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B.Tech. DEGREE EXAMINATION, MAY 2022 Fifth, Sixth and Seventh Semester

18EEO301T – SUSTAINABLE ENERGY

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:			,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,			1	404
(i)		Part	- A should be answered in OM	IR sheet w	rithin first 40 minutes and OMR she	et shou	ld be	nan	aea
41 15		over	to hall invigilator at the end of	40 th minute	c.				
(ii)		Part	- B should be answered in answ	ver booklet	- 675 all 1 as				
Time	. 21	4 Hoi	ırç			Max	Ma	rks:	75
1 11110	. 2,	2 110							
			PART – A (25	$\times 1 = 25 \text{ N}$	Marks)	Marks	BL	со	PO
			Answer AL						
	1	Sele	ect the process by which sol	ar energy	is used to evaporate water and	1	1	1	1
	1.	colle	ect its condensate within the	same clos	ed system.				
			Solar distillation	(B)	Solar condensation				
		(C)			Solar cooling		•		
		(-)							1
	2.	Wha	at is the rate of solar energy r	eaching th	ne earth surface?	1	1	1	1
			1016 W	(B)	865 W				
		(C)	2854 W	(D)	1912 W				
					4	1	1	1	1
	3.		tify the meter which is used	to measur	e the solar beam radiations	•	•	•	-
		` '	Pyrheliometer		Anemometer				
		(C)	Thermometer	(D)	Sunshine recorder				
				lastial sub	and directly over the observer's	. 1	1	1	1
	4.	1		lestiai spi	nere directly over the observer's	•			
		head		(B)	Zenith				
			Nadir Vsible horizon	` ,	Azimuth angle				
		(C)	V SIDIE HOHZOH	(D)	Azimum angio				
	5	Sele	et the maximum percentage	e efficien	acy obtained from the thin film	1 1	1	1	1
	٦.		r panels.	o formoren	ioy common from the man and	_			
			14%	(B)	16%				
		(C)	12%	(D)	20%				
		(0)		(-)	V ²				
	6.	How	does the output power vary	between	cut-in speed and the rated speed?	1	1	2	1
		(A)			Linearly				
		(C)	Square		Exponential				
			1	. ,	-				
	7.	Whi	ch of the following are the li	mits of th	e range of wind speeds for which	h ¹	1	2	1
			urbines are designed?						
			Elasticity	(B)	Threshold voltage				
		(C)	Networking	(D)	Cut-in speed and cut-out speed				

Q	India	sate the function of orid side of	onve	rter in wind energy conversion	1	1	2	. 1	
0.	svste	em.		an appearator in terms of					
	(A)	To ensure operation at low	(B)	To control generator in terms of reactive power					
		power factor	(D)	reactive power To control the DC-link voltage					
	(C)	To control generator in terms	(D)	10 control ma	1	1		2	
0	3371	of active power	wher	the wind turbine blades rotate	•	1		2	
9.	W II a	er for the entire operation unio:		first					
		The output power first	(B)	The output power first decreases then monotonically					
	()	increases then decreases		decreases then					
			(D)	increases The output power increases					·
		The output power decreases						2	. T
10	Solo	of the speed type which is the n	nost f	flexible in terms of the generator	1	1		2	1
10.	used	l in wind energy conversion syste	7111						
	(A)	Full variable	(B)	Limited variable					
		Half variable	(D)	Fixed					
		a di tana andrond	durir	ng rectification of bio ethanol is	1	1	l	3	1
11.	The	by-products that are produced	durn	ig footification of the					
	used	Pig feed	(B)	Cow feed					
		Dog feed	(D)	0 1					
					1	_	1	3	1
12.		ch of the following forestry mate	erials	can be used as biomass?	-		•		•
	` ,	Fish oil		Logging residues Manure					
	(C)	Tallow	(D)	Wantie					
13	List	out the two processes under bio-	chem	nical conversion	1		1	3	1
15.	(A)	Photosynthesis and respiration	(B)	Photosynthesis and					
	()			photovoltaic					
	(C)	Anaerobic digestion and	(D)						
		fermentation		photosynthesis					
1./	117h :	ch of the following is a product	of ny	rolysis of hiomass?	1		1	3	1
14.		Steel		Producer gas					
	` '	Agricultural residue	(D)						
	(0)	·		Socialis					
15.	Bio	ethanol is denatured alcohol that	is al	so called as	1		1	3	1
	(A)	Ethylene	(B)	Methylated spirit					
	(C)	Ethylene glycol	(D)	Methylene					
						-			
16.		ne the type of turbine which is co			1		1	4	1
	1	Francis turbine		Kalpan turbine					
	(C)	Pelton wheel	(D)) Gorloy turbine					
17	Wha	t type of tide is it if the diff	Gren	ce between high and low tide is		1	1	4	1 1
4	great	test?	CI CII(coolween myn and low tide is			1	7	. •
	_	Diurnal tide	(B)	Neap tide					
	(C)	Spring tide	(D						

