M.TECH/RE/2ND SEM/REEN 5202/2021

TECHNOLOGY OF RENEWABLE POWER GENERATION
(REEN 5202)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

    (i)   Low temperature solar thermal devices can attain the temperature of
            (a) 100^0 C   (b) 250^0C
            (c) 50^0C   (d) None of these

    (ii)   Mounting of solar panels are made of
            (a) Good Semiconductor   (b) Good current Conductor
            (c) Good Insulator   (d) Good heat Conductor

    (iii)   Blocking diodes are connected towards the
            (a) PV Panels   (b) Battery
            (c) Inverter   (d) None of these

    (iv)   The turbine used in a tidal range plant is
            (a) Pelton turbine   (b) Kaplan turbine with fixed pitch
            (c) Kaplan turbine with variable pitch   (d) Francis turbine

    (v)   Solar cell voltage reduces for every one degree temperature increase is
            (a) 2.3mV   (b) 23mV
            (c) 0.23mV   (d) None of the above

    (vi)   As per Betz criterion, the maximum percentage of available wind energy may be extracted by an ideal wind turbine is
            (a) 29.3%   (b) 59.3%
            (c) 89.3%   (d) 99.3%

    (vii)   Concentrating collectors are used to increase
            (a) Efficiency at high temperature   (b) Efficiency at low temperature
            (c) Efficiency at moderate temperature   (d) None of these

(viii)   The minimum tidal range required for power generation is about
     (a) 1m   (b) 5m
     (c) 10m   (d) 15m

(ix)   Two-basin tidal schemes
     (a) are more economical than single-basin schemes
     (b) produce more uniform power
     (c) produce less uniform power
     (d) decrease the net energy generation

(x)   The range of wind speed suitable for wind power generation is
     (a) 0-5m/s   (b) 5-25m/s
     (c) 25-50m/s   (d) 50-75m/s

Group – B

2. (a)   What are solar collectors? Give their classification and compare them based on construction area of applications.

    (b)   Describe the different methods of sun tracking.

$$(2 + 6) + 4 = 12$$

3. (a)   Discuss the working principle of Shallow Solar Ponds. Draw the schematic diagram of SSP based domestic solar water heater.

    (b)   Determine the criterion for static stability that provides the salinity gradient for solar ponds.

$$(3 + 5) + 4 = 12$$

Group – C

4. (a)   Describe the main components of Photovoltaic System.

    (b)   Establish the preliminary solar array area and battery size for the average load of 67W for 24h. Solar efficiency is 10% and sum total of all array design and degrade array factor is 0.5. Battery charging efficiency is 60%. The load is to be supported for seven continuous days of cloudy weather (no sunshine) and the battery is to be fully recharged in 3 days. Average monthly insolation is 181 kWh/m^2

$$4 + 8 = 12$$

5. (a)   Explain the different process of Silicon extraction.

    (b)   Why the Blocking diodes and bye pass diodes are used in PV system.

$$7 + 5 = 12$$

Group – D

6. (a)   With the help of a diagram, explain the nature of variation of wind speed with height.

    (b)   What do you understand by 'wind gust'?

8 + 4 = 12

7.   (a)   Sketch the diagram of a Horizontal Axis Wind Turbine and explain the functions of its main components.

    (b)   Explain the wind power generating curve.

7 + 5 = 12

Group – E

8.   (a)   What are the merits and demerits of geothermal energy?

    (b)   Compare the environmental impacts of geothermal energy harnessing with others?

6 + 6 = 12

9.   (a)   Briefly describe the two-basin tidal energy conversion schemes.

    (b)   Write short notes on: (i) power in waves, (ii) Wave energy technology.

6 + (3 + 3) = 12

Department & Section	Submission Link
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