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



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **14FP2024** | **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. | A double-acting reciprocating pump, running at 40 r.p.m., is discharging 1.0 m3 of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20 m and 5 m respectively. Find the slip of the pump and power required to drive the pump. | CO1, CO3 | 15 |
|  | b. | Compare positive displacement pumps and dynamic pumps. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Describe the working, construction and applications of the centrifugal pump. | CO1 | 15 |
| b. | Evaluate the type of pump suitable for CIP in food industries and describe its construction. | CO1 | 5 |
|  |  |  |  |  |
| 3. | a. | A solid shaft 125 mm in diameter transmits 120 kW at 160 rpm. Find the maximum shear stress induced in the shaft. Find also the angle of twist in a length of 7.5 m. Take C = 8 x 104 N/mm2. | CO2, CO3 | 15 |
|  | b. | Enlist the types of gear drives used in power transmission and describe their design. | CO2 | 5 |
| (OR) | | | | |
| 4. |  | Discuss about the design and application of these couplings with a neat diagram: i.Universal coupling. ii. Oldham coupling. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | An open belt drive is used for power transmission from driving shaft having larger pulley of 400 mm in diameter. The smaller pulley on driven shaft is having 250 mm in diameter and center distance between two shafts is 2.5 m. If the axes of two shafts are parallel and in the same plane, find the length of the belt required. Find also the length of the belt if it is a cross belt drive. | CO2, CO3 | 20 |
| (OR) | | | | |
| 6. |  | Explain the construction, working, advantages and limitations of Babcock and Wilcox boiler with a labelled sketch. | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | 28 tons of ice from and at 0oC 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.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Temperature  0 C | Enthalpy (kJ/kg)  Liquid | Enthalpy (kJ/kg)  Vapour | Entropy of liquid  (kJ/kgK) | Entropy of vapour  (kJ/kgK) | | 25 | 100.04 | 1319.22 | 0.3473 | 4.4852 | | -15 | -54.56 | 1304.99 | -2.1338 | 5.0585 | | CO2, CO3 | 20 |
| (OR) | | | | |
| 8. |  | Describe the construction, operation and application of the following cooling methods:  i. Vacuum Cooling ii.Tunnel Cooling | CO2 | 20 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. |  | Evaluate the applications of various types of material handling equipment in various aspects of food processing industries. | CO2 | 20 |

ALL THE BEST