

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Autumn-2018
Course Code: ME-2301

Program: B.Sc. Engg. (EEE)
Course Title: Fundamentals of Mechanical
Engineering
Full Marks: 50

Time: 2 hours 30 minutes

Part A

[Answer any two questions from the followings; figures in the right margin indicate full marks.]

- 1(a). What is Refrigeration? Sketch the refrigerator diagram and Find out the C.O.P. of Refrigerator. 5
- 1(b). A Carnot refrigeration Cycle absorbs heat at 270 K and rejects it at 300 K. 5
1. Compute the C.O.P. of this refrigeration cycle.
 2. If the cycle is absorbing 1130 KJ/min at 270 K, how many KJ of work is required per second?
- 2(a). Define unit of refrigeration. Hence prove that $1\text{TR} = 3.5\text{KW}$. 4
- 2(b). What is a refrigerant? What do you mean by primary and secondary refrigerant? 3
- 2(c). Illustrate the desirable properties an ideal Refrigerant should have. 3
- 3(a). Why a compressor is used in a refrigeration system? Distinguish the advantage and disadvantages of centrifugal compressor over reciprocating compressor. 5
- 3(b). What is a Fouling Factor? Make a comparison between air cooled and water cooled condenser. 5

Part B

[Answer any three questions from the followings; figures in the right margin indicate full marks.]

- 4(a). What is Psychrometry? Distinguish between relative humidity and humidity ration. 3
- 4(b). Draw a Psychrometric chart showing the five basic line. 3
- 4(c). Suppose your exam room in Electrical Engineering department has a dry bulb temperature of 35°C and relative humidity is 40% on that room. Determine the dew point, wet bulb temperature, enthalpy and specific humidity for that room. 4
- 5(a). What is cooling and dehumidification? Show the line of cooling and dehumidification on the psychrometric chart after drawing. 5
- 5(b). 1 kg of air at 40°C dry bulb temperature and 50% relative humidity is mixed with 2Kg of air at 20°C dry bulb temperature 20°C dew point temperature. Calculate the temperature and specific humidity of the mixture. 5

- 6(a). What is an impulse turbine? Enlist the main component of pelton wheel. 5
- 6(b). A Pelton wheel working under a head of 500 meters, produces 13000 KW at 430 rpm. If the efficiency of the wheel is 85%, determine a). discharge of the turbine, b). diameter of the wheel, c). diameter of the nozzle. 5
- 7(a). Differentiate between pumps, fan, blower and compressor. 3
- 7(b). What is a draft tube? What are function served by a draft tube? 3
- 7(c). An inward flow reaction turbine having an external diameter of 1.5 meters runs at 400 rpm. The velocity of flow at inlet is 10m/s. If the guide blade angle is 15° , find i) absolute velocity of water, ii) velocity of whirl at inlet, iii) inlet vane angle of the runner. 4