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GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester – Regular) Examinations, December – 2020 BPCAG 3050 – ENGINEERING PROPERTIES OF AGRICULTURAL PRODUCE (Agricultural Engineering)

Time: 2 hrs

Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

Q.1. Answer **ALL** questions

- a. The relationship between the true density (ρ) and bulk density (B) is
- (i) $\rho = \frac{B}{E-1}$ (ii) $\rho = \frac{1-E}{B}$
- (iii) $\rho = \frac{E-1}{B}$ (iv) $\rho = \frac{B}{1-E}$
- b. Specific heat of ice is ----- of the specific heat of water.
- (i) Half (ii) Same
- (iii) Double (iv) Triple
- c. The geometric mean diameter of the particle is also called
- (i) Mean diameter (ii) Equivalent diameter
- (iii) Arithmetic mean diameter (iv) Geometric diameter
- d. The coefficient of friction between granular materials equal to the ----- of the angle of internal friction for the material
- (i) Cosine (ii) Sine
- (iii) Tangent (iv) Secant
- e. The friction force existing between the surfaces in relative motion is called
- (i) Static friction (ii) Dynamic friction
- (iii) Internal friction (iv) Kinetic friction
- f. In a rotational viscometer relationship is established between
- (i) Shear stress and shear rate (ii) Density and shear rate
- (iii) Density and shear stress (iv) Viscosity and density
- g. Ideal plastic behavior is represented by
- (i) Hooken body (ii) St. Venant body
- (iii) Newtonian liquid (iv) All of them
- h. When the processing temperature of the orange juice increases, viscosity of the orange juice
- (i) Decreases (ii) Increases
- (iii) Decreases initially and then increase after reaching critical value (iv) Increases initially and then decrease after reaching critical value
- i. The dielectric constant of water is-----than that of ice.
- (i) 25 times lower (ii) 25 times higher
- (iii) 50 times higher (iv) 75 times higher
- j. Major properties needed to design a conveyor system are
- (i) Physical & thermal properties (ii) Physical & rheological properties
- (iii) Physical & electrical properties (iv) Physical & frictional properties

PART – B: (Short Answer Questions)

(2 x 5 = 10 Marks)

Q.2. Answer ALL questions

- a. Differentiate true density and bulk density.
- b. List the important physical characteristics of agricultural products which are used in handling and processing operations.
- c. Define angle of repose.
- d. What is the purpose of determining the flow properties of agricultural products?
- e. Indicate the importance of electrical properties in agricultural process engineering

PART – C: (Long Answer Questions)

(6 x 5 = 30 Marks)

Answer ANY FIVE questions

Marks

3. Describe the Pycnometer Method used to Determine the Specific gravity of grain (6)
4. Find the volume of 0.1 N NaOH in ml to be used for titrating 20 ml of fresh milk having density of 1028 kg/m^3 and 0.2% acidity. (6)
5. Describe the method used for measuring coefficient of internal friction of agricultural produce. (6)
6. The average values for major, minor and intermediate diameter for 50 pieces castor seed and its weight is given below. (6)
Major diameter = 17,2mm; intermediate diameter =13.1mm; minor diameter = 7.9mm
Weight = 0.97g.
If the castor seed is conveyed using pneumatic conveyor at the rate of $0.2\text{m}^3/\text{s}$ through a 20 cm diameter pipe, then compute the drag coefficient and the terminal velocity. Density and viscosity of air is 1.29 kg/m^3 and $1.91 \times 10^{-5} \text{ Ns/m}^2$
7. A Newtonian fluid is flowing through a tube of inside diameter 0.8 cm and length 25 cm at a flowrate of $55 \text{ cm}^3/\text{s}$. The pressure drop recorded was 710 Pa. Calculate the viscosity of the fluid. (6)
8. Explain the flow behaviour properties of non-newtonian fluids with flow curves (6)
9. Explain the factors affecting Electrical conductivity of Liquid Foods (6)
10. List out the major engineering properties needed to design a grain storage silo and a pneumatic conveyor. (6)

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