BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Tech.(ME)-2021
Course Name – Applied Thermodynamics
Course Code - PCC-ME402
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) the capacity of vapour power plant expressed

a) in terms of heat rate b) in terms of steam rate
c) in terms of work output d) none of the above

(ii) Identify the rate of evaporation of water is zero, the relative humidity of the air is

a) 0 b) 1
c) 0.5 d) unpredictable

(iii) Identify, Heat flow into a system is ____, and heat flow out of the system is _____

a) positive, positive b) negative, negative
c) negative, positive d) positive, negative

(iv) The enthalpy and internal energy are associate of temperature for

a) all gases b) steam
c) water d) ideal gas

(v) Identify in which thermodynamic process there is no flow of heat between system and surrounding

a) Isobaric b) Isochoric
c) Adiabatic d) Isothermal

(vi) A system is define to be in equillibrium if

a) It is in mechanical, chemical and thermal equillibrium b) It is in thermal equillibrium
c) It is in electrical, chemical, mechanical equillibrium d) Volume is changing and pressure is constant

(vii) Choose the correct following statement

a) The ratio of the discharge pressure to the inlet pressure of air is called compressor efficiency b) The compression ratio for the compressor is always greater than unity

c) The compressor capacity is the ratio of workdone per cycle to the stroke volume
d) During isothermal compression of air, the workdone in a compressor is maximum

(viii) The compressor capacity is related as the
a) actual volume of the air delivered by the compressor when reduced to normal temperature and pressure conditions
b) volume of air delivered by the compressor
c) volume of air sucked by the compressor during its suction stroke
d) none of the above

(ix) Choose the positive displacement compressor
a) roots blower compressor
b) vane blower compressor
c) centrifugal blower compressor
d) both a and b

(x) In a reaction turbine when the degree of reaction is zero, then identify there is
a) No heat drop in moving blades
b) No heat drop in fixed blades
c) Maximum heat drop in moving blades
d) Maximum heat drop in fixed blades

(xi) The relative efficiency is defined as the
a) Ratio of thermal efficiency to Rankine efficiency
b) Ratio of brake power to the indicated power
c) Ratio of heat equivalent to indicated power to the energy supplied in steam
d) Product of thermal efficiency and Rankine efficiency

(xii) Choose the relation between efficiencies of the ideal regenerative Rankine cycle and the Carnot cycle
a) the efficiency of ideal regenerative Rankine cycle is less than the efficiency of Carnot cycle
b) the efficiency of ideal regenerative Rankine cycle is more than the efficiency of Carnot cycle
c) the efficiency of ideal regenerative Rankine cycle is equal to the efficiency of Carnot cycle
d) none of the above

(xiii) In ideal regenerative cycle (saturated steam Rankine cycle),Identify the heat addition takes place
a) from lowest temperature to highest temperature
b) at constant pressure
c) at constant temperature
d) none of the above

(xiv) Choose the effect of superheated steam on efficiency of Rankine cycle?
a) efficiency of Rankine cycle decreases with increase in superheat of the steam
b) efficiency of Rankine cycle increases with increase in superheat of the steam
c) efficiency of Rankine cycle is not affected by change in superheat of the steam
d) none of the above

(xv) For the same pressure ratio, Identify the relation between work required to compress steam in vapour form and work required to compress steam in liquid form
a) work required to compress steam in vapour form is equal work required to compress steam in liquid form
b) work required to compress steam in vapour form is more than work required to compress steam in liquid form
c) work required to compress steam in vapour form less than work required to compress steam in liquid form
d) cannot say

Group-B

(Short Answer Type Questions) 3 x 5=15

2. State and Explain the Gibbs free energy. (3)
3. Differentiate macroscopic and microscopic approach. (3)
4. Define calorific value of fuel. Differentiate between higher and lower calorific value of fuel. (3)
5. Explain the effect of reheat, regeneration process. (3)

6. Explain the degree of saturation and estimate its limiting values. (3)

OR

Explain dry bulb and wet bulb temperatures. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Discuss briefly the advantages of a regenerative feed heating in steam power cycle. (5)
8. With the help of flow and p-h diagrams, Explain how dry ice is produced. (5)
9. Explain the different path of otto cycle and Draw PV and TS diagram. (5)
10. Summarize the different methods of compounding of steam turbine stages. List the advantages and limitations of velocity compounding. (5)
11. Explain the reason of not using more than two stages in velocity compounded steam turbines. (5)
12. Justify the compression process in which work done is minimum in a reciprocating aircompressor. (5)

OR

Write the difference in between rotary and reciprocating compressors. (5)

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