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B.Tech DEGREE EXAMINATION, MAY 2024

Fifth Semester

18CHE351T - RENEWABLE ENERGY ENGINEERING

(For the candidates admitted during the academic year 2018 - 2019 to 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.	Based on usability, energy resources are classified into _____ (A) primary, secondary and tertiary resources (B) primary and secondary resources (C) primary, secondary, intermediate and tertiary resources (D) primary, intermediate and secondary resources	1	1	1
2.	Which of the following is not a type of primary resource? (A) Crude Oil (B) Coal (C) Hydrogen Energy (D) Sunlight	1	1	1
3.	Renewable energy-based power plants have _____ (A) negligible fuel cost (B) low energy availability (C) negligible production capacity (D) fuel storage tanks	1	1	1
4.	Energy Resources which are being used for many decades are known as _____ (A) conventional energy sources (B) non-conventional energy sources (C) primary energy sources (D) fuel cells	1	1	1
5.	Wind flows from _____ pressure area to _____ pressure area. (A) high, high (B) high, low (C) low, high (D) low, low	1	1	2
6.	Which of the following factors affect wind speed near the turbine system? (A) Birds flying (B) Sunlight (C) Time of the day, temperature, season (D) A village far away from the wind site	1	1	2
7.	Which of the following wind turbine is mostly used to extract wind energy? (A) DC generator (B) Vertical-axis wind turbines (C) Sailing boat (D) Horizontal-axis wind turbines	1	1	2
8.	Wind turbines convert wind energy to _____ (A) mechanical energy (B) electrical energy (C) heat energy (D) solar energy	1	1	2
9.	Which of the following is a conventional solar water system? (A) Solar air collectors (B) Flat-plate collectors (C) Parabolic dish collectors (D) Linear Fresnel collectors	1	1	3

10. What is the basic working principle of direct solar dryers? 1 1 3

(A) Direct exposure of substance to fire
(B) Direct use of sunlight to start a heater which is then used to dry the substance
(C) Indirect exposure of substance to sunlight
(D) Dehydrating the substance by directly exposing to sunlight

11. What are the types of concentrating technologies? 1 1 3

(A) Parabolic trough and solar stills
(B) Parabolic dish and solar furnace
(C) Solar power tower and parabolic trough/dish
(D) Solar furnace and solar stills

12. Evacuated tube solar cookers use _____ glass tube for the cooking chamber. 1 1 3

(A) highly insulated
(B) thermal conducting
(C) parabolic
(D) cone shaped

13. _____ is an example of cellulosic biomass. 1 1 4

(A) Glucose
(B) Fats
(C) Lipids
(D) Agricultural residue

14. Which energy forms can biomass be converted to? 1 1 4

(A) Electrical and light
(B) Light and chemical
(C) Electrical and heat
(D) Heat and light

15. How is the biomass material and gasification agent fed into a downdraft gasifier? 1 2 4

(A) Biomass from top, gasifying agent from top
(B) Biomass from top, gasifying agent from bottom
(C) Biomass from bottom, gasifying agent from left side
(D) Biomass from top, gasifying agent from right side

16. Which of the following is used to produce biogas from biomass? 1 1 4

(A) Anaerobic treatment
(B) Aerobic treatment
(C) Fermentation
(D) Pyrolysis

17. Which of the following best describes the working of a tidal barrage for an incoming tide? 1 1 5

(A) Incoming tides → generator → barrage → basin
(B) Incoming tides → basin → generator → barrage
(C) Incoming tides → barrage → basin → generator
(D) Generator → barrage → basin → incoming tides

18. What is a tidal lagoon? 1 1 5

(A) A man-made structure that spans the area of coastline with a high tidal range
(B) A man-made structure that spans the entire coastline
(C) A barrage
(D) A fast-flowing water body caused due to tides

19. What is ocean thermal energy conversion? 1 1 5

(A) Harnessing the temperature differences between surface waters and deep ocean waters
(B) Harnessing the temperature differences between the coastal waters and deep ocean waters
(C) Harnessing the heat energy from the underwater volcanoes
(D) Harnessing the heat energy between surface water vapour and atmospheric gases

20. Which of the following is the most popular application of hydrogen fuel cell? 1 1 5

(A) Fuel cell vehicles
(B) Fuel cell energy power plants
(C) Fuel cells stand-alone power supplies
(D) Fuel cells spacecraft

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Discuss the status and future prospects of renewable energy sources in India.	4	1	1
22.	Write some advantages and disadvantages of wind energy.	4	1	2
23.	Explain a note on solar dryer.	4	2	3
24.	Mention the factors affecting the performance of biogas digestor.	4	1	4
25.	What is a fuel cell? List its applications.	4	1	5
26.	Define the terms for solar collector. (i) collector efficiency (ii) concentration ratio	4	1	3
27.	Discuss a note on pyrolysis.	4	1	4

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Explain the types of renewable and non renewable resources.	12	2	1
	(OR)			
	(b) Describe the importance and various aspects of energy conservation.			
29.	(a) Draw a neat sketch of horizontal axis wind turbine, detail its constructional features and explain the working procedure of it.	12	2	2
	(OR)			
	(b) Explain in detail about any five blade variables to optimize the wind energy conversion phenomena.			
30.	(a) Describe the working principle and construction of a solar water heater with a neat diagram.	12	2	3
	(OR)			
	(b) Describe the working principle and construction of standalone solar photovoltaic system with a neat diagram.			
31.	(a) Classify the various types of biogas plants and explain the working of Janata model biogas plant with neat sketch.	12	2	4
	(OR)			
	(b) Explain the steps involved in the production of ethanol from the three types of biomass resources.			
32.	(a) With help of neat sketch, explain the working concept of Proton exchange membrane fuel cell to extract energy.	12	2	5
	(OR)			
	(b) How geo thermal energy generated from the nature? Explain with neat sketch and also give its socio-economic problems, applications.			

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