17407

11920

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of Steam tables logarithmic, Mollier's chart is permitted.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) List different types of ideal gas processes.

(ii) Define sensible heat and latent heat.

(iii) Define free air delivered of compressor.

(iv) List down the uses of compressed air.

(v) Give the classification of gas turbines.

(vi) Enlist conventional and non conventional sources of energy.

(vii) Give the classification of Fuels.

(viii) List the properties of Fuels.

Marks

b) **Attempt any TWO of the following:** **8**

(i) Represent Isobaric, Isochoric, Isothermal and Adiabatic processes on P-V and T-S diagram.

(ii) Explain the phases of formation of steam.

(iii) Describe the working of Turbojet Engine.

2. Attempt any FOUR of the following: **16**

a) Explain Otto cycle with P-V and T-S diagram.

b) Describe the different modes of heat transfer.

c) Draw neat and labeled sketch of three pass packaged type boiler.

d) Explain the working of La-mont Boiler.

e) Explain the factors affecting volumetric efficiency of reciprocating air compressors.

f) Differentiate between open cycle and closed cycle gas turbine.

3. Attempt any FOUR of the following: **16**

a) Give the classification of air compressor.

b) Draw P-V and T-S diagram for Brayton cycle.

c) Explain working of Thermal power plant.

d) Draw and lable the gas turbine power plant.

e) Compare liquid fuels with solid fuels.

f) Explain combustion chemistry of carbon, hydrogen and methane.

4. Attempt any TWO of the following: **16**

a) Compare conventional and non-conventional energy sources.

b) A coal has the following combination of mass C = 90%, H_2 = 3%, S=1% O_2 = 2%, N_2 = 2% and remaining is ash. Find HCV and LCV of the fuel.

c) (i) Explain construction and working of Geothermal power plant.

(ii) Explain the construction and working of Bomb calorimeter.

Marks

5. Attempt any TWO of the following: **16**

a) Derive relation between P, V and T for adiabatic process.

b) Explain two pass down flow surface condenser with a neat sketch.

c) Differentiate between :

(i) Reciprocating and rotary air compressor

(ii) Centrifugal and axial flow compressor

6. Attempt any FOUR of the following: **16**

a) Draw P-V and T-S diagram of Dual combustion cycle.

b) Explain the sources of air leakage in condenser.

c) State necessity of multistaging and Intercooling of air compressor.

d) Explain the construction and working of Turboprop Engine.

e) Describe construction and working of closed cycle gas turbine.

f) Explain construction and working of two stage reciprocating air compressor.