Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14FP2016** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PHYSICAL PROPERTIES OF FOOD MATERIALS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the solid displacement method to find the volume of solid food material. | CO2 | 10 |
| b. | A cylindrical object has 1 cm diameter and 1.6 cm height. Calculate the sphericity of the object. | CO3 | 10 |
| **(OR)** | | | | |
| 2. | a. | Calculate the true density of coriander at 25℃ having the composition and density given in the table.   |  |  |  | | --- | --- | --- | | **Component** | **Density(kg/m3)** | **Composition(%)** | | Water | 995.74 | 91.57 | | Protein | 1319.63 | 2.86 | | Fat | 917.24 | 0.35 | | Carbohydrate | 1592.89 | 1.72 | | Ash | 2418.19 | 3.50 | | CO3 | 6 |
| b. | Discuss the various methods used for the determination of porosity of food samples. | CO1 | 14 |
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| 3. | a. | Outline the rhelogical classification and explain Newtonian and Non-Newtonian fluids with suitable examples. | CO1 | 10 |
| b. | Demonstrate the working of coaxial cylinder viscometer and deduce the equation for finding viscosity. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Discuss the generalized texture profile analysis with diagram. | CO1 | 10 |
| b. | Give a note on texture measuring instruments. | CO2 | 10 |
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| 5. | a. | Appraise the various methods used for the determination of specific heat of the materials. | CO2 | 14 |
| b. | A vacuum jacketed calorimeter of 86g was used for the determination of specific heat of 36g of lean beef sample. The calorimeter cup and the sample were first brought to 12℃ and then 68g of water at 6℃ was poured into the cup. The system was then sealed and brought toequilibrium. The equilibrium temperature was recorded to be 7.8℃. The specific heats of water andcalorimeter cup are 4198 J/kg℃ and 383 J/kg℃, respectively. The calorimeter was well insulated andthe heat loss to the surrounding was negligible. Calculate the specific heat of sample. | CO3 | 6 |
| **(OR)** | | | | |
| 6. | a. | Identify any two methods used for finding thermal conductivity and give a detailed answer. | CO2 | 10 |
| b. | The composition of date fruit (Phoenix dactylifera), densities of food components and thethermal conductivity equations are given in the table below. Determine the thermal conductivity of the fruit at 25℃, using parallel and series models.   |  |  |  |  | | --- | --- | --- | --- | | **Compo-**  **nent** | **Wt(%)** | **Density (kg/m3)** | **Thermal Conductivity Equation** | | Water | 22.5 | 995.7 | kwater= 0.57109+1.7625×10−3T−6.7036×10−6T2 | | CHO | 72.9 | 1592.9 | kCHO= 0.20141+1.3874×10−3T−4.3312×10−6T2 | | Protein | 2.2 | 1319.6 | kprotein= 0.17881+1.1958×10−3T−2.7178×10−6T2 | | Fat | 0.5 | 917.15 | kfat= 0.18071 − 2.7604 × 10−3T −1.7749 × 10−7T2 | | Ash | 1.9 | 2418.2 | kash= 0.32961+1.4011×10−3T−2.9069×10−6T2 | | CO3 | 10 |
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| 7. | a. | A sheet of 2.5m x 1.5m size moves at 60 km/hour in stationary air of density 1.15 kg/m3. If the coefficient of drag and lift are 0.25 and 0.75 respectively, calculate the lift force, drag force and the resultant force. | CO3 | 8 |
| b. | Deduce the equation for finding terminal velocity of a falling spherical particle in a fluid medium. | CO3 | 12 |
| **(OR)** | | | | |
| 8. | a. | Elaborate the vapour pressure method and freezing point depression method for the determination of water activity. | CO2 | 12 |
| b. | Explain the effect of temperature and pressure on water activity. | CO1 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss in detail about Microwave principles and Dielectric properties of foods. | CO2 | 12 |
| b. | Calculate the depth of penetration of a meat sample during processing in a microwave oven operating at 2450MHz. The sample has a dielectric constant of 53.2 and dielectric loss factor of 18.1. Assume that dielectric properties are constant during heating. (Use C = 3x108 m/s). | CO3 | 8 |