

**Government College of Engineering, Aurangabad**  
(An Autonomous Institute of Government of Maharashtra)

**M. E. (ELECTRICAL MACHINES & DRIVES)**  
**& M. E. (ELECTRICAL POWER SYSTEMS) FT REVISED Examination**  
End Semester Examination November 2016

**EE 674 – RENEWABLE ENERGY TECHNOLOGY**

Time: Three Hours

15 NOV 2016

Max. Marks: 60

*“Verify the course code and check whether you got the correct question paper”*

**N. B.**

1. Solve any four questions
2. Each question carry 15 Marks and sub-question carries (9+6) Marks
2. Assume suitable data if necessary and state it clearly
3. Use of non-programmable calculator is allowed

- Q.1. a) Describe the concept of Distribution Generation with fossil fuels. 9M  
b) Draw and describe electrical characteristics of real fuel cells. 6M
- Q.2. a) What are the generators used in wind turbines? Discuss in detail its operation and suitability in wind turbine. 9M  
b) What is power in the wind? Discuss with the help of curves. 6M
- Q.3. a) Discuss average monthly insolation in solar systems with the help of curves. 9M  
b) What are the concepts of solar time and civil(clock) time? Discuss in detail. 6M
- Q.4. a) Describe PV I-V curve under standard test conditions (STC). Also describe impacts of temperature and insolation on it. 9M  
b) Charging a 12 V Battery. Suppose that a nearly depleted 12 V lead acid battery has an open circuit voltage of 11.7 V and an internal resistance of  $0.03 \Omega$ .  
i) What voltage would a PV module operate at if it is delivering 6 A to the battery?  
ii) If 20 A is drawn from a fully charged battery with open circuit voltage 12.7 V, what voltage would the PV module operate at? 6M
- OR
- b) A PV module is made up of 36 identical cells, all wired in series. With 1-sun insolation ( $1\text{kW/m}^2$ ) each cell has short circuit current  $I_{sc} = 3.4 \text{ A}$  and at  $25^\circ \text{C}$  its reverse saturation current is  $I_0 = 6 \times 10^{-10} \text{ A}$ , Parallel resistance  $R_p = 6.6 \Omega$  and Series resistance  $R_s = 0.005 \Omega$ . Find the voltage, current and power delivered when the junction voltage of each cell is 0.50V. 6M
- Q.5. What is grid connected wind power system? Discuss various configurations and design aspects of wind power plant. 15M