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Question Paper Code: 58031

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

ONE CREDIT COURSE

Electrical and Electronics Engineering

15UEE861 - WIND FARM DEVELOPMENT AND OPERATION

(Regulation 2015)

Duration: One hour

Maximum: 50 Marks

Answer ALL Questions

PART A - (15 x 2 = 30 Marks)

1. A major obstacle to the establishment of wind farms near population centers that need them is
 - (a) the lack of infrastructure to support wind generated electricity
 - (b) NIMBY
 - (c) the lack of financial support for the construction of wind farms
 - (d) the lack of government support for the construction of wind farms
2. Prior to 1950, the main use of windmills in the United States was for
 - (a) draining wetlands
 - (b) pumping drinking water for cattle
 - (c) grinding grain for bread
 - (d) energy generation
3. Winds caused by greater solar heating of the earth's surface near the equator than near the northern or southern poles, are known as
 - (a) local winds
 - (b) equatorial winds
 - (c) planetary winds
 - (d) trade winds
4. The total power of a wind stream is proportional to
 - (a) velocity of stream
 - (b) (velocity of stream)²
 - (c) (velocity of stream)³
 - (d) 1/ (velocity of stream)
5. One of the obstacles to the rapid replacement of nonrenewable energy sources with renewable energy sources is
 - (a) the improvement in the infrastructure for using renewable energy sources
 - (b) the lack of government and private financial support

- (c) advancements in technological development of renewable energy
 (d) the motivation of private industry to proactively develop renewable energy
6. Currently, the fastest growing source of electricity generation using new renewable sources is
 (a) solar (b) wind (c) hydro (d) coal
7. The BETZ limit for power in the wind that a modern wind turbine can extract is approximately
 (a) 100% (b) 59% (c) 68% (d) 72%
8. The power output per square kilometre of a wind farm consisting of turbines with rotor diameters D in a mean wind speed u_m depends approximately on
 (a) $D^2 u_m^2$ (b) $D^3 u_m^3$ (c) u_m^3 (d) $D^3 u_m^2$
9. Out of the following characteristics which one provides the index of profitability
 (a) Net present value (b) Benefit to cost ratio
 (c) Capital recovery amount (d) Annual equivalent Amount
10. A major advantage of solar power is that
 (a) cost is prohibitive even in developed countries
 (b) solar systems provide local, decentralized control over power
 (c) pollution is high
 (d) there is a lack of knowledge on long term impacts
11. The typical capacity factor of a wind farm is
 (a) 10-20% (b) 20-40% (c) 40-60% (d) 60-80%
12. In a region where the mean wind speed is 4 m s^{-1} , the area of land required for a wind farm to produce an average output of 50 MWe is about
 (a) 33 km^2 (b) 50 km^2 (c) 100 km^2 (d) 150 km^2
13. A typical spacing between turbines in a wind farm in terms of their rotor diameters D is approximately
 (a) $4D \times 7D$ (b) $2D \times 3D$ (c) $15D \times 20D$ (d) $2D \times 4D$
14. One disadvantage of wind energy is that
 (a) wind turbines are not cost-effective
 (b) large amounts of farmland are needed for the turbines
 (c) it must be transported from its source to where it is needed
 (d) wind turbines generate only a small amount of energy

15. The percentage of energy put into a system that does useful work is

- (a) Energy conservation
- (b) Energy efficiency
- (c) Renewable energy
- (d) Energy conversion

PART - B (1 x 20 = 20 Marks)

16. (a) (i) Discuss about Techno economical feasibility Considerations of WECS. (10)

(ii) Explain in detail about the challenges in interconnection of WECS in to the grid. (10)

Or

(b) (i) Discuss about the techniques and methods employed in Micro siting of wind energy conversion system. (10)

(ii) Explain about the system and practices to be followed in commissioning of WECS in other countries. (10)
