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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14FP2024** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Mechanical Systems for Food Processing** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | 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 | 20 |
| (OR) | | | | |
| 2. | a. | Write in brief about the working of the following pumps with a sketch:  (i) Membrane pump | CO1 | 10 |
| b. | (ii) Gear pump | CO1 | 10 |
| 3. |  | 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 | 20 |
| (OR) | | | | |
| 4. | a. | Write in detail about the following with a neat diagram :  (i) Universal coupling | CO2 | 10 |
|  | b. | (ii) Oldham coupling | 10 |
| 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 centre 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 | 20 |
| (OR) | | | | |
| 6. |  | Write in detail about the construction, working, advantages and limitations of Babcock and Wilcox boiler with a neat diagram. | 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 | | CO3 | 20 |
| (OR) | | | | |
| 8. | a. | Write in detail about setup construction, operation and application in food industries:  (i) Hydrocooling | CO3 | 7 |
|  | b. | (ii) Tunnel Cooling | 7 |
|  | c. | (iii) Vacuum Cooling | 6 |
|  | | **Compulsory:** |  |  |
| 9. |  | Discuss in detail about the applications of various type of material handling equipment in various aspects of food industries. | CO3 | 20 |

ALL THE BEST