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[15/A-16]

SARDAR PATEL UNIVERSITY
EXTERNAL EXAMINATION
B.SC. INDUSTRIAL CHEMISTRY
(FOURTH SEMESTER)
US04CICH02: CHEMICAL PLANT UTILITIES
TUESDAY, 10TH APRIL, 2018

Time: 10:00 am to 1:00 pm **Total Marks: 70**

Q. 1 Answer the following multiple choice question. **[10]**

1. Which of the following gas is used in making tungsten filaments for electric lamps?
   (a) N_2 (c) O_2
   (b) Mixture of N_2 & H_2 (d) CO_2
2. Permanent hardness of water can't be removed by.....
   (a) Adding soda (c) Distillation
   (b) Boiling (d) Adding lime-soda
3. The work required for a reciprocating compressor is minimum when the compression process is.....
   (a) Isothermal (c) Isentropic
   (b) Polytropic (d) Adiabatic
4. Coagulants help in the settling of.....
   (a) Suspended impurities only (c) Fine suspended matter only
   (b) Colloidal particles only (d) Dissolved Ca and Mg salt
5. Bomb calorimeter is used for determining the calorific value of:
   (a) Solid fuel (c) Solvent
   (b) Gaseous fuel (d) Crystals
6. Scale formation in boilers causes.....
   (a) No loss of heat (c) Wastage of heat
   (b) Increase in efficiency (d) None of above
7. The efficiency of diesel engine is.....
   (a) 70 to 75% (c) up to 45%
   (b) 50 to 60% (d) None of above
8. A refrigerant with highest critical pressure is.....
   (a) R-11 (c) R-12
   (b) R-22 (d) Ammonia
9. Which of the following is not a water tube boiler?
   (a) Cochran (c) Babcock
   (b) Lancashire (d) Locomotive
10. The coefficient of performance of heat pump is always.....
    (a) = 1 (c) < 1
    (b) > 1 (d) 0

Q.2 Answer any ten of following. **[20]**

1. Write the composition of gases in atmospheric air.
2. Enlist the common impurities present in water.
3. Distinguish between hard water and soft water.
4. Enlist the uses of hydrogen.
5. Define high calorific value.
6. Why coagulants are not used in hot lime-soda process?
7. Define internal combustion engine.
8. Define critical pressure.
9. Enlist the name of inorganic refrigerants.
10. Define the term ignition temperature.

[P.T.O.]

11. Enlist the functions of a boiler.
12. What is fire tube boiler?

Q.3 With the help of labeled diagram discuss the zeolite process. [10]

OR

Q.3 With the help of suitable examples explain the effect of water on rocks and minerals. [10]

Q.4 (a) Define fuel. Write the classification of fuel in detail. [05]
(b) Explain advantages of solid, liquid and gaseous fuels over each other. [05]

OR

Q.4 (a) Explain characteristics of good fuel. [05]
(b) Discuss the applications of oxygen and nitrogen. [05]

Q.5 (a) Discuss the classification of compressor in detail. [05]
(b) Explain mechanism of simple vapour compression refrigeration system. [05]

OR

Q. 5 (a) Write a brief note on: [05]
1. Refrigerator
2. Heat pump

(b) Discuss the work done by single stage single acting reciprocating compressor without clearance volume. [05]

Q. 6 (a) Derive the equation for efficiency of otto engine. [05]
(b) Explain the construction, working of simple vertical boiler with neat diagram. [05]

OR

Q. 6 (a) Discuss steam power plant working on carnot cycle in detail. [05]
(b) Discuss the classification of boilers. [05]