

Signature of Invigilator _____

ID No. _____

Session: 2015-16 Year: Second Semester : I Examination : Mid-Sem II
Course: Applied Thermodynamics Course Code : METIZC271 Durn : 1300-1615 Max. Marks: 20
Date: 2/11/15

(A) (B) (C) (D)

1. (A) (B) (C) (D)

2. (A) (B) (C) (D)

3. (A) (B) (C) (D)

4. (A) (B) (C) (D)

5. (A) (B) (C) (D)

6. (A) (B) (C) (D)

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8. (A) (B) (C) (D)

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10. (A) (B) (C) (D)

11. (A) (B) (C) (D)

12. (A) (B) (C) (D)

13. (A) (B) (C) (D)

14. (A) (B) (C) (D)

15. (A) (B) (C) (D)

16. (A) (B) (C) (D)

17. (A) (B) (C) (D)

18. (A) (B) (C) (D)

19. (A) (B) (C) (D)

20. (A) (B) (C) (D)

21. (A) (B) (C) (D)

22. (A) (B) (C) (D)

23. (A) (B) (C) (D)

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28. (A) (B) (C) (D)

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30. (A) (B) (C) (D)

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32. (A) (B) (C) (D)

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34. (A) (B) (C) (D)

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37. (A) (B) (C) (D)

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39. (A) (B) (C) (D)

40. (A) (B) (C) (D)

41. (A) (B) (C) (D)

42. (A) (B) (C) (D)

43. (A) (B) (C) (D)

44. (A) (B) (C) (D)

45. (A) (B) (C) (D)

46. (A) (B) (C) (D)

47. (A) (B) (C) (D)

48. (A) (B) (C) (D)

49. (A) (B) (C) (D)

50. (A) (B) (C) (D)

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Session: 2015-16 Year: Second Semester : I Examination : Mid-Sem II
Course: Applied Thermodynamics Course Code : METIZC271 Durn : 1500-1615 Max. Marks: 20
Date: 2/11/2015

Instructions:

1. All questions are compulsory.
2. Fill the most appropriate option (A, B, C, D) using blue /black pen only in the bubble sheet provided.
3. Each question carries 1 mark unless mentioned otherwise.

Q1. Consider a slab of copper with thickness 0.25 m, having one surface maintained at 100°C and the other surface at 0°C . The heat transfer per unit area will be _____ W/m^2 ; for thermal conductivity of copper as 387.6 W/m.K .

- A. 5.11×10^5 B. 1.55×10^5 C. 15.5×10^5 D. 51.1×10^5

Q2. Thermal resistance in case of convection is _____.

- A. dx/kA B. $1/hA$ C. $-kA dt/dx$ D. $hA dt$

Q3. A mild steel tank of wall thickness 10 mm contains water at 90°C when the atmospheric temperature is 15°C . The thermal conductivity of mild steel is 50 W/m.K , and the heat transfer coefficients for the inside and outside of the tank are 2800 and $11 \text{ W/m}^2.\text{K}$. The overall heat transfer coefficient will then be _____ $\text{W/m}^2.\text{K}$.

- A. 10.93 B. 30.19 C. 93.01 D. 19.03

Q4. The rate of heat transfer per unit area for the above Q.3 will be _____ W/m^2

- A. 208.4 B. 765.1 C. 820 D. 82

Q5. In a counter flow double pipe heat exchanger, water is heated from 25°C to 65°C by an oil with a specific heat of 1.45 kJ/kg.K and mass flow rate of 0.9 kg/s . The oil is cooled from 230°C to 160°C . If the overall heat transfer coefficient is $420 \text{ W/m}^2.\text{K}$, the rate of heat transfer will be _____ kW.

- A. 31.59 B. 65.25 C. 91.35 D. 25.56

Q6. The logarithmic mean temperature difference for the heat exchanger mentioned in Q5 will be _____ $^{\circ}\text{C}$.

