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GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Seventh Semester – Regular) Examinations, November – 2022

BESAG7020 – Renewable Power Sources

(AGE)

Time: 3 hrs

Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

Q.1. Answer ALL questions

[CO#] [PO#]

- | | | | | | |
|--|---|--|--|---|---|
| a. An MPPT is basically: | | | | | |
| (i) dc-dc switching regulator | (ii) an ac-dc converter | | | 1 | 1 |
| (iii) a dc-ac inverter | (iv) an amplifier | | | | |
| b. On September 21, 2022, the declination angle was: | | | | 1 | 1 |
| (i) 0 degrees | (ii) +23.45 degrees | | | | |
| (iii) -23.45 degrees | (iv) +180 degrees | | | | |
| c. If no load is connected to solar PV system: | | | | 1 | 1 |
| (i) it will stop absorbing light | (ii) it will start reflecting the light | | | | |
| (iii) its voltage will go on increasing till its breakdown | (iv) it will dissipate energy in the panel and increase its temperature | | | | |
| d. Liquefaction of biomass is carried out at : | | | | 2 | 1 |
| (i) High temperature and low pressure | (ii) Relatively low temperature and high pressure | | | | |
| (iii) Relatively low temperature and normal pressure | (iv) Room temperature and high pressure | | | | |
| e. E20 is the blend of : | | | | 2 | 1 |
| (i) 15% ethanol 85% gasoline | (ii) 80% ethanol 20% gasoline | | | | |
| (iii) 20% ethanol 80% gasoline | (iv) 85% ethanol 15% gasoline | | | | |
| f. Bio-diesel is : | | | | 2 | 2 |
| (i) Obtained from fermentation of sugars | (ii) Obtained from pyrolysis process | | | | |
| (iii) Exudates of plants | (iv) An upgraded vegetable oil | | | | |
| g. Hydrogen can be generated commercially through : | | | | 2 | 2 |
| (i) Aerobic digestion | (ii) Steam reforming methane | | | | |
| (iii) Incineration | (iv) Pyrolysis | | | | |
| h. The interference factor, 'a' is also known as: | | | | 3 | 2 |
| (i) Perturbation Factor | (ii) Fractional Factor | | | | |
| (iii) Power Coefficient | (iv) Bertz criterion | | | | |
| i. Between 30 degrees N and 30 degrees S, heated air at the equator rises and is replaced by cold air coming from north to south, such circulation of wind is known as | | | | 3 | 1 |
| (i) Hemispheric circulation | (ii) Rossby circulation | | | | |
| (iii) Hadley circulation | (iv) Trade Winds | | | | |
| j. The air density at standard conditions at sea level is approximately | | | | 3 | 2 |
| (i) 1.885 kg/m ³ | (ii) 1.3267 kg/m ³ | | | | |
| (iii) 2.555 kg/m ³ | (iv) 1.226 kg/m ³ | | | | |

PART – B: (Short Answer Questions)**(2 x 10 = 20 Marks)**

<u>Q.2. Answer ALL questions</u>	[CO#]	[PO#]
a. Define primary force and Coriolis force	3	1
b. What do you mean by teetering of rotor?	3	1
c. Name three plants widely used for energy farming.	2	2
d. Define solidity and tip speed ratio related to wind energy.	3	2
e. Draw the block diagram to show the products and by-products of sugar cane farming	2	2
f. Differentiate between gasification and pyrolysis	2	2
g. What do you mean by angle of latitude?	1	1
h. Define semiconductors. What do you mean by intrinsic and extrinsic semiconductors?	1	1
i. Differentiate between open and closed cycle MHD.	4	2
j. Write the equation of current for dark and illuminated solar cell.	1	2

PART – C: (Long Answer Questions)**(10 x 4 = 40 Marks)**

<u>Answer ALL questions</u>	Marks	[CO#]	[PO#]
3. a. What are the ten operational parameters of biogas plant? Briefly explain them.	5	2	1
b. Explain with block diagram the working methodology of MSW incineration.	5	2	2
(OR)			
c. Explain with proper diagram the functioning of fixed dome type biogas plant.	5	2	2
d. Tabulate the differences between various types of gasifiers.	5	2	2
4. a. Derive the equation for coefficient of force. Find the value of C_f for maximum power	5	3	1
b. The HAWT wind turbine has found to have 20 m/s wind speed at 1 atm pressure and 270°C having rotor diameter of 80m and speed of rotor is 40 rpm. Calculate the torque produced at the shaft for maximum output of the turbine.	5	3	2
(OR)			
c. Explain with neat sketch the working procedure of lithium bromide refrigeration sytem using solar power	5	1	2
d. Explain with neat sketch the working procedure of distributed collector solar thermal electric power plant	5	1	2
5. a. A two bladed HAWT has a height of tower is 80m. The speed of wind at a height of 10m is 8m/s, air density of 1.226 kg/m ³ , α is 0.13, rotor diameter is 60m. The downstream wind velocity is half of upstream wind. Find	10	3	1
i. Total power available ii. Power extracted by the turbine			
iii. Axial thrust on the turbine iv. Maximum axial thrust on the turbine			
(OR)			
c. Explain the different regions of wind speed with diagram.	5	3	1
d. What are three types of generators for WECS? Mention the problems and solution for each generator	5	3	1
6. a. Explain the working of Claude cycle OTES with neat diagram	5	4	2
b. Mention the impact of OTES on environment	5	4	2
(OR)			
c. Mention various types of dam on the basis of structure, use and material.	5	4	1
d. Draw the diagram of a dam and label its various parts	5	4	1

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