

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

**CLASS: BE
BRANCH: EEE/CIVIL**

**SEMESTER : VII
SESSION : MO/18**

SUBJECT: MEE2157 RENEWABLE SOURCES OF ELECTRICAL ENERGY

TIME: 3:00 HRS.

FULL MARKS: 60

INSTRUCTIONS:

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
 2. Candidates may attempt any 5 questions maximum of 60 marks.
 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.
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- Q.1(a) Define Renewable sources of Energy. List its advantages & disadvantages. [2]
Q.1(b) How energy need of the world is linked to climatic change & renewable source of energy? [4]
Q.1(c) Write salient features of **Kyoto Protocol** or **Paris Accord** or **issues before COP24** (to be held in Poland-Dec18). [6]
- Q.2(a) Roughly how much energy in Joule per second from the Sun is intercepted by the Earth? In which form is it transmitted and reaches the earth? Conduction, Convection, Radiation? [2]
Q.2(b) If for a particular day solar Insolation I_0 is given, hour angle is given (ω_1 at sunrise & ω_2 sunset), latitude of place ϕ is given, Declination angle δ is given How would you calculate energy falling on earth over one day. Give suitable expression and method to calculate. [4]
Q.2(c) Define Solar Constant, Tilt angle, Beam Radiation, Global radiation, Concentration ratio, Solar Insolation. [6]
- Q.3(a) What is solar PV cell, module? Draw the Current versus voltage Characteristic of of Solar PV module. [2]
Q.3(b) Air Density is 1.226 kg/m^3 , wind speed is 15 m/s , turbine diameter is 120m , find out the (i) Energy in wind(ii) Max Mech power obtainable. If overall efficiency is 70% , Calculate overall power generated by wind turbine. [4]
Q.3(c) With a block diagram explain how solar PV module/array can be connected to grid/standalone system to feed electrical power. [6]
- Q.4(a) What is Biomass? List some Biomass sources from which Energy can be extracted. [2]
Q.4(b) Explain how biogas can be obtained from Biomass? Write down the calorific Value of Coal, Wood, Biogas. [4]
Q.4(c) What do You mean by waste to energy? Explain one scheme by which you can extract energy from Municipal waste. [6]
- Q.5(a) What do mean by OTEC system? [2]
Q.5(b) Explain open cycle OTEC system with diagram. [4]
Q.5(c) What are topographic requirement of Tidal power plant? Explain working of one such plant. [6]
- Q.6(a) How energy storage is related to Renewable energy source? [2]
Q.6(b) What is Hybrid system? Explain one such system. [4]
Q.6(c) Why at all do we need energy storage device? How Ultra Capacitors store energy? How a Flywheel stores energy? [6]
- Q.7(a) What is Hybrid system of energy supply for standalone system? [2]
Q.7(b) Differentiate standalone system and grid integrated system of energy supply? [4]
Q.7(c) What are the issues before grid interactive renewable energy system? With a neat block diagram explain how Solar PV system can be integrated to grid. [6]

:::10/12/2018:::M