

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: CSE

SEMESTER : V
SESSION : MO/2023

SUBJECT: ME392 RENEWABLE ENERGY SOURCES

TIME: 03 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

		CO	BL
Q.1(a)	Comment on the future availability trend of fossil fuel in the world.	[2]	1 2
Q.1(b)	Explain the importance of non-Conventional sources in context of global warming.	[3]	1 2
Q.1(c)	What is the difference between conventional and non-conventional energy resources?	[5]	1 1
Q.2(a)	Explain the term solar radiation and solar constant.	[2]	2 1
Q.2(b)	Explain with neat sketch working principle of solar still.	[3]	2 2
Q.2(c)	Explain with neat sketch working principle of natural circulation solar water heater.	[5]	2 2
Q.3(a)	State the advantages and disadvantages of wind energy conversion systems.	[5]	3 1
Q.3(b)	A 40 m diameter, wind turbine produces 700 kW at a wind speed (hub height) of 14 m/s. The air density is 1.225 kg/m ³ . Find: a) The rotational speed (rpm) of the rotor at a tip-speed ratio of 5.0, b) What is the tip-speed (m/s)? c) If the generator turns at 1800 rpm, what gear ratio is needed to match the rotor speed to the generator speed, and d) What is the efficiency of the wind turbine system (including blades, transmission, shafts, and generator) under these conditions?	[5]	3 3
Q.4(a)	Explain briefly, with a neat sketch the working principle of floating drum type Biogas plant (KVIC Model).	[5]	4 2
Q.4(b)	The following data are given for a family biogas digester suitable for the output of five cows: the retention time is 20 days, temperature 30°C, dry matter consumed per day = 2 kg, the density of dry matter in the fluid as 50 kg/m ³ , biogas yield is 0.24 m ³ /kg. The efficiency of burner is 60%. Methane proportion is 0.8 and heat of combustion of methane = 28 MJ/m ³ . Overall efficiency of the plant = 25%. Calculate i) the volume of the biogas digester, and ii) the electric power available from the plant.	[5]	4 3
Q.5(a)	A tidal power plant of the simple single basin type has a basin area of 30 × 10 ⁶ m ² . The tide has a range of 12 m. The turbine, however, stops operating when the head on it falls below 3 m. Calculate the energy generated in one filling (or emptying) process in kWh, if the turbine generator efficiency is 35%.	[5]	5 3
Q.5(b)	Describe with neat sketch working principle of closed cycle ocean thermal energy Conversion (OTEC) plant.	[5]	5 2

:::30/11/2023 M:::