Paper / Subject Code: 89423 / Heating, Ventilation, Air Conditioning and Refrigeration

1T01436 - T.E. (Mechanical) Engineering)(SEM-VI)(Choice Base Credit Grading System.) ((R-20-21) (C Scheme) / 89423 - Heating. Ventilation, Air Conditioning and Refrigeration QP CODE: 10015040 DATE: 13/12/2022 (3 Hours)

HO:	

- Question no. 1 is compulsory.
- Attempt any three questions out of the remaining five questions.
- Clearly mention the assumptions made if any.
- 4) Use of Refrigerant table, P-h chart, Friction chart, Psychrometric chart and Steam table is permitted.
- O.1 Answer any Four of the following:

- a) Explain Standard VCR cycle with schematic, P-h & T-S diagrams.
- b) Explain the terms SHF, RSHF, GSHF and ERSHF.
- c) Define refrigerant and classify refrigerant giving examples of each.
- d) Define By-Pass Factor of a coil. Express it for heating & cooling coil. Also define efficiency of coil.
- e) Write short note on Thermal Comfort
- Define: Specific Humidity, Relative Humidity, DBT, WBT & DPT

Q.2 a) A boot strap cooling system of 10 TR Capacity is used in an aeroplane. The ambient air temperature and pressure are 20 °C & 0.85 bar respectively. The pressure of air increases from 0.85 bar to 1 bar due to ramming action of air. The pressure of air discharged from the main compressor is 3 bar. The discharge pressure of air from the auxiliary compressor is 4 bar. The isentropic efficiency of each compressor is 80%, while that of turbine is 85%. The heat exchanger effectiveness for both the heat exchanger is 60%. Assuming ramming action to be isentropic, the required cabin pressure of 0.9 bar and temperature of air leaving the cabin not more than 20 °C, Find: Power required to operate the system, COP of system. 12

b) Explain following Psychrometric Processes with neat sketch.

008

(i) Heating & Humidification. (ii) Cooling & Dehumidification. (iii) Sensible Heating

[Total Marks 80]

(iv) Sensible Cooling

Q.3 a) A Vapour Compression Refrigeration System using R-12 works between -25°C and 40°C as evaporator & condenser temperature respectively. Using P-h chart, Determine;

- I. COP.
- Mass of Refrigerant per TR.
- Piston Displacement per TR using Volumetric Efficiency = 83%.
- Heat Rejected in the Condenser per TR.
- Ideal COP.

12

0.80

b) Enlist the types of Air Cooling Systems. Explain Simple Air Cooling System with T-S diagram, processes involved in the cycle & application.

150.40

Page 1 of 2

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Table of Contents Mechanical Technology 2012grade 11 Exam Paper

- 1. Understanding the eBook Mechanical Technology 2012grade 11 Exam Paper
 - The Rise of Digital Reading Mechanical Technology 2012grade 11 Exam Paper
 - Advantages of eBooks Over Traditional Books
- 2. Identifying Mechanical Technology 2012grade 11 Exam Paper
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
- 3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Mechanical Technology 2012grade 11 Exam Paper
 - User-Friendly Interface
- 4. Exploring eBook Recommendations from Mechanical Technology 2012grade 11 Exam Paper
 - Personalized Recommendations
 - Mechanical Technology 2012grade 11 Exam Paper User Reviews and Ratings
 - Mechanical Technology 2012grade 11 Exam Paper and Bestseller Lists

- 5. Accessing Mechanical Technology 2012grade 11 Exam Paper Free and Paid eBooks
 - Mechanical Technology 2012grade 11 Exam Paper Public Domain eBooks
 - Mechanical Technology 2012grade 11 Exam Paper eBook Subscription Services
 - Mechanical Technology 2012grade 11 Exam Paper Budget-Friendly Options
- 6. Navigating Mechanical Technology 2012grade 11 Exam Paper eBook Formats
 - o ePub, PDF, MOBI, and More
 - Mechanical Technology 2012grade 11 Exam Paper Compatibility with Devices
 - Mechanical Technology 2012grade 11 Exam Paper Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Mechanical Technology 2012grade 11 Exam Paper
 - Highlighting and Note-Taking Mechanical Technology 2012grade 11 Exam Paper
 - Interactive Elements Mechanical Technology 2012grade 11 Exam Paper
- 8. Staying Engaged with Mechanical Technology 2012grade 11 Exam Paper
 - o Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Mechanical Technology 2012grade 11 Exam Paper
- 9. Balancing eBooks and Physical Books Mechanical Technology 2012grade 11 Exam Paper
 - ∘ Benefits of a Digital Library
 - o Creating a Diverse Reading Collection Mechanical Technology 2012grade 11 Exam Paper
- 10. Overcoming Reading Challenges
 - o Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Mechanical Technology 2012grade 11 Exam Paper
 - Setting Reading Goals Mechanical Technology 2012grade 11 Exam Paper
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Mechanical Technology 2012grade 11 Exam Paper
 - Fact-Checking eBook Content of Mechanical Technology 2012grade 11 Exam Paper
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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