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



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

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| **Code :** | **17FP2036** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STORAGE ENGINEERING** | **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 in detail the angle of repose, internal and external friction of grains. | CO1 | 10 |
| b. | Describe various engineering properties of grains. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Describe a psychrometric chart in drying problem analysis with schematic diagram. | CO2 | 10 |
| b. | (i) Describe EMC and its importance.  (ii) Calculate the equilibrium moisture content of potato at a relative humidity of 10% and temperature of 50oC using Hendersons equation. GiveN that constants c is 6.5 x 10-6, and n is 1.8. | CO3 | 10 |
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| 3. | a. | Describe briefly the morai type, pusa bin, bunker storage, and CAP storage structures with suitable figures. | CO1 | 8 |
| b. | Describe the merits and demerits of bag and bulk storage. | CO1 | 6 |
| c. | Explain drying theory and drying rate periods. | CO2 | 6 |
| **(OR)** | | | | |
| 4. | a. | Briefly discuss the types of airflow in mechanical drying systems. | CO1 | 6 |
| b. | Point out and discuss the sources of infestation in grains. | CO2 | 6 |
| c. | Describe the methods for determination of EMC. | CO2 | 6 |
| d. | Summarize the hysteresis effect with a suitable diagram. | CO2 | 2 |
|  |  |  |  |  |
| 5. | a. | 500 kg of maize at 22% moisture content (wb) is dried to 14% moisture content (wb) for further processing. Calculate the amount of moisture removed in drying. | CO3 | 5 |
| b. | Paraphrase the various methods by which residual fumigant or leaks in a fumigated storage unit can be detected. | CO1 | 5 |
| c. | Describe continuous flow dryers with a suitable diagram. | CO1 | 5 |
| d. | Derive the Rankine's pressure formula for silo. | CO3 | 5 |
| **(OR)** | | | | |
| 6. | a. | Discuss about the silo design and various pressure distribution theories involved in the bin. | CO2 | 10 |
| b. | An R.C.C cylindrical grain storage bin has internal diameter of 5 m and is 20 m deep. It is completely filled with paddy weighing 600 kg/m3. The angle of internal friction for paddy can be taken as 35o while the angle of friction between paddy and bin wall is 30o. The ratio of horizontal and vertical pressure intensity, k is 0.4. Calculate the lateral pressure intensity at 10.0 m and 20.0 m interval. | CO3 | 10 |
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| 7. |  | Discuss about permanent storage structures used for grains with a suitable sketch. | CO2 | 20 |
| **(OR)** | | | | |
| 8. |  | Design a bag storage structure for storing 1000 tonnes of paddy. Assume reasonable data whenever necessary. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Describe the key principles of fumigation in the grain storage units. | CO1 | 10 |
| b. | Discuss briefly the controlled atmospheric storage and modified atmospheric storage systems. | CO2 | 10 |