MCQ ON RENEWABLE POWER SOURCES

BRANCH---E&TC

SEM--6TH

1. Based on usability, Energy Resources are classified into _____
a) primary, secondary and tertiary resources
b) primary and secondary resources
c) primary, secondary, intermediate and tertiary resources
d) **primary, intermediate and secondary resources**

2. Which of the following is not a type of primary resource?
a) Crude Oil
b) Coal
c) **Hydrogen Energy**
d) Sunlight

3. The ratio of energy received from a raw energy source to energy spent to obtain the raw energy source is called as _____
a) consumption ratio
b) fuel ratio
c) **energy yield ratio**
d) joule ratio

4. Energy Resources which are being used for many decades are known as _____
a**) conventional energy sources**
b) non-conventional energy sources
c) primary energy sources
d) fuel cells

5. Which of the statements is correct about Solar Energy?
a) It is a renewable and conventional source of energy
b) It is a non-renewable and non-conventional source of energy

c**) It is a renewable and non-conventional source of energy**
d) It is a non-renewable source of energy

6. Wind and Hydrogen energy are examples of_____
a) primary sources
b**) primary and secondary sources respectively**
c) secondary sources
d) tertiary sources

7. On the basis of long-term availability, resources are classified into____
a) conventional and non-conventional resources
b**) renewable and non-renewable resources**
c) primary and secondary resources
d) commercial and non-commercial resources

8. Which of these resources does not produce CO_2 during electricity generation?
a) Coal
b) Methane
c) **Uranium**
d) Biogas

9. On the basis of origin, energy resources are classified into natural and artificial resources.
a) True
b) **False**

10. Which of these is the major contributor to world pollution?
a**) Commercial resources**
b) Non-Commercial Resources
c) Renewable Resources
d) Nuclear Energy

11. Half of the world's energy needs are fulfilled by renewable energy sources.
a) True
b) False

12. Which of the energy resources were considered for large scale use after the oil crisis of 1973?

a) Conventional Sources
b) **Non-Conventional Sources**
c) Non-renewable sources
d) Primary Sources

13. The unit of energy yield ratio is _____
a) joule
b) watt
c) joule/Kelvin
d) dimensionless

14. Which of the statements is correct about Solar Energy?
a) It is a renewable and conventional source of energy
b) It is a non-renewable and non-conventional source of energy
c) It is a renewable and non-conventional source of energy
d) It is a non-renewable source of energy

15. World Energy Needs are rising due to _____
a) deforestation
b) increasing population and Industrialization
c) inflation
d) natural calamities

16. Which of the following is a disadvantage of Hydro Power?
a**) They cause deforestation and affect wildlife**
b) They cause harmful emissions
c) They are an unstable source of energy
d) They are not suitable for long-distance electricity transmission

17. Which of the following statement is true about conventional energy sources?
a) They cause minimum pollution
b**) They are available in limited quantity**
c) Coal is the most used conventional energy source in the world
d) There are sufficient reserves of Coal, Petroleum and Natural gas for the next 300 years

18. . All of the conventional energy sources are Non-Renewable.
a) True
b) False

19. To focus on Renewable and Other alternative sources of energy, _____ was established in March 1981 by the Government of India.
a) **commission for additional sources of energy**
b) commission for alternative sources of energy
c) council of scientific & industrial research
d) centre for science and environment

20. IREDA was developed by the Government of India _____
a) to implement more efficient methods for using Conventional Energy sources
b**) to promote the Development of Non-Conventional Energy Sources**
c) to develop Nuclear Energy in India
d) to control pollution

21. Apart from supplying energy, fossil fuels are used for_____
a) storing energy in solar ponds
b) drying Vegetables
c) rotating turbine in Hydro Power plants
d**) manufacture of Organic Chemicals**

22. The only country having a full-fledged ministry for Development of New and Renewable Resources is _____
a**) India**
b) Bangladesh
c) USA
d) China

23. CASE was established after the Oil Crisis of 1973.
a) True
b) False

24. Which of the following schemes was launched by MNRE?
a) MNREGA
b) UJJWALA

c**) KUSUM**
d) JWALA

25. Which of the following pollutants are emitted by the burning of fossil fuel?
a) **Oxides of Carbon, Nitrogen, and Sulphur**
b) Oxides of Carbon, Uranium, and Radium
c) Calcium Halides and Oxides of Nitrogen
d) Noble Gases

26. _____ is a petrochemical and is used as raw material for chemical, pharmaceutical, and paint industry.
a) Plutonium
b) Uranium
c) Coal
d) Protactinium

27. Which of the following statements is not true about radioactive waste?
a) It has radioactivity quotient of dangerous levels.
b) The disposed radioactive waste is to be guarded for a long period
c**) It has low radioactivity quotient**
d) Its radioactivity decreases with time.

