Scheme - I

Sample Question Paper

Program Name   : Diploma in Automobile Engineering

Program Code   : AE

Semester   : Fourth

Course Title   : Heat Power Engineering

Marks   : 70

22441

Time: 3 Hrs.

Instructions:

(1) All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

(5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following.   **10 Marks**

    a. List different types of ideal gas process.

    b. Define system. List different types of systems.

    c. State properties of fuel.

    d. Define i) Dryness Fraction   ii) Degree of superheat

    e. Define i) Five Air Delivered   ii) Piston Displacement

    f. List different renewable energy sources.

    g. State the advantages of solar energy.

Q.2) Attempt any THREE of the following.   **12 Marks**

    a. Write classification of steam turbine.

    b. Sketch P-V and T-S diagram of Otto cycle used in petrol engine and explain different process involved in it.

    c. Compare water tube and fire tube boiler on the basis of i) path of flue gases. ii) evaporative capacity iii) pressure of steam iv) application with example.

    d. Classify the air compressor on the basis of i) action of cylinder ii) number of stages iii) working principle iv) path of air flow.

Q.3) Attempt any THREE of the following.   **12 Marks**

    a. Explain Carnot cycle with P-V and T-S diagram and write it's equation for thermal efficiency with it's significance.

b. A coal has following composition by mass : 85%, H2=4%, S=1%, O2=2% and N2=1% and remaining is ash. Find HCV and LCV of fuel.

c. Suggest energy conservation techniques used in air compressor.

d. One kg of gas contained in a cylinder at a pressure of 7 bar and temperature 300 k, expands four times its original volume at constant pressure.

Calculate –

(1) Initial volume

(2) Final temperature

(3) Work done by gas

(4) Heat added

Q.4) Attempt any THREE of the following.   **12 Marks**

a. Explain different modes of heat transfer with one example each.

b. Describe with neat sketch working of Bomb calorimeter.

c. Sketch energy flow diagram for IC engine.

d. Describe with neat sketch working of air compressor used in aeroplane.

e. Explain cogeneration system on the basis of sequence of energy use.

Q.5) Attempt any TWO of the following.   **12 Marks**

a. Describe the need of analysis of coal. Explain ultimate analysis and proximate analysis of coal.

b. Draw neat sketch of two pass down flow surface condenser. Explain it's construction and working.

c. Describe government policy (MNRE) for harnessing the potential power of renewable energy sources.

Q.6) Attempt any TWO of the following.   **12 Marks**

a. Compare reciprocating and rotary compressor on the basis of i) working principle ii) capacity iii) nature of flow iv) application v) maintenance vi) delivery pressure range.

b. Calculate the enthalpy of 1 kg of steam at a pressure of 8 bar and dryness fraction of 0.8. How much heat would be required to raise 3 kg of this steam from water at 20^0 C? Take Sp. Heat of water = 4.2 kJ/kg K,

h_F = 720.9 kJ/kg, h_{Fg} = 2046.5kJ/kg

c. Write advantages and limitations of wind power plant in relation to human aspects of the environment.

Scheme - I

Sample Test Paper - I

Program Name	: Diploma in Automobile Engineering
Program Code	: AE
Semester	: Fourth
Course Title	: Heat Power Engineering
Marks	: 20

22441

Time: 1 Hour.

Instructions:

(1) All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

(5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.   **08 Marks**

    a. Represent isobaric process on P-V and T-S diagram.

    b. Define property. List different types of properties.

    c. Define HCV of fuel.

    d. Define i) Dryness Fraction ii) Degree of superheat.

    e. State the functions of condenser.

    f. State the properties of fuel.

Q.2 Attempt any THREE.   **12 Marks**

    a. Differentiate the Otto and diesel cycle on following basis –

          (i) Representation on P-V chart

          (ii) Representation on T-S chart

          (iii) Addition of heat

          (iv) Air standard efficiency and its relation.

    b. Draw a neat sketch of two pass down flow type surface condenser. Describe its construction and working.

    c. Describe the combustion chemistry of Carbon, Hydrogen and Methane.

    d. One kg of air at 115kPa and 15° C is compressed adiabatically to a volume of 0.1 m^{3}. Calculate fuel temperature and pressure of an air. Take - $C_v = 0.712$ kJ/kb^{0} k, R = 0.287 kJ/kg^{0} k, U = 1.4 FOR AIR.

Scheme - I

Sample Test Paper - II

Program Name	: Diploma in Automobile Engineering
Program Code	: AE
Semester	: Fourth
Course Title	: Heat Power Engineering
Marks	: 20

22441

Time: 1 Hour.

Instructions:

(1) All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

(5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

    a. Define i) Free Air Delivered ii) Volumetric efficiency.

    b. List different renewable energy sources.

    c. State the advantages of tidal energy.

    d. Define cogeneration.

    e. State the factors that affect the volumetric efficiency of air compressor.

    f. Define energy conservation.

Q.2 Attempt any THREE. **12 Marks**

    a. Explain with neat sketch working of single stage reciprocating air compressor.

    b. Describe necessity of multistaging and intercooling in reciprocating air compressor.

    c. Define energy audit and explain different types of energy audits.

    d. Explain how the power is saved due to solar water heating.