 4 a Write about the effect of moisture content on thermal conductivity, diffusivity and specific heat? 8M  
b List out the various thermal properties that are to be considered while designing a dryer for agricultural produce. 4M

**UNIT-III**

- 5 a How the frictional properties influence the flow pattern of the grain in vertical silos? 6M  
b With a neat diagram, describe the method for measuring the angle of repose? 6M
- OR**
- 6 a Derive the expression for terminal velocity? 6M  
b Define static, kinetic and rolling frictions? 6M

**UNIT-IV**

- 7 a What are the differences between the biomaterials and engineering materials? 6M  
b What is the bioyield point? Show the bioyield point on force-deformation curve? 6M
- OR**
- 8 On strain- stress plot, show these behaviours: (a) Linear elasticity in steel, 12M  
(b) Non-linear elasticity in rubber, and (c) In-elasticity behaviour in dry corn kernel

**UNIT-V**

- 9 a What the important two dielectric properties? Define those properties? 6M  
b How the dielectric properties influence the heating with microwaves? 6M
- OR**
- 10 a Color is one of the important optical property for agricultural produce. Write about its measurement and scales for the color representation. 6M  
b What is the difference among the dielectric, ohmic and infrared energies? 6M

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