17529

21415

3 Hours/100 Marks

Seat No. | | | | | | | | |

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

MARKS

1. A) Attempt **any three** : **12**
   a) Write the equations for air standard efficiency of otto cycle and diesel cycle and state various terms involved in it.
   b) Define :
      i) Compression ratio (R_c) ii) Swept volume (v_s)
      iii) Cut off ratio iv) Clearance volume (v_c)
   c) Write uses of compressed air.
   d) Draw a neat sketch of vane compressor and label the different parts.

   B) Attempt **any one** : **6**
   a) What is the necessity of I.C. Engine Testing ? What are the different test carried out on I.C. Engines ?
   b) Explain the procedure for conducting Morse test.

2. Attempt **any two** : **16**
   a) An I.C. Engine uses 6 kg of fuel having calorific value 44000 kJ/kg in one hour. The IP developed is 18 kW. The temperature of 11.5 kg of cooling water was found to rise through 25°C per minute. The temperature of 42 kg of exhaust gas with specific heat 1 kJ/kg°k was found to rise through 220°C. Draw the heat balance sheet for the engine.
   b) What is the necessity of multistage compression ? Explain the working of two stage reciprocating air compressor with intercooler, with the help of p-v diagram.
   c) Explain vapour compression refrigeration (for dry saturated state of refrigerant) cycle with the help of P-h and T-s charts.

P.T.O.

MARKS

3. Attempt **any four** : **16**
   a) Draw actual valve timing diagram for 4-stroke petrol engine.
   b) Explain turb charging with a neat sketch.
   c) Explain three way catalytic convertor.
   d) Explain with a neat sketch turbo propeller w.r.to Jet propulsion.
   e) Explain the concept of super heating and sub cooling with the help of P-h and T-s charts.

4. A) Attempt **any three** : **12**
      a) What are the causes of detonation in I.C. engine ?
      b) What are the effects of pollutants on environment ?
      c) What are the methods to improve thermal efficiency of gas turbine ? Explain any one method.
      d) What is jet propulsion ? Give the classification of jet propulsion system.

   B) Attempt **any one** : **6**
      a) Explain with neat sketch turning moment diagram for a four-stroke engine.
      b) The following results were obtained during Morse test on 4-stroke petrol engine.
         B.P. developed when all cylinders are working = 16.2 kW.
         B.P. developed when cylinder No. 1 cutt off = 11.55 kW.
         B.P. developed when cylinder No. 2 cut off = 11.63 kW
         B.P. developed when cylinder No. 3 cut off = 11.68 kW
         B.P. developed when cylinder No. 4 cut off = 11.51 kW
         Calculate mechanical efficiency of engine.

5. Attempt **any two** : **16**
   a) Differentiate between reciprocating and rotary compressors.
   b) Explain intercooling and reheating in gas turbine with the help of T-S diagram.
   c) Draw a neat sketch of vapour compression refrigeration cycle. Describe its working.

6. Attempt **any four** : **16**
   a) What is MPFI ? Explain any one MPFI system with neat sketch.
   b) Define :
      i) Free air delivered
      ii) Compressor capacity
      iii) Swept volume
      iv) Pressure ratio, w.r.to compressor.
   c) Explain the working principle of jet propulsion with a neat sketch.
   d) Differentiate between heat pump and refrigerator.
   e) Explain the working of window air conditioner with neat sketch.
