GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
Non Conventional Energy Sources
EI703B

TIME ALLOTTED : 3 Hrs **FULL MARKS : 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **1×10=10**

		Marks	CO No
1(i)	The maximum solar irradiance on surface of the earth is a. 1 kW/m^2 b. 10 kW/m^2 c. 100 kW/m^2 d. None of these	1	CO1
1(ii)	In the northern hemisphere, the duration of daytime is maximum on a. 21st March b. 21st June c. 21st September d. 21st December	1	CO1
1(iii)	Direct solar irradiance can be measured by a. Pyranometer b. Anemometer c. Pyroheliometer d. None of these	1	CO1
1(iv)	Highest efficiency is obtained by the photovoltaic cell made of a. Monocrystalline silicon b. Polycrystalline silicon c. Amorphous silicon d. Thin-film silicon	1	CO2
1(v)	In small wind turbines, the preferred generator is a. DC generator b. Permanent magnet synchronous generator c. Doubly fed induction generator d. None of these	1	CO2
1(vi)	The approximate value of solar constant is: a. 1364 W/m^2 b. 1500 W/m^2 c. 2165 W/m^2 d. 2230 W/m^2	1	CO1

1(vii)	Solar still is used to produce a. Solar thermal energy b. Water thermal energy c. Wind energy d. Purified water	1	CO2
1(viii)	Highest efficiency is obtained by a wind mill with a a. Horizontal axis b. Vertical axis c. Multiple axis d. None of these	1	CO2
1(ix)	Pyrolysis converts biomass to: a. Water vapour b. Thermal energy c. Char d. Syngas	1	CO2
1(x)	In a fuel cell, the electrolyte can be: a. Polymer b. Ceramic c. Carbonate d. All of these	1	CO1
1(xi)	As of now, in India, the non-conventional source of energy that produces highest electricity is a. Solar energy b. Wind energy c. Ocean energy d. Geothermal energy	1	CO1

GROUP – B
(Short Answer Type Questions)

(Answer any *three* of the following) **3 x 5 = 15**

		Marks	**CO No**
2. a)	What are the different non-conventional sources of energy that can be used in India?	3	CO1
2. b)	What are the drawbacks of fossil fuel based energy production systems?	2	CO1
3.a)	Define the solar panel efficiency.	1	CO1
3.b)	Define fill factor for a solar panel.	1	CO1
3.c)	What are the electrical parameters for a solar panel?	1	CO1
3.d)	What are the differences between solar panel and solar array?	2	CO1
4.	Describe with diagram the principle of operation of a photodiode based pyranometer.	5	CO2
5.	Briefly describe how biomass can be used as a nonconventional source of energy.	5	CO3
6. a)	What is green energy?	1	CO1
6.b)	Justify if atomic energy is green energy.	4	CO1

GROUP – C
(Long Answer Type Questions)

(Answer any *three* of the following) **3 x 15 = 45**

		Marks	CO No
7. a)	Briefly explain with proper diagram how a photovoltaic cell works.	6	CO3
7. b)	Draw the I-V and P-V characteristic curves of a photovoltaic cell.	4	CO3
7. c)	Compare monocrystalline solar cell and polycrystalline solar cell.	5	CO3
8. a)	Briefly explain the methods used to control the output frequency of a wind turbine.	8	CO2
8. b)	Why is 3-blade turbine preferred for wind turbines?	2	CO3
8. c)	What are the advantages and disadvantages of vertical axis wind turbines?	5	CO3
9.a)	What are the advantages and disadvantages of ocean thermal energy converter (OTEC)?	5	CO2
9.b)	Compare the principles of operation of closed cycle OTEC and open cycle OTEC.	10	CO4
10.	Answer any three from the following:		
10.a)	Solar still	5	CO2
10.b)	Solar thermal power plant	5	CO3
10.c)	Multistage flash distillation	5	CO2
10.d)	Flash steam plant	5	CO4
10.e)	Fuel cell	5	CO3