Reg. No. : | | | | | | | | | | |

Question Paper Code: 59091

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Elective

Chemical Engineering

15UCH910 - ENERGY ENGINEERING

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. What is the calorific value of Anthracite coal *(kJ/kg)*

   (a) 32500 – 34000 (b) 17000 – 23250
   (c) 28000 – 31000 (d) 39000 – 48000

2. What is the form of crystallized natural gas?

   (a) Oxides (b) Nitrides (c) Nitrates (d) Hydrates

3. What is the reason for release of energy from sun?

   (a) Nuclear fission (b) Nuclear fusion
   (c) Burning of gases (d) Chemical reaction

4. Which plants produce both power and manure?

   (a) Nuclear plants (b) Thermal plants
   (c) Biogas plants (d) Hydroelectric plant

5. Which of the following generating station has minimum running cost?

   (a) Nuclear (b) Hydro (c) Thermal (d) Diesel

6. The amount of energy available in the wind at any instant is proportional to _____ of the wind speed.

   (a) Square root power of two (b) Square root power of three
   (c) Square power (d) Cube power

7. Water boils underground in a hydrothermal when it has pressure of about ____ atm and temperature of about _____ °C.

(a) 3, 100 (b) 5, 120 (c) 6, 140 (d) 7, 165

8. Tidal energy utilizes

(a) Kinetic energy of water (b) Potential energy of water
(c) Both (a) and (b) (d) None of these

9. What is the purpose of waste heat recovery?

(a) Fossil fuels can be utilized more efficiently
(b) Air pollution can be reduced from fossil fuels
(c) Can reduce the noise pollution from industry
(d) All the above

10. Which of the following comes under energy conservation?

(a) Time (b) Labour (c) Capital (d) All the above

PART - B (5 x 2 = 10 Marks)

11. What are the disadvantages of shale oil?

12. What are the components of a biogas plant?

13. What are the factors need to be considered for selection of site for a hydro-electric plant?

14. What are the site requirements of a tidal power station??

15. Write the nature of fluids to be used in a heat pipe.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain in detail about natural gas production and its applications. (8)

(ii) What is tar sand? Write the applications of it. (8)

Or

(b) Explain Pressurized fluidized bed combustion of coal process and its applications. (16)

17. (a) (i) What are the advantages of anaerobic digestion? (8)

(ii) What are the advantages and disadvantages of floating drum plant? (8)

Or

(b) (i) Compare nuclear fission and fusion processes. (12)

(ii) What are the advantages and disadvantages of nuclear power plant? (4)

18. (a) (i) What are the problems in operating large wind power generators? (6)

(ii) Classify wind energy collectors. (10)

Or

(b) (i) What are the advantages of concentrating collector over flat collector? (8)

(ii) What are the applications of flat plate collector? (4)

(iii) What are the major factors influencing the electrical design of the solar array? (4)

19. (a) (i) What are the applications of geothermal energy? (8)

(ii) For a proposed tidal site, the observed difference between high and low water tide is 9m. The basin area is about 0.45 sq. km which can generate power for 3 hours in each cycle. The average available head is assumed to be 8.5m, and overall efficiency of the generation is 72 percent. Assume density of sea water as 1025 kg/m^3. Calculate: (i) Power at instant. (ii) Yearly power output. (8)

Or

(b) (i) Describe working procedure of Solid Oxide Fuel Cell with a neat sketch. (10)

(ii) Write the current-voltage characteristics of a fuel cell. (6)

20. (a) With help of a neat sketch describe combined cycle with heat-recovery boiler. (16)

Or

(b) (i) Explain types of Energy audit. (10)

(ii) Draw schematic representation of space heating mode and cooling mode using a heat pump. (6)

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