- A. 149.5 B. 159.94 C. 451.34 D. 511.99

Q7. At critical pressure

- A. the entropy of a substance is zero B. the latent heat of vaporization is zero
C. saturated vapor becomes a gas D. a real gas obeys ideal gas law

Q8. During a phase transformation .

- A. both pressure and temperature may change B. pressure may change
C. pressure and temperature – both will remain unchanged D. temperature may change

Q9. A rigid tank contains 50 kg of saturated liquid water at 90°C . The volume of this tank will be _____ m^3 .

- A. 0.0518 B. 0.001036 C. 0.8631 D. 31.680

Q.10 The amount of energy transferred to a mass of 200 grams of saturated liquid water to completely vaporize it at a constant pressure of 100 kPa will be _____ kJ.

- A. 2725 B. 451.5 C. 2257.5 D. 515.4

Q.11 For a fixed value of capacity ratio (R) as NTU increases effectiveness of a heat exchanger _____.

- A. decreases B. remains same C. none of the above D. increases

Tolani Maritime Institute, Induri
Off campus centre of Birla Institute of Technology & Science, Pilani
Multi Choice Question paper

Program: BTME / BSNT / MCEC / DNS / OTHERS

Form No. **FEX - 2A**

Revn. 00

- Q.12 For a fixed value of NTU as capacity ratio (R) increases effectiveness of a heat exchanger _____.
- A. decreases B. remains same C. none of the above D. increases
- Q.13 In steam nozzle, the steam expands from 4 bar to 1 bar. The initial velocity is 60 m/s and initial temperature is 473K. Nozzle Efficiency is 92%. Determine actual enthalpy drop
- A. 255.1 kJ/kg B. 255.1 J/kg C. 234.69 kJ/Kg D. 234.69 J/kg
- Q.14 The effect of considering friction losses in steam nozzle for the same pressure ratio leads to
- A. Increase in velocity of steam B. Decrease in velocity of steam
C. No change in exit velocity D. Increase or decrease depending upon exit quality of steam
- Q.15 The ratio of exit pressure to inlet pressure for maximum mass flow rate per unit area of steam through nozzle when steam is initially superheated and dry saturated respectively
- A. 0.555, 0.6 B. 0.578, 0.5457 C. 0.5457, 0.578 D. 0.6, 0.555
- Q.16 The effect of considering friction losses in steam nozzle for the same pressure ratio leads to
- A. Increase in dryness fraction of steam B. Decrease in dryness fraction of steam
C. No change in quality of exit steam D. Decrease or increase of dryness fraction of exit steam depending upon inlet quality
- Q.17 Determine exit velocity in m/sec for steam nozzle to pass a mass flow of 0.2 Kg/s when inlet conditions are 10 bar and 523K and final pressure is 2 bar. Assume expansion is isentropic and flow is supersaturated with $pv^{1.3}=\text{constant}$. Inlet velocity is negligible.
- A. 513.15 B. 520.25 C. 791.45 D. 800
- Q.18 Which one of the following is a non-positive type rotary compressor?
- A. Vane Blower B. Roots Blower C. Centrifugal Compressor D. Reciprocating Compressor
- Q.19 A single acting single cylinder reciprocating air compressor is compressing 20 Kg/min. of air from 110 kPa, 30°C to 600 kPa and delivers it to a receiver. Law of compression is $pv^{1.25}=\text{constant}$. Mechanical efficiency is 80%. Find the power input to compressor, neglecting losses due to clearance, leakages and cooling in kilo watt
- A. 58.55 B. 46.8 C. 73.18 D. 91.475
- Q.20 In steam nozzle, the steam expands from 4 bar to 1 bar. The initial velocity is 60 m/s and initial temperature is 473K. Nozzle Efficiency is 92% Determine exit velocity
- A. 685.11 m/s B. 687.7m/sec C. 690m/sec D. 695 m/sec