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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth Semester

18CHE351T - RENEWABLE ENERGY ENGINEERING

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Energy crops are used to produce (A) ethanol (B) acetic acid (C) acetone (D) ether compounds	1	2	1
2.	Which of these produce unwanted carbon emissions? (A) Solar power (B) Fossil fuels (C) Wind power (D) Biomass	1	2	1
3.	The source of renewable energy having high power density in kW/m^2 is (A) Solar radiation (B) Tidal power (C) Wind energy (D) Geothermal radiation	1	2	1
4.	Which parameter is used as an index for the standard living of the people of a country? (A) Industrial production (B) Number of vehicles per house (C) Population density (D) Per capita energy consumption	1	2	1
5.	The range of wind speed suitable for wind power generator is (A) 0 to 5 m/s (B) 5 to 25 m/s (C) 25 to 50 m/s (D) 50 to 75 m/s	1	3	2
6.	_____ is an example for vertical axis wind turbine. (A) Darrieus (B) Dutch type rotor (C) Sail wing rotor (D) Multi blade propeller type	1	2	2
7.	The Betz limit for a lift propelled wind turbine is _____. (A) 32/27 (B) 14/27 (C) 16/27 (D) 11/27	1	1	2
8.	The _____ speed is the minimum velocity at which the wind turbine generates useful power. (A) rated speed (B) cut-in speed (C) cut-out speed (D) knot speed	1	2	2
9.	The value of concentration ratio of a flat plate solar collector is (A) 1 (B) 10 (C) 100 (D) 1000	1	3	3
10.	The typical cooking time in a paraboidal dish collector is (A) 1 to 2 hours (B) 2 to 5 hours (C) 20 to 30 s (D) 6 to 12 hours	1	2	3

11.	Reflector mirrors used in solar panels are called (A) mantles (B) heliostats (C) generators (D) diffusers	1	2	3
12.	The efficiency is maximum in which of these collectors? (A) Flat plate (B) Line focusimg (C) Paraboidal dish (D) Fresnel lens	1	3	3
13.	Biogas is predominantly (A) CO (B) CO2 (C) CH4 (D) N2	1	2	4
14.	The density of biomass can be increased by (A) Incineration (B) Briquetting (C) gasification (D) Pyrolysis	1	2	4
15.	What is the composition of Syngas? (A) H_2 and CO (B) H_2 and O_2 (C) N_2 and CO (D) N_2 and H_2	1	2	4
16.	_____ is thermal decomposition of biomass occurring in the absence of oxygen. (A) Gasification (B) Liquefaction (C) Pyrolysis (D) Combustion	1	2	4
17.	Which type of energy does volcanoes possess? (A) Kinetic energy (B) Geothermal energy (C) Electrical Energy (D) Nuclear energy	1	2	5
18.	A fuel cell makes use of _____ energy. (A) electrochemical (B) electromechanical (C) thermal (D) geothermal	1	2	5
19.	What does OTEC stand for? (A) Ocean thermal energy cultivation (B) Ocean thermal energy conversion (C) Ocean techno energy conservation (D) Ocean technical energy consumption	1	1	5
20.	How is water trapped from coastal waters for generating tidal power? (A) By building canals (B) By building dams (C) By digging wells (D) By storing in tanks	1	3	5

PART - B (5 × 4 = 20 Marks)
Answer **any 5** Questions

		Marks	BL	CO
21.	Explain the future of renewable energy in India.	4	4	1
22.	Discuss the equation for power extracted from wind sing a wind turbine.	4	3	2
23.	Explain the working of a solar dryer. Mention its applications.	4	2	3
24.	Explain the mechanism of pyrolysis process to extract the fuel from the biomass.	4	2	4
25.	Write short notes about the adverse effects of geothermal energy process.	4	4	5
26.	Write short notes on green house effect.	4	1	3
27.	How the waves and tides occur in oceans and explain the energy production by using tidal sources?	4	3	5

PART - C (5 × 12 = 60 Marks)
Answer **all** Questions

Marks	BL	CO

28.	(a) Discuss the relevance of energy conservation in today's global scenario based on available resources and future needs.	12	3	1
	(OR)			
	(b) Explain the relationship between energy consumption, economy development and environment deterioration.			
29.	(a) Draw a neat sketch of horizontal axis wind turbine, detail its constructional features and explain the working procedure of it.	12	3	2
	(OR)			
	(b) Discuss and derive the Betz limit equation for optimum wind energy conversion.			
30.	(a) Classify the solar collectors and explain about its uses for various types of space heating purposes.	12	2	3
	(OR)			
	(b) How does a photovoltaic cell work? Explain this concept with the working of a PN Junction diode.			
31.	(a) Write the types of biomass and its energy conversion methods. Also explain the three types of pyrolysis process to obtain the solid, liquid and gaseous fuel from the available biomass.	12	2	4
	(OR)			
	(b) Using a process block diagram, explain the production of bioethanol from the biomass and discuss about the limiting factors.			
32.	(a) With the help of a neat sketch, explain the working concept of Proton exchange membrane fuel cell to extract energy. Also give its applications and other uses.	12	2	5
	(OR)			
	(b) Discuss in detail about the production and storage of hydrogen fuel.			

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