Unit-III

Wind Energy Conversion Systems (WECS) – 20 Objective Questions with Answers

1. A wind turbine that operates at a constant rotor speed is called:

A) Variable-speed turbine
B) Fixed-speed turbine
C) Hybrid turbine
D) Offshore turbine

Answer: B) Fixed-speed turbine

2. The main advantage of variable-speed wind turbines is:

A) Lower energy capture
B) Higher noise level
C) Better energy extraction efficiency
D) Higher maintenance cost

Answer: C) Better energy extraction efficiency

3. The component that converts wind energy into mechanical energy is:

A) Generator
B) Rotor blades
C) Transformer
D) Converter

Answer: B) Rotor blades

4. WECS stands for:

A) Wind Energy Control System
B) Wind Energy Conversion System
C) Wind Electrical Conversion Source
D) Wind Energy Conservation System

Answer: B) Wind Energy Conversion System

5. Which component converts mechanical energy into electrical energy in WECS?

A) Gearbox
B) Tower
C) Generator
D) Blade

Answer: C) Generator

6. The primary function of a gearbox in a wind turbine is:

A) Increase voltage
B) Store energy
C) Increase rotational speed for the generator
D) Reduce wind speed

Answer: C) Increase rotational speed for the generator

7. Which type of generator is most commonly used in fixed-speed wind turbines?

A) Synchronous Generator
B) DC Generator
C) Squirrel Cage Induction Generator (SCIG)
D) Stepper Motor

Answer: C) Squirrel Cage Induction Generator (SCIG)

8. DFIG stands for:

A) Double Frequency Induction Generator
B) Doubly Fed Induction Generator
C) Direct Fed Induction Generator
D) Distributed Fed Induction Generator

Answer: B) Doubly Fed Induction Generator

9. Which generator allows variable-speed operation with partial-scale converters?

A) SCIG
B) DFIG
C) DC Generator
D) Reluctance Generator

Answer: B) DFIG

10. The tower of a wind turbine is used to:

A) Increase rotor diameter
B) Support the nacelle and rotor at a greater height
C) Store electricity
D) Control frequency

Answer: B) Support the nacelle and rotor at a greater height

11. The nacelle houses:

A) PV modules
B) Battery bank

C) Generator and gearbox
D) Transformer only

Answer: C) Generator and gearbox

12. The cost of generating electricity from wind energy is mainly affected by:

A) Wind speed availability
B) Blade color
C) Tower paint
D) Cable insulation

Answer: A) Wind speed availability

13. Capacity factor of a wind turbine represents:

A) Rated power only
B) Actual energy output compared to maximum possible output
C) Blade efficiency only
D) Generator speed only

Answer: B) Actual energy output compared to maximum possible output

14. Before connecting a wind turbine to the grid, synchronization of _____ is required.

A) Voltage, frequency, and phase
B) Wind speed only
C) Rotor diameter only
D) Temperature only

Answer: A) Voltage, frequency, and phase

15. Grid integration of wind turbines helps:

A) Reduce electricity generation
B) Supply power to consumers through the utility network
C) Stop wind fluctuations
D) Eliminate converters

Answer: B) Supply power to consumers through the utility network

16. Power electronic converters in WECS are mainly used for:

A) Water pumping
B) Speed and power control
C) Blade manufacturing
D) Tower construction

Answer: B) Speed and power control

17. A back-to-back converter topology is commonly used with:

A) DFIG systems
B) Diesel generators
C) PV arrays
D) Fuel cells

Answer: A) DFIG systems

18. Which converter converts AC generated power into DC?

A) Inverter
B) Chopper
C) Rectifier
D) Cycloconverter

Answer: C) Rectifier

19. Which converter converts DC power into AC power suitable for grid connection?

A) Rectifier
B) Inverter
C) Transformer
D) Controller

Answer: B) Inverter

20. The economic viability of a wind power project is commonly evaluated using:

A) Rotor color index
B) Capacity factor and cost per kWh
C) Tower height only
D) Blade thickness only

Answer: B) Capacity factor and cost per kWh

Fill in the Blank Questions

Multi-String Inverters, Microinverters, Inverter Topology, Battery & Inverter Sizing, and Types of PV Systems

1. A _____ inverter allows each string of PV modules to operate with its own MPPT.

Answer: Multi-string

2. In a multi-string inverter, each PV string is connected to a separate _____ tracker.

   Answer: MPPT

3. A microinverter is also known as a _____ integrated inverter.

   Answer: Module

4. Microinverters are installed at the level of individual PV _____.

   Answer: modules

5. The main function of an inverter is to convert _____ current into alternating current.

   Answer: direct (DC)

6. The arrangement of power electronic switches and components in an inverter is called inverter _____.

   Answer: topology

7. A commonly used inverter topology for PV systems is the _____ bridge inverter.

   Answer: full

8. Inverter efficiency is defined as the ratio of AC output power to _____ input power.

   Answer: DC

9. Battery sizing depends on the load demand and the required _____ days.

   Answer: autonomy

10. The capacity of a battery is generally expressed in _____-hours (Ah).

    Answer: Ampere

11. The inverter rating should be greater than or equal to the total connected _____.

    Answer: load

12. A Grid-Connected Solar PV System is directly connected to the utility _____.

Answer: grid

13. Grid-connected PV systems generally do not require large-scale _____ storage.

    Answer: battery

14. A Stand-Alone Solar PV System operates independently of the utility _____.

    Answer: grid

15. In stand-alone PV systems, batteries are used to _____ energy for use during periods of low solar radiation.

    Answer: store