**Wind and Solar Energy Systems (WSES)**

 **BTEE-603D-18**

1. Discuss the Wind speed statistics-probability distributions.
2. Discuss the history of wind power. Also discuss the Indian and Global statistics of wind power.
3. Discuss the Wind speed and power cumulative distribution functions.
4. Discuss the Fixed and Variable speed wind turbines.
5. Discuss the construction and working of HAWTs.
6. Discuss the construction and working of VAWTs.
7. Discuss the working of Doubly-Fed Induction Generators and their characteristics.
8. Discuss the wind generator-converter configurations and also discuss the converter Control.
9. Discuss the advantages, disadvantages, applications and environment impacts of wind power.
10. Discuss the working of Induction Generators and their characteristics.
11. Discuss the working of permanent magnet synchronous Generators and their characteristics.
12. Explain briefly
13. Efficiency of wind turbine
14. Angle of attack
15. Describe basic principle of wind energy conversion and derive the expression for the power developed due to wind.
16. Discuss essential features for probable site for wind farm.
17. Write a note on following:
18. Solidity Ratio in rotor design
19. Coefficient of Performance
20. Discuss the term Betz’s Limit. Also derive the expression for the same.
21. Discuss the Stall and Pitch Control mechanism in Wind Turbines.
22. Discuss the following:
23. Cut-in speed
24. Cut-out speed
25. Discuss the meaning and significance of TSR in wind turbines.
26. Discuss following terms with the help of some diagram:
27. Hour angle
28. Solar constant
29. Solar Day length
30. Declination angle
31. Zenith angle
32. Discuss the working of Solar pond.
33. Discuss the method for estimation of available solar energy.
34. Discuss following type of solar collectors:
35. Parabolic trough
36. Parabolic dish
37. Fresnel
38. Tower and Central receivers
39. Explain with the help of some sketch, working of solar thermal power generation plant.
40. Discuss construction and working of Solar PV.
41. Discuss the I-V characteristics, efficiency and fill factor of Solar PV.
42. Discuss the hybrid and isolated operation of Wind systems.
43. Discuss the hybrid and isolated operation of Solar PV systems
44. Discuss the Solar PV and wind farm behavior during system disturbances
45. Discuss fault ride through in wind farms considering real and reactive power regulation and voltage and frequency operating limits.
46. Write a note on following:
47. overview of grid code technical requirements
48. Power system interconnection experiences in the world
49. Discuss various power quality issues faced during network integration.
50. Discuss various types of power electronics converters used in solar system with their control.
51. Discuss Maximum power point tracking (MPPT) technique with its algorithm in detail.
52. Calculate the power density of wind for velocity of wind 8 m/s.
53. Calculate TSR of a wind mill rotating at 100 rpm and installed at a location having 25 kmph wind speed if the rotor diameter is 20m.
54. Wind turbine produces 1000 W at a certain wind speed. Theoretical power in wind at this speed is 3900 W. what is the coefficient of performance?
55. Calculate the Betz limit for a horizontal axis wind turbine whose blade sweep a circular area with a diameter of 80 m and wind speed is 12 m/s.
56. Calculate the Declination angle for March 31 in a leap year.
57. Calculate the hour angle at 2:30 pm
58. Calculate the number of Day light hours at Delhi on Dec 21 and June 21 in a leap year. Latitude angle=28.35