GUJARAT TECHNOLOGICAL UNIVERSITY

DI -5 SEMESTER – OLD PAPER – W23 TO S25 – QUESTION BANK(English)

Subject Name & Code:

Thermal Engineering-II- 4351903

Unit I: Internal Combustion Engines

Repeated Questions:

1. **Compare S.I and C.I Engine.**
   - **Appeared in:** W23 (Q1a, 03 marks)
2. **Comparison between 2 stroke and 4 stroke petrol engine.**
   - **Appeared in:** W24 (Q1a, 03 marks), S24 (Q2b, 04 marks), S25 (Q2b, 04 marks)
3. **Explain the working of Four stroke petrol engine with neat sketch.**
   - **Appeared in:** W24 (Q1c, 07 marks), S24 (Q1b, 04 marks)

Other Important Questions:

1. **List the various Governing system used in I.C. engine and Explain any one.**
   - **Appeared in:** W23 (Q1b, 04 marks)
2. **Draw Valve Timings Diagram of Petrol Engine and discuss the difference between actual and theoretical diagram.**
   - **Appeared in:** W23 (Q1c, 07 marks)
3. **Write classification of Reciprocating Internal Combustion Engines.**
   - **Appeared in:** W24 (Q1b, 04 marks)
4. **State the function of (i) Carburetor, (ii) Crankshaft, and (iii) Flywheel.**
   - **Appeared in:** S24 (Q1a, 03 marks)
5. **Define the following terminology: (1) Top dead center (2) Specific fuel consumption (3) Brake power.**
   - **Appeared in:** S25 (Q1a, 03 marks)
6. **Explain fuel supply system of petrol engine with block diagram.**
   - **Appeared in:** S25 (Q1b, 04 marks)
7. **Classify IC engines according to minimum three criteria.**
   - **Appeared in:** S25 (Q2a, 03 marks)

8. **Draw actual valve timing diagram of four stroke diesel engine.**
    - **Appeared in:** S25 (Q2a (OR), 03 marks)
9. **Label various parts on line diagram of IC engine and also write function of it.**
    - **Appeared in:** S25 (Q2b (OR), 04 marks)

Unit II: IC Engine Fuels

Repeated Questions:

1. **Compare CNG and LPG as alternative fuels and draw schematic diagram of CNG Sequential injection system.**
    - **Appeared in:** W23 (Q2c, 07 marks), W24 (Q2c, 07 marks), S25 (Q2c, 07 marks)
2. **Define following term: (i) Flash point (ii) Fire Point (iii) Pour Point.**
    - **Appeared in:** W23 (Q2a, 03 marks), S24 (Q3a, 03 marks), S25 (Q3a, 03 marks)

Other Important Questions:

1. **Why need of Alternate fuels is arises?**
    - **Appeared in:** W23 (Q2b, 04 marks)
2. **List the advantages and disadvantages of Liquid Hydrogen fuels.**
    - **Appeared in:** W23 (Q2a (OR), 03 marks)
3. **Discuss the merits and demerits of alcohol blended petrol as fuel.**
    - **Appeared in:** W23 (Q2b (OR), 04 marks)
4. **Interpret physical significance of octane number and cetane number? State the remedies for the situation of knocking in Compression ignition system.**
    - **Appeared in:** W23 (Q2c (OR), 07 marks)
5. **Define following term: (i) Freezing point (ii) Viscosity (iii) Fire Point.**
    - **Appeared in:** W24 (Q2a, 03 marks)
6. **Explain LPG fuel system conversion kit.**
    - **Appeared in:** W24 (Q2b, 04 marks)
7. **State the advantages and disadvantages of liquefied hydrogen as a fuel.**
    - **Appeared in:** W24 (Q4b (OR), 04 marks)
8. **List the advantages and disadvantages of CNG as a fuel.**
    - **Appeared in:** S24 (Q3a (OR), 03 marks)
9. **Write a short note on Biodiesel.**
    - **Appeared in:** S25 (Q3a (OR), 03 marks)

Unit III: Gas Turbines

Repeated Questions:

1. **List Advantages and Disadvantages of Closed cycle gas turbine system.**
    - **Appeared in:** W23 (Q3a, 03 marks), W24 (Q2b (OR), 04 marks), S25 (Q4a, 03 marks)
2. **Illustrate the methods of improving performance of gas turbine and explain any one of them with sketch.**
    - **Appeared in:** W23 (Q3b, 04 marks), S25 (Q3b (OR), 04 marks)

Other Important Questions:

