Reg. No. :

Question Paper Code: 50381

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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. The energy available in the wind at any instant is proportional to _____ of the diameter of rotor.

   (a) Cube power   (b) Square power
   (c) Square root power of three   (d) Square root power of two

2. Which of these is NOT a part of a modern wind turbine?

   (a) Compressor   (b) Gear box   (c) Nacelle   (d) YAW Drive

3. Gain in kinetic energy is equal to the

   (a) loss in P.E - work against friction   (b) loss in K.E - work against friction
   (c) loss in P.E + work against friction   (d) loss in P.E * work against friction

4. For calculating plant energy performance which of the following data is not required

   (a) Current year's production   (b) Reference year production
   (c) Reference year energy use   (d) Capacity utilization

5. The wind direction is measured using an instrument called

   (a) Pyranometer   (b) Manometer   (c) Anemometer   (d) Wind vane

6. The change of direction of wind with respect to obstacle is called

   (a) Wind shear   (b) Wind turbulence
   (c) Wind solidity   (d) None of these

7. The fraction of power in the wind that a modern wind turbine can extract is approximately

    (a) 90%   (b) 59%   (c) 45%   (d) 60%

8. What is the NPV of a project , (life 2 year) which requires an investment of Rs.50000 & yield Rs.30000 in the 1st year and Rs.40000/- in the next year, if the interest rate is 10%.

    (a) 10331   (b) 10330   (c) 20660   (d) 30660

9. The mean wind speed at site A for a wind farm is 20% higher than at site B. What would be the expected increase in electricity production at site A compared to site B

    (a) 10%   (b) 20%   (c) 40%   (d) 33%

10. A wind turbine designed for a tip-speed ratio $\lambda = 9$, is operating in a mean wind speed of 12 m s-1. The turbine blades are 50 m long. Estimate the number of revolutions made by the turbine in 30 years taking the capacity factor as 30%.

    (a) 10^8 (b) 3×10^7 (c) 3×10^8 (d) 3×10^9

11. The typical capacity credit of a wind farm is

    (a) 10-20%   (b) 20-40%   (c) 40-60%   (d) 60-80%

12. A major disadvantage to using wind to produce electricity

    (a) emissions it produces once in place
    (b) energy efficiency compared to conventional power sources
    (c) people can use a single mill or develop a large scale wind farm
    (d) initial startup cost

13. Windmill towers are generally more productive if they are

    (a) higher, to minimize turbulence and maximize wind speed
    (b) lower, to minimize turbulence and maximize wind speed
    (c) higher, to minimize the number of birds that interfere with blade turning
    (d) higher, to increase heat convection from the ground

14. Offshore wind farms are being seriously considered because

    (a) they are more aesthetically pleasing
    (b) they do not interfere with bird migration routes
    (c) wind speeds are higher and turbulence is lower
    (d) development of land for human use is pushing wind farms to open water

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15. The largest problem with adopting the new technology of renewable resources is

   (a) in evaluating the scientific and economic impacts
   (b) that the start-up costs are high
   (c) that long term maintenance costs are higher than those for fossil fuel
   (d) that energy production facilities are not located near consumers

PART - B (1 x 20 = 20 Marks)

16. (a) (i) Discuss about the Operation and supervision of wind farm.   (10)

   (ii) Explain in detail about the basic infrastructure of wind energy conversion system.   (10)

Or

   (b) (i) Explain in detail about Offshore wind farm development and its special considerations.   (10)

   (ii) Explain the Failure analysis, aging and rehabilitation in WECS.   (10)

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