

Total No. of Questions : 4]

SEAT No. :

PA-10221

[Total No. of Pages : 2

[6010]-97

B.E. (Mechanical) (In-Sem)

ENERGY ENGINEERING

(2019 Pattern) (Semester - VIII) (402049)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Attempt Q1 or Q2 and Q3 or Q4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) In a steam power plant, steam is supplied at 100 bar and 500°C. The condenser pressure is 0.035 bar. In first stage, the steam is expanded to its saturation condition where the pressure measures to be 9.55 bar and then reheated to its original temperature. In second stage, expansion takes place to condenser pressure. Determine: **[6]**

- i) Pump work
- ii) Total turbine work
- iii) Cycle Efficiency

b) Explain Fluidized bed combustion system with neat sketch. State its advantages and disadvantages. **[5]**

c) Write a note on Energy crisis in India. **[4]**

OR

Q2) a) In a steam power plant, steam enters the turbine at 30 bar and 400°C. The condenser pressure is 0.1 bar. The feed water heater of direct contact type operates at a pressure of 5 bar. Determine: **[6]**

- i) Fraction of steam extracted from turbine (kg/kg of steam)
- ii) Thermal Efficiency of a cycle
- iii) Specific steam consumption

b) Explain Lamont Boiler with neat sketch. **[5]**

c) Write a note on Energy Policy of India. **[4]**

P.T.O.

Q3) a) Following observations were made on a surface condenser during a test on surface condenser: [6]

Barometric reading = 760 mm of Hg

Condenser vacuum = 705 mm of Hg

Mean condensate temperature = 35°C

Condensate collected = 2000 kg/hr

Quantity of cooling water circulated = 60000 kg/hr

Rise in temperature of cooling water = 16°C

Hot well temperature = 28°C

Inlet temperature of water = 20°C

Determine:

- i) Vacuum efficiency
 - ii) Condenser efficiency
 - iii) Mass of air present per unit volume of condenser
- b) What are types of Ash handling systems? Elaborate mechanical ash handling with simple diagram. [5]
- c) What is a function of following main components of closed type cooling system? [4]
- i) Air Pump
 - ii) Hot well
 - iii) Cooling Tower
 - iv) Make up water pump

OR

Q4) a) Following observations were made on a surface condenser during a test on surface condenser: [6]

Barometric reading = 720 mm of Hg

Condenser vacuum = 663.75 mm of Hg

Mean temperature of condenser = 30°C

Condensate temperature = 23°C.

Condensate collected = 500 kg/hr

Quantity of cooling water circulated = 18000 kg/hr

Rise in temperature of cooling water = 14°C

Determine:

- i) Dryness fraction of steam entering condenser
 - ii) Capacity of air pump in m³/min
 - iii) Mass of air discharged in kg/min
- b) Write a note on carbon credits and footprints. [5]
- c) Write note on-single and double deck cooling pond. [4]

