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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

inole.	1. All the	questions are com	pulsory	,							
	2. Figures	on the right brack	cet indic	cated ma	rks						
-1: Cho	ose the cor	rect answer									
(i)	Magneto	Hydro Dynamic p	ower ge	eneration	princip	le expl	lained by				
	a.	Joule	0	b.	Farada	v					
	с.	Thomson		d.	Peltier	- -					
(ii)	Gas cond	uctivity required in	n MHD	is							
	a.	> 8 mhos/m		b.	> 10	mhos					
	c.	>9 mhos/m		d.	> 6 m	nhos					
(iii)	Minimum	temperature of er	nitter re	equired i	n thermi	ionic co	onvertor	should be	•		
	a.	900 °C	b.	800 °C							
	c.	1000 °C	d.	500 °C							
(iv)	Maximun	afficiency attain	able in t	hormoio	nia gon	orator i	noroncin	tompore	turo ic		
(10)	Waximun	15 %	b h	35.0%	me gene	erator i	nereasing	gtempera	ure is	•••••	•
	a.	15 70	0.	55 70							
	C	40 %	d	20%							
	c.	40 %	d.	20 %							
(v)	c. When an	40 % electric current f	d. lows ac	20 % ross the	two iso	otherma	al junctio	on of two	dissimil	ar materia	al
(v)	c. When an with an ev	40 % electric current f volution or absorp	d. lows ac tion hea	20 % ross the at is know	two iso vn as	otherma	al junctio	on of two	dissimil	ar materi	al
(v)	c. When an with an ev a.	40 % electric current f volution or absorp Seebeck Effect	d. lows ac tion hea	20 % ross the it is know b. Jou	two isc vn as ule Effe	otherma	al junctio	on of two	dissimil	ar materia	al
(v)	c. When an with an ev a. c.	40 % electric current f volution or absorp Seebeck Effect Peltier Effect	d. lows ac tion hea	20 % cross the at is know b. Jou d. Th	two iso vn as ule Effe omson l	otherma ct Effect	al junctio	on of two	dissimil	ar materia	al
(v) (vi)	c. When an with an ev a. c. The proce	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w	d. lows ac tion hea vith rele	20 % ross the tt is know b. Jou d. Th ase of er	two isc vn as ule Effe omson l nergy as	otherma ct Effect well as	al junctio	on of two	dissimil	ar materia	al
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(v) (vi)	c. When an with an ev a. c. The proce a. c.	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission	d. lows ac tion hea vith rele	20 % ross the tt is know b. Jou d. Th ase of er b. Re d. Fu	two iso vn as ule Effe omson l nergy as duction sion	otherma ct Effect well as	al junctio s neutron	on of two s called	dissimil	ar materia	al
(v) (vi) (vii)	c. When an with an ev a. c. The proce a. c.) Thermoco	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission	d. lows ac tion hea vith rele	20 % cross the tt is know b. Jou d. Th ase of er b. Re d. Fu	two iso wn as ule Effe omson hergy as duction sion	otherma ct Effect well as	al junctio	on of two s called	dissimil	ar materia	al
(v) (vi) (vii)	c. When an with an ev a. c. The proce a. c.) Thermoco a.	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission ouple is an exampl Thermionic gen	d. lows ac tion hea vith rele le of erator	20 % ross the tt is know b. Jou d. Th ase of er b. Re d. Fus	two iso vn as ule Effe omson l nergy as duction sion b. Th	otherma ct Effect well as	al junctio s neutron lectric ge	on of two s called	dissimil	ar materia	al
(v) (vi) (vii)	c. When an with an ev a. c. The proce a. c.) Thermoco a. c.	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission ouple is an exampl Thermionic gen Thermonuclear	d. lows ac tion hea with rele e of erator fusion	20 % cross the tt is know b. Jou d. Th ase of er b. Re d. Fus	two isc vn as ule Effe omson l nergy as duction sion b. Th d. Th	otherma ct Effect well as nermoe nermo c	al junctions s neutron lectric ge chemical	on of two s called enerator conversio	dissimil	ar materi	al
(v) (vi) (vii)	c. When an with an ev a. c. The proce a. c.) Thermoco a. c.	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission ouple is an exampl Thermionic gen Thermonuclear	d. lows ac tion hea with rele le of erator fusion ly availa	20 % ross the ti is know b. Jou d. Th ase of er b. Re d. Fus	two iso vn as ule Effe omson l nergy as duction sion b. Th d. Th oactive	otherma ct Effect well as nermoe nermo c substar	al junctio s neutron lectric ge chemical nce used	on of two s called enerator conversion	dissimil on ur fission	ar materia	al
(v) (vi) (vii)	c. When an with an ev a. c. The proce a. c.) Thermoco a. c. 1)	40 % electric current f volution or absorp Seebeck Effect Peltier Effect ess accompanied w Emission Fission ouple is an exampl Thermionic gen Thermonuclear is natural Plutonium-239	d. lows ac tion hea vith rele le of erator fusion ly availa	20 % cross the at is know b. Jou d. Th ase of er b. Re d. Fus	two isc vn as ule Effe omson l nergy as duction sion b. Th d. Th oactive b.	otherma ct Effect well as nermoe nermo c substar	al junctions s neutron lectric ge chemical nce used ium- 235	on of two s called enerator conversion	dissimila on ur fission	ar materi:	al

Q-2: Answer any seven short questions

- 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 μ V/°K at 373 K and 50 μ V/°K 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 m²,

Distance between plates: 0.50 m,

Flux density: 2 Wb/ m²,

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

Α.	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)
A.	Explain basic principle of thermoelectric power generation with suitable figures	(6)
B.	100 kW, 115 volt, thermoelectric generator operates between 1500 and 1000 $^{\circ}$ K. The material properties are	(6)
	α_{SAB} at 1250 °K = 0.0012 volt/°K	
	K_{A} = 0.02 watt/cm °K K_{B} = 0.03 watt/cm °K	
	А. В. А. В.	 A. Explain principle working of magneto hydro dynamic power generation with suitable figure B. Explain closed cycle MHD system with suitable diagram OR Explain the advantages of MHD power generation system A. Explain basic principle of thermoelectric power generation with suitable figures B. 100 kW, 115 volt, thermoelectric generator operates between 1500 and 1000 °K. The material properties are

 $\rho_A = 0.01$ ohm cm

 $\rho_{\rm B} = 0.12$ ohm cm

For optimum design $A_A = 43.5 \text{ cm}^2$ $A_B = 48.6 \text{ cm}^2$ $L_a = L_a = 0.49 \text{ cm}$ and the c

 $L_A = L_B = 0.49$ cm, and the current density in the element is limited to 20 amps/cm²,

OR

Explain with suitable figures i. Joule effect

ii. Peltier Effect

(3) (3)

Q-5:	Α.	Describe the principle of working and constructional details of a basic thermionic generator (basic diode) with suitable figures	(6)
	Β.	Derive expression for power and efficiency for thermionic generator	(6)
		OR	
	Ex	plain	
		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)
		Write down the characteristic of D. T reaction in nuclear fusion	(6)
		while down the characteristic of D-1 reaction in nuclear fusion	(0)

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