Question Paper

Exam Date & Time: 06-Jun-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
IV SEMESTER B.S. DEGREE MAKE UP- EXAMINATION - MAY / JUNE 2018
DATE: 6 JUNE 2018
TIME : 9.30 AM TO 12.30 PM

Renewable Energy Utilization [ME 242]

Marks: 100 **Duration: 180 mins.**

Answer ANY FIVE full Questions.
Missing data, if any, may be suitably assumed

1)	A)	Explain with neat sketch the working principle of a Pyranometer.	(6)
	B)	Explain the working of Forced circulation direct gain type solar dryers with a neat sketch.	(6)
	C)	Calculate the number of daylight hours [day length] at Bangalore at 21 June and 21 December in a leap year. The latitude of Bangalore is 12^0 58' N.	(8)
2)	A)	With the sketch explain the working of solar absorption refrigeration system.	(6)
	B)	With neat sketch explain the working of Forced circulation direct gain type solar dryers.	(6)
	C)	Define the following with respect to Solar liquid flat plate collector i) Transmissivity absorptivity product ii) Collector Efficiency factor iii) Collector heat removal factor.	(8)
3)	A)	With neat sketch explain the working of Horizontal axis wind turbines (HAWT).	(6)
	B)	Prove that in case of horizontal axis wind turbine the maximum power can be obtained when:	(6)

$$\text{Exit Velocity} = \frac{1}{3}\ \text{Wind Velocity}$$

$$P_{max} = \frac{8}{27}\rho A V^3$$

	C)	Explain various advantages of HAWT and VAWT wind turbines.	(8)
4)		With neat sketch explain the working of closed ocean thermal energy conversion system.	(8)
	A)		
	B)	Explain the importance of i) Heat removal ii) Collector efficiency factor iii) Transmissivity-Absorptivity product.	(6)
	C)	List the site requirements, advantages, disadvantages of Tidal power plant.	(6)
5)		With neat sketch explain the geothermal energy conversion in liquid dominated reservoir.	(6)
	A)		
	B)	Explain with neat diagram 'Dolphin type' wave power machine.	(6)
	C)	A single basin type tidal power has a basin area of 3 km^2 . The tide has an average range of 10 m. Power us generated only during the flood cycle only. The turbine stops operating when the head on it falls below 3 m. Calculate the average power generated by the plant in a single filling process of the basin if the turbine-generator efficiency is 0.65. Estimate the average annual energy generation of the plant.	(8)
6)		Explain power generation through Hot Dry Rock Technology with neat sketch.	(8)
	A)		
	B)	Explain various advantages and disadvantages of geothermal energy.	(4)
	C)	With a neat sketch explain the geothermal energy conversion in liquid dominated reservoir.	(8)
7)		Explain the working of Fixed Dome Type Biogas plant with sketch emphasis on the various processes of biogas generation.	(8)
	A)		
	B)	With the help of sketch explain the working of downdraft type gasifier	(6)
	C)	Explain the various factors affect biogas production.	(6)

8)		With neat sketch explain the working of a suitable system that makes use of Magneto hydrodynamic principle with exhaust gas as working fluid.	(6)
	A)		
	B)	Write short notes on the working of Thermionic Converter.	(6)
	C)	With neat sketch explain the working of a suitable energy conversion device that make use of hydrogen as fuel with byproduct as water.	(8)

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