

International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Final Exam, Spring 2022

Course Code: ME-2301

Course Title: **Fundamental of Mechanical Engineering**

Time: 2 hours 30 minutes

Full Marks: 50

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	Provide current knowledge, ideas, and the conceptual framework of Mechanical engineering.
CO2	Demonstrate proficiency in solving basic mechanical Engine design problems.
CO3	Design of basic Mechanical Engine for application-specific troubleshooting, identifying problems, and providing solutions for the sustainable development of the society.

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

1. a) Mention the advantages of Nuclear Power over its drawbacks. CO3 U 5
1. b) Draw a schematic diagram of a Boiler Plant. Write down the advantage of an Economizer? CO3 Ap, R 5
2. a) Characterize the following terms: CO2 An 5
 I. System. ii. Zeroth Law of Thermodynamics. iii. Equilibrium of State. iv. Applications of Thermodynamics.
2. b) Design a graphical presentation of the system, boundary, and surroundings and classify the system on the boundary. CO2 An 5

Or,

2. a) Renewable energy differs from nonrenewable energy-Explain statement according to its properties. CO2 C 5
2. b) A stationary mass of gas is compressed without friction from an initial state of 0.5m^3 and 0.105 MPa to a final state of 0.25 m^3 and 0.105MPa , the pressure remaining constant during the process. There is a transfer of 46.1 KJ of heat from the gas. Determine the internal energy change of the gas? $Q_{1-2} = U_2 - U_1 + W_{1-2}$, $W_{1-2} = P(V_2 - V_1)$ CO2 E 5

Part B

[Answer the questions from the followings]

3. a) Identify the main components of the I.C Engine with a Diagram. CO3 An 5
3. b) Petrol Engine is a four-stroke Cycle SI engine- Justify it. CO3 E 5
4. a) Define: CO2 Un 4
 i) Humidity. ii) Wet bulb temperature.
 iii) Dew point temperature. iv) Relative humidity.

4. b) 7 kg of air at 35°C dry bulb temperature and 50% relative humidity is mixed with 4 kg of air at 15°C dry bulb temperature and 15°C dew point temperature. Calculate specific humidity and the dry bulb temperature of the mixture CO2 E 6
5. a) Describe units of refrigerant. Compare a Heat Engine, Refrigeration, and Heat Pump. CO3 R, An 5
5. b) 3000 kg of fruits are supplied to cold storage at 240 C. The cold storage is maintained at -60 C and the fruits get cooled to the storage temperature in 14 hours. The latent heat of freezing is 105 KJ/Kg and the specific heat of fruit is 1.25. Estimate the refrigeration Capacity of the plant. CO3 E 5

Or,

5. a) Write down the factors which affect Air Conditioning. CO3 Ap 5
5. b) A theater of 1200 seating capacity is to be air-conditioned for summer conditions with the following data: 5 CO3 E 5

Outdoor Conditions 30°C DBT and 55% RH

Required Conditions 20°C DBT and 60% RH

Amount of air supplied 0.25 m³/min/person

Find the sensible heat, latent heat removed from the air per minute, And sensible heat factor for the system.