

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2023**

**RENEWABLE ENERGY POWER PLANTS**

[Maximum Marks: 75]

[Time: 3 Hours]

**PART-A**

**I. Answer all the following questions in one word or one sentence. Each question carries 'one' mark.**

**(9 x 1 = 9 Marks)**

		Module Outcome	Cognitive level
1.	List any two examples for non-conventional resources.	M1.01	R
2.	List the Classification of small hydel power plants based on head.	M1.02	R
3.	Define biomass.	M1.04	R
4.	The rate of incident energy per unit area of a surface is termed as .....	M2.01	R
5.	Define megawatt peak with respect to solar photovoltaic system.	M2.03	R
6.	State the function of Gear box in Horizontal axis wind turbine.	M3.02	R
7.	Write the equation for power output from a wind turbine.	M3.02	R
8.	List any two applications of fuel cells.	M4.03	R
9.	The process or technology for producing energy by harnessing the temperature differences between ocean surface waters and deep ocean waters is called.....	M4.02	R

**PART-B**

**II. Answer any eight questions from the following. Each question carries 'three' marks.**

**(8 x 3 = 24 Marks)**

		Module Outcome	Cognitive level
1.	Define renewable energy source and state its need.	M1.01	R
2.	List any three advantages of geothermal power plant.	M1.03	R
3.	Explain the process of anaerobic digestion.	M1.04	U
4.	List the classification of solar collectors with examples.	M2.01	R
5.	Explain the working principle of solar cell with a neat diagram.	M2.03	U
6.	Draw the block diagram of wind energy conversion system and label all blocks.	M3.02	R
7.	Compare horizontal axis and vertical axis wind turbines.	M3.02	U
8.	A wind turbine has a blade length of 54 m. Determine the power developed by the turbine if the wind speed is 15 m/s. Take air density as 1.23kg/m <sup>3</sup>	M3.03	A
9.	Illustrate constant speed constant frequency wind energy conversion system.	M3.04	U
10.	State the basic concept of a tidal power plant.	M4.01	R

**PART-C**

**Answer all questions from the following. Each question carries 'seven' marks.**

**(6 x 7 = 42 Marks)**

		Module Outcome	Cognitive level
III.	Draw the schematic diagram of a small hydel power plant and specify the functions of each part. <b>OR</b>	M1.02	U
IV.	Illustrate the working principle of binary cycle geothermal power plant.	M1.03	U
V.	Draw and explain V/I characteristics of a PV module. <b>OR</b>	M2.03	U
VI.	Illustrate the concept of solar pond.	M2.02	U
VII.	Following are the list of electrical load to be connected to a solar array <ul style="list-style-type: none"> <li>• Three 18 watt fluorescent lamp used 6 hours per day.</li> <li>• Two 60 watt fan used for 7 hours per day.</li> <li>• One 150 Watt Television 5 hours per day.</li> </ul> Calculate (a) Daily solar energy requirement in watt-hour/day (b) Number of 12 V, 100 Ah batteries required for 2 days of autonomy in a solar PV System. Assume depth of discharge of battery as 60%. <b>OR</b>	M2.04	A
VIII.	5 Nos of 12 V, 100 Ah batteries connected in parallel are to be charged from a solar panel. Calculate the Number of 110 Wp solar panels required for this purpose. Assume charging current = 1/10 of ampere hour rating.	M2.04	A
IX.	With the help of block diagram explain grid interactive wind power plant. <b>OR</b>	M3.03	U
X.	Explain with neat sketch a horizontal axis wind turbine.	M3.02	U
XI.	Draw a neat sketch of oscillating water columns in tidal power generation and explain. <b>OR</b>	M4.01	U
XII.	Summarize the operation of closed cycle ocean thermal energy conversion with a block diagram.	M4.02	U
XIII.	Explain the operation of hydrogen fuel cell with neat diagram and chemical reaction. <b>OR</b>	M4.03	U
XIV.	Draw and explain the block diagram of MHD power plant.	M4.04	U

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