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SARDAR PATEL UNIVERSITY

M.Sc. (Renewable Energy)Examination: Second Semester

Day and Date: Monday, 27.04.2015

Session: Morning, **Time:** 10:30 to 13:30

Subject/ Course Code: PS02EREN01 / Paper No. 4

Subject/ Course Title: Alternate Energy Sources

Total Marks: 70

Note: 1. All the questions are compulsory

2. Figures on the right bracket indicated marks

Q-1: Choose the correct answer **(8)**

(i) Magneto Hydro Dynamic power generation principle explained by .....

a. Joule b. Faraday
c. Thomson d. Peltier

(ii) Gas conductivity required in MHD is .....

a. > 8 mhos/m b. > 10 mhos
c. > 9 mhos/m d. > 6 mhos

(iii) Minimum temperature of emitter required in thermionic convertor should be .....

a. 900 °C b. 800 °C
c. 1000 °C d. 500 °C

(iv) Maximum efficiency attainable in thermoionic generator increasing temperature is .....

a. 15 % b. 35 %
c. 40 % d. 20 %

(v) When an electric current flows across the two isothermal junction of two dissimilar material with an evolution or absorption heat is known as .....

a. Seebeck Effect b. Joule Effect
c. Peltier Effect d. Thomson Effect

(vi) The process accompanied with release of energy as well as neutrons called

a. Emission b. Reduction
c. Fission d. Fusion

(vii) Thermocouple is an example of .....

a. Thermionic generator b. Thermoelectric generator
c. Thermonuclear fusion d. Thermo chemical conversion

(viii)..... is naturally available radioactive substance used for nuclear fission

a. Plutonium-239 b. Uranium- 235
c. Uranium- 233 d. Tritium

Q-2: Answer any seven short questions **(14)**

a) What is fusion reaction?
b) Sate the advantages of nuclear fusion
c) Explain in brief what is thermionic emission
d) Draw diagram of thermionic converter
e) The seabeck coefficient of a junction is 55 $\mu V/^oK$ at 373 K and 50 $\mu V/^oK$ at 273 K. Find the Peltier heats absorbed and rejected when the thermocouple is operating between these heat reservoirs and supplying a current of 10 mA.
f) Describe in brief thermoelectric power generator
g) Describe in brief
    i. Seeding
    ii. Super Conductivity
h) A MHD generator has following specification.
Plate area: 0.25 m^2,
Distance between plates: 0.50 m,
Flux density: 2 Wb/ m^2,
Avg. gas velocity: 10^3 m/sec,
Gas conductivity; 10 Mho/m.
Calculate- open circuit voltage and maximum power output.
i) State the important factors to be considered during selection of material for MHD

Q-3: A. Explain principle working of magneto hydro dynamic power generation with suitable figure **(6)**

B. Explain closed cycle MHD system with suitable diagram **(6)**

OR

Explain the advantages of MHD power generation system **(6)**

Q-4: A. Explain basic principle of thermoelectric power generation with suitable figures **(6)**

B. 100 kW, 115 volt, thermoelectric generator operates between 1500 and 1000 ^oK. The material properties are **(6)**

α_{SAB} at 1250 ^oK= 0.0012 volt/^oK

K_A= 0.02 watt/cm ^oK K_B= 0.03 watt/cm ^oK

ρ_A= 0.01 ohm cm ρ_B= 0.12 ohm cm

For optimum design
A_A= 43.5 cm^2
A_B= 48.6 cm^2
L_A= L_B= 0.49 cm, and the current density in the element is limited to 20 amps/cm^2,

OR

Explain with suitable figures **(3)**
i. Joule effect **(3)**
ii. Peltier Effect

Q-5: A. Describe the principle of working and constructional details of a basic thermionic generator (basic diode) with suitable figures **(6)**

B. Derive expression for power and efficiency for thermionic generator **(6)**

OR

Explain

i. Richardson law **(3)**

ii. Work function in thermionic emission **(3)**

Q-6: A. Describe Tokamak system with suitable figure **(6)**

B. Explain different methods of plasma heatingin magnetic confinement fusion **(6)**

OR

Write down the characteristic of D-T reaction in nuclear fusion **(6)**

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