1. **In an air standard gas turbine, air enters the compressor at 16°C and at a pressure of 1.01 bar. There its pressure is increased five times. The temperature of the air entering the turbine is 810°C and there the air expands to the starting pressure. Find the ratio of turbine work to compressor work. Find the thermal efficiency of the turbine if it operates on an ideal Brayton cycle. Take γ=1.4 and Cp 1.05 kJ/kg K.**
    - **Appeared in:** W23 (Q3c, 07 marks)
2. **Write application of Gas Turbine system.**
    - **Appeared in:** W24 (Q2a (OR), 03 marks)
3. **In a gas turbine plant, air enters the compressor at 15°C and atmospheric pressure. The pressure ratio is 5. Then high-pressure air enters the combustion chamber. Where its temperature is increased to 695°C. This hot air then enters the turbine. where it undergoes adiabatic expansion. Find the thermal efficiency of the turbine and the power generated for air flowing at the rate of 1 kg/s.**
    - **Appeared in:** W24 (Q4c, 07 marks)
4. **Draw a schematic diagram of gas turbine showing the effect of intercooling with the name of each component and show the cycle on the p-v & T-s diagram.**
    - **Appeared in:** S24 (Q3b, 04 marks)
5. **A constant pressure open cycle gas turbine plant works between a temperature range of 15oC and 700oC and a pressure ratio of 6. Find the mass of air circulating in the installation if it develops at 1100kW. Also, find the heat supplied by the combustion chamber. Take Cp = 1.0kJ/KgK**
    - **Appeared in:** S24 (Q3c, 07 marks)
6. **Draw a schematic diagram of a closed-cycle gas turbine with the name of each component and show the cycle on the p-v & T-s diagram.**
    - **Appeared in:** S24 (Q3b (OR), 04 marks)
7. **In a gas turbine plant, the air is compressed in a single-stage compressor from 1bar to 9bar and from an initial temperature of 300K. The same air is then heated to a temperature of 800K and expanded in the turbine. The same air is then reheated to a temperature of 800K and expanded in a second turbine. Find the maximum power that**

can be obtained from the installation if the mass of air circulated per second is 2 kg. Take Cp = 1kJ/kg K.

- **Appeared in:** S24 (Q3c (OR), 07 marks)

8. **Recall the combustion chamber in gas turbine with a neat sketch.**
   - **Appeared in:** S24 (Q4a, 03 marks)
9. **List the fuels used in gas turbine.**
   - **Appeared in:** S24 (Q4a (OR), 03 marks)
10. **Derive equation of air standard efficiency of brayton cycle.**
    - **Appeared in:** S25 (Q3b, 04 marks)
11. **Atmospheric air enters into the compressor of a gas turbine power plant, working on ideal brayton cycle, at temperature of 18°C and pressure of 1.01 bar. Its pressure increased up to six times of its original pressure in this compressor. Its temperature at turbine inlet is 800°C and it is expanded to its original pressure in the turbine. Find out ratio of turbine work to compression work, work ratio and thermal efficiency by assuming $\gamma = 1.4$ and Cp = 1.005 kJ/kgK for air.**
    - **Appeared in:** S25 (Q3c, 07 marks)
12. **A gas turbine power plant working on brayton cycle between maximum temperature and minimum temperature of 1050 K and 290 K respectively. Pressure ratio of the cycle is 5 and isentropic efficiencies of compressor and turbine are 85% and 90% respectively. Find out thermal efficiency of plant by assuming $\gamma = 1.4$ and Cp = 1.005 kJ/kgK for working medium.**
    - **Appeared in:** S25 (Q3c (OR), 07 marks)
13. **List the applications of gas turbine system.**
    - **Appeared in:** S25 (Q4a (OR), 03 marks)

Unit IV: Refrigeration

Repeated Questions:

1. **A vapour compression cycle operates between 60 bar and 25 bar limits. At the end of compression the working fluid is saturated and dry. there is no under cooling. Find 1) C.O.P of the cycle 2) flow of liquid is 4 kg/min, find the capacity of refrigerant. (Uses Refrigerant Property Table)**
    - **Appeared in:** W23 (Q4c, 07 marks), S25 (Q4c (OR), 07 marks)
2. **Draw schematic diagram of VCRS with name of each component & show the cycle on T-s & P-h diagram.**
    - **Appeared in:** S24 (Q4b, 04 marks)

Other Important Questions:

1. **List different types of evaporators used in VCRS and explain any one of them.**
    - **Appeared in:** W24 (Q3b, 04 marks)
2. **Air is compressed from 1 bar to 5 bar in a refrigeration plant that operates on the Bell Coleman cycle. The initial temperature is 10oC. After compression the air is cooled in the cooler at 25oC before expansion to the atmosphere (1 bar). Then find 1) Theoretical C.O.P 2) Net refrigeration effect (take Cp = 1.005 kJ/Kg.K and Cv = 0.718 kJ/Kg.K)**
    - **Appeared in:** W24 (Q3c, 07 marks)
3. **Write Short note on capillary tubes used in refrigerators.**
    - **Appeared in:** W24 (Q3b (OR), 04 marks)
4. **Explain vapor absorption system with diagram and write advantages of vapor absorption system.**
    - **Appeared in:** W24 (Q4c (OR), 07 marks)
5. **The temperature limits of an Ammonia refrigerating system are −10°C and 30°C. If the gas is dry at the end of compression and there is no under-cooling of the liquid Ammonia. Plot the system on the T-s and P-h diagram and calculate the COP of the cycle. Use the following table for the properties of ammonia.**
    - **Appeared in:** S24 (Q4c, 07 marks)
6. **Compare between Hermetically sealed compressor and open compressor.**
    - **Appeared in:** S24 (Q4b (OR), 04 marks)
7. **A VCRS cycle operates between -5oC and 25oC. At the end of isentropic compression, the gas is dry and saturated and there is no undercooling of the refrigerator and throttling of the liquid after leaving the condenser. So, find the COP using following table for the properties of refrigerant.**
    - **Appeared in:** S24 (Q4c (OR), 07 marks)
8. **Explain primary refrigerant and secondary refrigerant with example.**

