GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 713902N   **Date: 04-06-2013**
Subject Name: Energy Conversion System
Time: 10.30 am – 01.00 pm   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Sketch the layout of steam power plant and discuss its merits.   **07**
      (b) What are the advantages and short falls of regenerative feed heating over the simple rankine cycle?   **07**

Q.2 **(a)** What do you understand by radioactive decay? What are the radioisotopes?   **07**
      (b) In a nuclear reactor, each fission of U-235 yields 190 MeV of useful energy. Assuming that 85% of neutrons absorbed by U-235 cause fission, the rest is absorbed by non- fission capture to produce an isotope U-236, calculate the fuel consumption of U-235 per day to produce 5000 MW of thermal power.   **07**
<div align="center">OR</div>

      (b) The fuel density N for a uranium oxide fuel is given by $N = 2.373f \times 10^{22}$ U-235 nuclei/cm3 where f is the mass fraction of U-235 in the fuel.   **07**
Determine for a light water moderated uranium reactor the specific energy release rate for the following conditions.
   = neutron flux = $10^{13}/cm^2 s$
G = energy per fission = 180 MeV
f = 3.5 % U-235 enrichment
    f = 577 barns

Q.3 **(a)** With reference to modified Rankine cycle draw and explain reheat cycle.   **07**
      (b) Dry and saturated steam at pressure 11 bar is supplied to a turbine and expanded isentropically to pressure of 0.07 bar. Calculate the following :   **07**
    (a) heat supplied   (b) Total change of entropy
    (b) heat rejected   (d) theoretical thermal efficiency
<div align="center">OR</div>

Q.3 **(a)** Explain Rankine cycle with necessary diagram & write the methods of increasing the thermal efficiency.   **07**
      (b) Steam is supplied to a turbine at a pressure of 32 bar and a temperature of 410°C. It expands isentropically to a pressure of 0.08 bar. What is the dryness fraction at the end of expansion and thermal efficiency of the cycle.   **07**
Calculate the modified exhaust condition and thermal efficiency if the steam is reheated at 5.5 bar to a temperature of 395°C and then expanded isentropically to a pressure of 0.08 bar.

Q.4 **(a)** Explain nuclear fussion?   **07**
      (b) Draw & Explain working of CANDU reactor.   **07**
<div align="center">OR</div>

Q.4 **(a)** State the importance of cogeneration and trigeneration in content of energy.   **07**
      (b) With the help of neat sketch discuss the salient features of bubbling fluidized bed(BFB) boiler & discuss its merits.   **07**

Q.5 **(a)** Discuss the various methods used of waste heat recovery. **07**

(b) Give the list of various methods used for governing steam turbine and explain throttling governing in detail. **07**

OR

Q.5 Write short note on: **14**

     (1) Electrostatic precipitator.

     (2) Tangential burner.

     (3) Draw the sketch of nuclear reactor & Write the functions of moderator and reflector.

     (4) Various cooling system of thermal power plant.

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