

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

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

**SEMESTER : VII
SESSION : MO/19**

SUBJECT: MEE2157 RENEWABLE SOURCES OF ELECTRICAL ENERGY

TIME:3:00 HOURS

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) How do you define Renewable Energy source? Define it. Give some suitable Example. [2]
- Q.1(b) Classify Energy Sources from your Knowledge Base. [4]
- Q.1(c) Write some Important features of Kyoto Protocol. And state whether it has served its purpose. [6]
- Q.2(a) Differentiate Tracking and Non Tracking type of solar Collector. [2]
- Q.2(b) Determine the solar radiation on earth surface at a place having latitude of 40° N on February 15 at 2.00PM. Solar Constant is 1.35 KW/m², Sky is clear ie Clarity index=1 [4]
- Q.2(c) With a neat diagram(or Block diagram) explain the working of Grid connected PV Array. [6]
- Q.3(a) What is lift force and drag force as related to Wind Turbine? Which force dominates in well designed, modern horizontal axis wind turbine. [2]
- Q.3(b) Air Density is 1.226 kg/m³, wind speed is 12 m/s, turbine diameter is 110m, find out the (i) Power density in wind(ii) Max Mech power obtainable. If overall efficiency is 40%, Calculate overall power generated by wind turbine. [4]
- Q.3(c) Define following for wind turbine- (i) Cut in speed (ii) Furling speed (iii) Yaw control (IV) Pitch control [6]
- Q.4(a) Define Biomass and Biomass Energy source. Name some Biomass source of energy. [2]
- Q.4(b) What are different Conversion Technologies from which we can convert raw Biomass to Useful Energy. Write briefly. [4]
- Q.4(c) What do you mean by Waste to Energy? With a diagram? Explain one Scheme which can extract electrical energy from urban waste by incineration(burning). [6]
- Q.5(a) How high tide and low tide is produced in coastal part of India (or anywhere)? [2]
- Q.5(b) What do you mean by OTEC system? Explain closed cycle OTEC system with diagram. [4]
- Q.5(c) A Tidal hydro power plant around Mumbai has basin, dam arrangement; basin area of 12km², density of sea water is 1025 kg/m³. During high tide water is stored in basin through sluice gate, and level of water is 11m. water is released during low tide and turns the turbine generator. Height of turbine is 2m over sea. Calculate the Electrical energy generated in KWh during on high tide. [6]
- Q.6(a) List some benefits of energy storage device. [2]
- Q.6(b) Write down some devices which can store energy. How do these store Energy? [4]
- Q.6(c) How Pumped storage plant stores energy? Explain [6]
- Q.7(a) What is Grid interactive system? [2]
- Q.7(b) Differentiate standalone system and grid integrated system of electrical energy supply? Which are the areas where we can use these two? Which one should we prefer in modern electrical energy supply system? [4]
- Q.7(c) What are the issues before grid interactive renewable energy system? With a neat block diagram explain how Wind Power system can be integrated with grid? [6]

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