- **Appeared in:** S25 (Q4b, 04 marks)

9. **R-12 working fluid, the condensing temperature in the theoretical vapour compression cycle is 40°C and the evaporation temperature -6°C, so calculate the Refrigeration effect, work done and C.O.P. Assume the value of specific enthalpy at the outlet of the compressor to be 405 kJ/kg. (Uses Refrigerant Property Table)**
    - **Appeared in:** S25 (Q4c, 07 marks)
10. **Compare hermetically sealed compressors and open compressors.**
    - **Appeared in:** S25 (Q4b (OR), 04 marks)

Unit V: Air-Conditioning

Repeated Questions:

1. **Classify the Air conditioning and list the benefits / application of Industrial / comfort Air conditioning systems.**
    - **Appeared in:** W23 (Q5c, 04 marks), W24 (Q5c, 07 marks), S25 (Q5c, 07 marks)
2. **If a room temperature is 28°C / 30°C and specific humidity is 13.6g / 12.6g / 13.5g per kg of air, find 1) partial vapor pressure 2) relative humidity and 3) dew point temperature.**
    - **Appeared in:** W24 (Q3c (OR), 07 marks), S24 (Q5c, 07 marks), S25 (Q5c (OR), 07 marks)

Other Important Questions:

1. **Define Following terms: a) Dew point temperature b) Relative Humidity c) Saturated Moist Air**
    - **Appeared in:** W23 (Q5a, 03 marks)
2. **Illustrate following processes on Psychrometric chart. a) Sensible heating and cooling b) cooling and Dehumidification c) Heating and humidification**
    - **Appeared in:** W23 (Q5b, 07 marks)
3. **State the Advantages and Disadvantages of Split Air Conditioner.**
    - **Appeared in:** W23 (Q5a (OR), 03 marks)
4. **The following readings are taking during test in office cabin: 1)Barometric Pressure:1.01325 bar 2)Wet Bulb Temperature: 28°C 3) Dry Bulb Temperature: 35°C Then find a)Vapor Pressure b) Specific Humidity c) Relative Humidity**
    - **Appeared in:** W23 (Q5b (OR), 07 marks)
5. **What is psychometric chart? Draw it and show four air properties lines and label it.**
    - **Appeared in:** W23 (Q5c (OR), 04 marks)
6. **Define following psychrometric terms: 1) Dry air 2) Moist air 3) Humidity**
    - **Appeared in:** W24 (Q3a (OR), 03 marks)
7. **Write Short note on Split air conditioning system.**
    - **Appeared in:** W24 (Q5b, 04 marks)
8. **Show the following processes on a psychrometric chart: 1)Sensible heating 2) sensible cooling 3) latent heating**
    - **Appeared in:** W24 (Q5a (OR), 03 marks)
9. **Write merits and demerits of alcohol fuel.**
    - **Appeared in:** W24 (Q5b (OR), 04 marks)
10. **Explain Psychometric chart with a neat sketch.**
    - **Appeared in:** S24 (Q5b, 04 marks)
11. **Define (i) Heat Pump, (ii) Heat Engine, and (iii) Refrigerator.**
    - **Appeared in:** S24 (Q5a, 03 marks)
12. **Differentiate between Window Air Conditioner and Split Air Conditioner.**
    - **Appeared in:** S24 (Q5b (OR), 04 marks)
13. **List the various properties of ideal Refrigerants.**
    - **Appeared in:** S24 (Q5a (OR), 03 marks)
14. **Describe three applications of comfort air conditioning.**
    - **Appeared in:** S25 (Q5a, 03 marks)
15. **What is refrigeration? State the classification of refrigeration.**
    - **Appeared in:** S25 (Q5b, 04 marks)
16. **Label various parts online diagram of split air conditioning system.**
    - **Appeared in:** S25 (Q5a (OR), 03 marks)
17. **Describe the four processes of vapour compression cycle on P-V, T-S and P-h diagrams.**
    - **Appeared in:** S25 (Q5b (OR), 04 marks)

18. **Illustrate the following processes on psychrometric chart: (a) Sensible cooling (b) Heating with humidification (c) Cooling with dehumidification.**
    - **Appeared in:** S25 (Q5c (OR), 07 marks)

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