

# 17407

14115

3 Hours / 100 Marks

Seat No.

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- 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) Assume suitable data, if necessary.  
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.  
(6) Use of steam tables, logarithmic, Mollier's chart is permitted.

**Marks**

1. (A) Attempt any SIX of the following :

12

- What is an isothermal process ? Plot it on P-V diagram.
- Define sensible heat and latent heat.
- State necessity of multistaging in air compressors.
- Define Free Air Delivered. (FAD)
- Draw Brayton cycle on P-V diagram and T-S diagram.
- State advantages of non-conventional energy.
- What is calorific value of fuel ? What is high calorific value ?
- List out the merits of liquid fuels over gaseous fuels.

(B) Attempt any TWO of the following :

08

- Explain the adiabatic process with the help of P-V and T-S diagram. Give work done, Internal energy and heat transferred in it.
- Steam enters in engine at a pressure of 12 bar with a 67 °C of superheat. It is exhausted at a pressure of 0.15 bar & 0.95 dry. Find the drop in enthalpy of the steam.
- Explain working principle of Turboprop engine, with a neat sketch.

2. Attempt any FOUR of the following :

16

- Represent the Otto cycle on P-V & T-S diagram and write equation for air standard efficiency for the cycle.
- Differentiate between conduction and convection with example.
- Only draw labeled diagram of La-Mont Boiler.
- Explain construction and working of three pass packaged type boiler.
- State various factors affecting volumetric efficiency of air compressor.
- Compare open cycle gas turbine and closed cycle gas turbine.



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- 3. Attempt any FOUR of the following :** **16**
- Explain working of single stage reciprocating air compressor with the help of P-V diagram.
  - Plot Carnot cycle on P-V and T-S diagram.
  - Point out parameters involved in site selection of Diesel power plant.
  - Only draw a neat sketch, of Thermal Power Plant.
  - Write four advantages of liquid fuels over gaseous fuels used in boilers.
  - A steam boiler uses pulverized coal in the furnace. The ultimate analysis of coal (by mass) as received is :  
 $C = 78\%$  ;  $H_2 = 3\%$  ;  $O_2 = 3\%$  ;  $S = 1\%$  Ash = 10% and Moisture = 5%  
 Excess air supplied is 30%. Calculate the mass of air to be supplied and mass of gaseous product formed per kg of coal burnt.
- 4. Attempt any TWO of the following :** **16**
- Compare conventional energy sources and non-conventional energy sources on the basis of
    - Availability
    - Harnessing Technology Developed
    - Harnessing cost
    - Pollution
    - Magnitude of power generation
  - Compare : (i) Solid Fuels and Gaseous Fuel  
 (ii) Ultimate Analysis and Proximate Analysis
  - Attempt the following :
    - Explain the working of Geothermal power plant with a neat sketch.
    - Explain the working of Tidal power plant with neat sketch.
- 5. Attempt any TWO of the following :** **16**
- Derive the relation between P, V and T during Adiabatic Process.
  - What are the various sources of air leakage into a steam condenser ?  
 How does it affect the performance of the condensing plant ?
    - Explain the function and location of condenser in steam power plant.
  - Explain the construction & working of screw compressor. Differentiate between centrifugal and axial flow compressor.
- 6. Attempt any FOUR :** **16**
- Explain briefly Diesel Cycle with the help of P-V and T-S diagram and write equation of Air Standard Efficiency of Diesel Cycle.
  - Give classification of condensers.
  - What are the advantages of multi-stage compression ? Explain it on P-V diagram.
  - Explain the construction and working of Turbojet engine.
  - Give advantages of closed gas turbine plant over open type gas turbine plant.
  - Give applications of compressed air.