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Question Paper Code: 93903

B.E./B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Chemical Engineering

19UCH303 - HEAT POWER ENGINEERING

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Absolute zero temperature is taken as CO1- R
(a) -273°C (b) 273°C (c) 237°C (d) -373°C
- The unit of energy in SI units is CO1- R
(a) Joule (J) (b) Joule metre (Jm) (c) Watt (W) (d) Joule/metre (J/m).
- The latent heat of steam at atmospheric pressure is..... CO1- R
(a) 1535 kJ/kg B. 1875 kJ/kg (c) 2257 kJ/kg (d) 2685 kJ/kg
- The efficiency of Ericsson cycle is.....Carnot cycle CO1- R
(a) Greater than (b) Less than (c) Equal to (d) None of the above
- The economiser is used in boilers to..... CO1- R
(a) Increase thermal efficiency of boiler (b) Economise on fuel
(c) Extract heat from the exhaust the gases (d) Increase flue gas temperature
- The water tubes in a simple vertical boiler are CO1- R
(a) Horizontal (b) Vertical (c) Inclined (d) All of the above
- When water is heated with rise of temperature, it consumes CO1- R
(a) Latent heat (b) Enthalpy (c) Sensible heat (d) None

8. Volume of steam is approximately CO1- R
 (a) 600 times that of water (b) 800 times that of water
 (c) 1000 times that of water (d) None of the above
9. Non Condensing steam turbine can also be called as CO1- R

 (a) Extraction steam turbine (b) Back pressure steam turbine
 (c) Impulse steam turbine (d) None of the mentioned
10. Steam turbine is classified on basis of _____ CO1- R
 (a) type of blades (b) exhausting condition
 (c) type of Steam flow (d) all of the mentioned

PART – B (5 x 2= 10 Marks)

11. State Zeroth law of thermodynamics. Brief Internal energy, enthalpy and energy with expressions. CO1- U
12. Write down the air standard efficiency for Otto and Diesel cycle. CO3- U
13. List the essential factors for the selection of a boiler. CO1- U
14. Draw the Mollier chart and mention the different steam conditions. CO1- U
15. Define steam turbine. What is the function of steam turbine? CO1- R

PART – C (5 x 16= 80 Marks)

16. (a) Nitrogen gas is confined in a cylinder and the pressure of the gas is maintained by a weight placed on piston. The mass of piston and weight together is 100kg. The $g=9.81\text{m/s}^2$ and the atmospheric pressure is 1.01325 bar. assume frictionless piston. Determine CO2- App (16)
 a) The force exerted by the atmosphere, the piston, and the weight on the gas if the piston is 200mm in diameter.
 b) The pressure of the gas.
 c) If the gas is allowed to expand pushing up the piston and the weight by 500mm, what is the work done by the gas in kJ.
 d) What is the change in potential energy of the piston and weight of the expansion in part(c)

Or

- (b) (i) If a man weighs 600N at a place where the local acceleration due to gravity is 9.81m/s^2 . What would be his weight on moon, where $g=1.67\text{m/s}^2$ CO2- App (8)
- (ii) A man whose weight is 700N takes 2.5 min for climbing up a staircase. What is the power developed in him, if the staircase is made up of 20 stairs each 0.18m in height? **CO2- AP** (8)
17. (a) Draw the P-V and T-S diagram for Diesel cycle and derive the Efficiency of diesel cycle.. CO2- App (16)
- Or
- (b) Derive an expression for air-standard efficiency of dual-combustion, Cycle. CO3 -Ana (16)
18. (a) Explain the construction and working of fire tube boilers, chain grate stoker with a layout CO1- U (16)
- Or
- (b) With a neat sketch explain the construction and working of pulverized fuel firing. CO1- U (16)
19. (a) Discuss briefly about different types of thermodynamic steam traps CO1- U (16)
- Or
- (b) With a neat sketch explain Combination of Sampling & Throttling Calorimeters calorimeters. CO1- U (16)
20. (a) Explain the function of steam ejector with a neat sketch CO1- U (16)
- Or
- (b) Explain the operation of McLeod gauge CO1- U (16)

