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



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

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| **Code :** | **17FP2018** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHANICAL SYSTEMS FOR FOOD PROCESSING** | **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. | Write in detail about the working of centrifugal pump with a sketch. | CO1 | 10 |
|  | b. | Derive an equation for the work done by the impeller per second. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. | CO1 | 15 |
|  | b. | Draw a neat sketch of reciprocating pump and mention the parts. | CO1 | 5 |
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| 3. | a. | Differentiate between Gear, Chain and Belt drive. | CO2 | 10 |
|  | b. | Draw the diagram of compound gear drive and derive the speed ratio. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmits 6kW through the belt. The belt is 100mm wide and 10mm thick. The distance between the shaft is 4m. The smaller pulley is 0.5m and the larger pulley is 0.75m in diameter respectively. Calculate the stress in the belt, if it is  a) an Open Belt Drive  b) a Cross Belt Drive. Take μ = 0.3. | CO2 | 20 |
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| 5. | a. | Discuss briefly on the working of Cohran boiler with a neat diagram. | CO3 | 10 |
|  | b. | Discuss briefly on the working of Babcock and Wilcox boiler with a neat diagram. | CO3 | 10 |
| (OR) | | | | |
| 6. | a. | A boiler generates 5000 kg of steam per hour at 15 bar pressure with steam quality of 0.9 from the feedwater which is at 40°C temperature. The coal consumption in the boiler is 600 kg/h. The calorific value of the coal is 30 MJ/kg. Find (i) equivalent evaporation and (ii) thermal efficiency of the boiler. | CO3 | 10 |
|  | b. | Write a brief note on performance of boilers. | CO3 | 10 |
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| 7. | a. | Write in detail the types of freezing equipment used, operation and application in food industries. | CO4 | 20 |
| (OR) | | | | |
| 8. | a. | 28 tons of ice from and at 0°C is produced per day in an ammonia refrigerator. The temperature range in the compressor is from 250°C to -150°C. The vapour is dry and saturated at the end of compression and an expansion valve is used. Assuming a coefficient of performance of 62% of the theoretical, calculate the power required to drive the compressor. | CO4 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss in detail about the applications of various type of material handling equipment in various aspects of food industries. | CO5 | 20 |