17406

15162

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 answer 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) Define I.C. engine, give two examples of it.

(ii) Define biomass, state two methods to convert biomass into energy.

(iii) Define intensive property, give two examples of it.

(iv) State,

1) Boyle's Law

2) Charle's Law

(v) What is isochoric process? Represent it on P.V. diagram.

Marks

(vi) State four uses of compressed air.

(vii) Classify air compressor on the basis of

1) Principle of operation

2) Action of cylinder

(viii) List different component of vapour compression cycle.

b) **Attempt any <u>TWO</u> of the following:** **08**

(i) Classify I.C. engine on the basis of

1) Types of ignition

2) Engine cycle

3) Methods of charging the engine

4) Fuel used

(ii) Differentiate between open system and closed system.

(iii) Gas in a container, is at pressure of 1.5 bar and volume of $4m^3$. What is work done by gas if it expands at constant pressure to twice it's initial volume.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Compare S.I. engine and C.I. engine on the basis of

(i) Basic cycle

(ii) Ignition system

(iii) Compression ratio

(iv) Speed

b) Differentiate between conventional and non-conventional energy source on the basis of

(i) Availability

(ii) Harnessing cost

(iii) Pollution

(iv) Magnitude of power generation

Marks

c) Define following:

(i) Heat

(ii) Work

(iii) Internal energy

(iv) Enthalpy

d) Derive the relation for work done in adiabatic process.

e) Explain with neat sketch working of centrifugal compressor.

f) Write characteristics gas equation and give meaning of each term involved in it. Write value of universal gas constant with it's unit.

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

a) In certain process 675J heat is absorbed by system while 290J of work is done on system. What is change in internal energy of system.

b) Explain with neat sketch working of screw compressor.

c) Explain with neat sketch solar distillation plant.

d) Represent diesel cycle on P-V and T-S diagram and write equation for air standard efficiency of cycle.

e) Differentiate between Isochoric process and Isobaric process.

f) Differentiate fire tube type boiler and water tube type boiler. Give two examples of each.

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

a) Design summer air conditioning system for 'Delhi' city.

b) Explain with neat sketch construction and working of four stroke diesel engine.

c) Differentiate between reciprocating and rotary air compressor (minimum 8 points).

Marks

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

a) State different statements of second law of thermodynamics and explain its application to heat pump.

b) With a neat sketch explain working of 'Babcock and Wilcox' boiler.

c) Explain working of vapour compression cycle, with a neat sketch. Plot it on P-H and T-S diagram.

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

a) State 1^{st} law of thermodynamics and write limitations of 1^{st} law of thermodynamics.

b) Draw neat sketch of steam power plant and write function of condenser.

c) Differentiate between heat and work.

d) Attempt following:

(i) State zeroth law of thermodynamics 2

(ii) Define entropy 2

e) Explain with neat sketch geothermal power plant.

f) Only draw labelled diagram of 'window air conditioner'.