18.	Which of the following tidal barrage electricity?	s has	s the largest capacity to generate	1	1	4	
	(A) La Rance	(B)	Annapolis royal				
	(C) The sihwa lake tidal power						
	station						
19.	Mention the three ways to harness tide	al en	ergy	1	1	4	
	(A) Tidal streams, tidal barrages and wind	(B)	Tidal barrages, wind and sun				
		(D)	Tidal lagoons, tidal streams and tidal barrages				
20	Kinetic energy that results from the os	scilla	tion of water is called as	1	1	4	1
20.	(A) Wave energy	(B)	Tidal energy				
			Hydro energy				
	(c) Cocan morniar energy	(-)					
21	Fuel cell converts chemical energy to	elect	rical energy using a reaction that	1	1	5	1
	(A) Eliminates combustion of fuel	(B)	Requires combustion of fuel				
	(C) Requires no ignition of fuel	(D)	Includes combustion of fuel				
				1	1	5	1
22.	The type of reactions in a fuel cell is r	ot de	etermined by	1	•	,	•
	(A) Fuel and oxidizer combination	(B)	Composition of electrolyte				
	(C) Materials of anode and cathode	(D)	container				
			Container				
23	What is the voltage output of hydroge	n –02	xygen fuel cell?	1	1	5	1
23.	(A) $-1.23V$	(B)	-1.45V				
		٠	-0.93				
		` /					
24.	The hydrocarbons cracked with steam	in fu	nel cells do not give rise to	1	1	5	1
	(A) CO	(B)	CO_2				
	(C) H ₂	(D)	H_2O				
			20 1 11 1 4 1 9	1	1	5	1
25.	Which of these should not be a proper	ty of	fuel cell electrodes?				
	(A) Good electrical conduction	(B)	Highly resistant to corrosive environment				
	(C) Should norform charge	(D)	Take part in chemical reactions				
	_	(D)	Take part in chemical reactions				
	separation						
	$PART - B (5 \times 10 =$	50 N	farks)	Marks	BL	СО	PO
	Answer ALL Qu						
	7 mis (10 1 1 1 2 2 4 1						
26. a.	Enumerate the different types of cond	centra	ating type collectors. Describe a	10	1	1	1
	flat plate collectors used for generation	n of e	electrical energy.				
	(OR)			10			
b.	Illustrate with neat sketch about	low	temperature thermal electric	10	1	1	1
	production using solar pond and explain	in in	detail.				

		10	2	2	1
27. a.	Prove that maximum power is generated from ideal horizontal axis wind	10	_		
	turbine system is equal to $P_{\text{max}} = \frac{8}{27g_c} \rho A V i^3$.				
	(OD)	10	2	2	1
	Calculate the total power density, maximum obtainable power density and the total power generated in a propeller type wind turbine for a wind at 1 standard atmospheric pressure and 15°C. Wind velocity is $15m/s$, turbine diameter is 120 m and turbine operating speed is 40 rpm at maximum efficiency. Consider air density as 1.226 kg/m^3 .	10	2	1	
	With neat sketch, explain how the energy is generated using two stage digestion process. Also summarize the advantages of fixed dome type plant.	10	1	3	1
b.	(OR) Define anerobic digestion, explain the constructional detail and working of KVIC digestor.	10	1	3	1
29. a.	Describe the construction and working of closed cycle thermal power plant with neat diagram. Distinguish between closed and open cycle OTEC system.	10	1	4	1
b.	(OR) Discuss in detail about the working of single basin single effect type tidal power plant with neat sketch. Write the limitation of double basin type tidal power plant.	10	1	4	1
30. a.	Describe the construction and principle of operation of an alkaline of fuel cell and phosphoric acid fuel cell with neat diagrams.	10	1	5	1
	(OR) Describe the principle of working of a fuel cell. With reference to $H_2 - O_2$	10	1	5	1
	cell. Write some of the applications of fuel cell.				

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