

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

CLASS: BE  
BRANCH: ECE

SEMESTER: VII  
SESSION : MO/2019

**SUBJECT : MEE2157 RENEWABLE SOURCES OF ELECTRICAL ENERGY**

TIME: 1.5 HOURS

FULL MARKS: 25

**INSTRUCTIONS:**

1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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- Q1 (a) Define Renewable Source of Energy. Quote some energy sources which are Renewable. List few factors Which have driven its importance world wide. [2]  
(b) Define term NDC. With which climate conference/Meeting NDC is linked. What is INDC? What is India's INDC? What do you think India is and will be promising country or defaulter country so far as pollution mitigation is concerned? [3]
- Q2 (a) Differentiate Mitigation & Adaptation. List some International agencies, their efforts in Chronological order in this direction (Mitigation). [2]  
(b) Explain the following terms Energy Efficiency, Energy Conservation, Sustainable Energy Source, Carbon Finance. [3]
- Q3 (a) Define Solar constant, Solar Insolation, Beam radiation, Diffused radiation, global radiation [2]  
(b) A flat plate solar collector is mounted atop a Delhi Hotel has a surface area of 10 m<sup>2</sup>. Plate faces south and is inclined at angle of 30° from surface. Latitude of Delhi is 23°. Solar insolation is 0.6KW/m<sup>2</sup>. Said thermal collector warms the 1000 kg of water. Initial temp of water is 30° C, find the water temp after 1 hour on 1 December, 9AM. Specific heat of water is 4186J/kg °C. [3]
- Q4 (a) How does Solar PV module work? Draw the equivalent electrical circuit of Solar PV Module. [2]  
(b) Draw the V-I, P-V Characteristic of PV module. With a neat sketch explain the working of solar module connected to three phase electrical line and feeding power. [3]
- Q5 (a) What are the causes for wind generation? List some important causes. What do you mean by Yaw control & Pitch control? [2]  
(b) A Horizontal axis propeller type wind turbine has diameter of 90 meter, wind velocity is 11 m/s, calculate (i)power density of wind(ii)Maximum obtainable mechanical power(iii)actual electrical power output if it is operating at overall efficiency of 45%.Density of air 1.226kg/m<sup>3</sup>. [3]
- Q6 (a) With a neat diagram explain the components of Horizontal axis wind turbine. [2]  
(b) Define -(i) Cutin speed (ii) Furling speed (iii) Power coefficient (iv) Drag force & Lift force [3]  
Which of these two is more prominent in Horizontal axis wind turbine?