28. Which of the following is not a disadvantage of Hydro Power?
a) A large land area submerges into the water leading to deforestation
b) It causes dislocation of a large population and rehabilitation
c) It causes ecological disturbances like earthquake
d**) It causes calamities like landslides**

29. Which Oxides of Nitrogen are generated by burning of fossil fuel?
a**) NO and NO_2**
b) NO_2, NO_3, and N_2O_5
c) N_2O_5 and N_2O_3
d) NO_3 and N_2O_5

30. . Which Uranium isotope is used in nuclear power plants?
a**) U-235**
b) U-234

c) U-215
d) U-218

31. . _____ energy sources provide energy in dilute form.
a) Non-Renewable
b) Conventional
c) Nuclear
d) Renewable

32. Non-Conventional Energy sources have a high gestation period.
a) True
b**) False**

33. The availability of Renewable energy sources is _____
a) uncertain
b) constant
c) high
d) regular

34. The cost of harnessing energy from Non-Conventional Energy sources is low.
a) True
b) **False**

35. Which of the following statements is not true about Renewable Energy?
a) They do not cause pollution
b) Their transportation is difficult
c) **They cause ecological imbalance**
d) They have a low gestation period

36. Renewable energy-based power plants have _____
a) **negligible fuel cost**
b) low energy availability
c) negligible production capacity
d) fuel storage tanks

37. Renewable energy plants require _____than traditional generators.
a) more fuel
b) **less maintenance**

c) higher operating cost
d) more uranium

38. .Most of the Renewable energy sources are _____
a) **location-specific**
b) universally available
c) highly efficient
d) polluting

39. The storage of renewable energy sources is expensive.
a) **True**
b) False

40. Which of the following has caused global warming since the past 150 years?
a) **Anthropogenic greenhouse gas emissions**
b) Ice age greenhouse gas emission
c) Emissions of sulphur
d) Emissions of aerosols

41. Which of the following has caused global warming?
a) Burning of biomass
b) Burning of fossil fuels
c) Releasing CFCs into the atmosphere
d) Melting metals

42. What is the major problem with wind energy?
a) Generates energy from wind
b) It is a renewable source of energy
c**) Requires large area of land**
d) Compact and does not require large area of land

43. How does acid rain affect the environment?
a) By precipitating clean and fresh rainwater only in freshwater bodies
b) By precipitating clean and fresh rainwater in all water bodies at once
c) By consuming all polluted water and precipitate clean water from water cycle
d**) By precipitating acidic rainwater**

44. What is the pH level of acid rain?
a**) Between 3-4**
b) Between 6-8
c) 7
d) Between 11-14

45. Which of the following is/are directly harming the atmosphere?
a) Contamination of water bodies
b**) Ozone layer depletion and emission of acidic gas**
c) Global climate change and contamination of water bodies
d) Land fills and industrial emissions into water bodies

46. Which of the following is/are major contributor(s) of acid rain?
a) Sulphur
b) Sulphur and sulphur dioxide
c**) Sulphur dioxide and nitrogen dioxide**
d) Nitrogen dioxide and argon

47. Which of the following energy sources is affected when energy crops compete with food production?
a) Solar
b) Wind
c) Hydro
d) Biomass

48. What is a solar cooling technology?
a) **Sun's thermal energy is transferred to a heat transfer fluid which passes through a heat exchanger**
b) Sun's thermal energy is transferred to a heat transfer solid which passes through a heat exchanger
c) Sun's nuclear energy is transferred to a heat transfer fluid which passes through a cold exchanger
d) Sun's thermal energy is transferred to a heat transfer fluid which passes through a cold exchanger

49. What does ozone protect the earth from?
a) Sound waves

b**) Harmful UV radiation**
c) Visible radiation
d) Greenhouse effect

50. . Wind plants affect the habitat of _____
a) tigers
b) whales
c**) birds and bats**
d) fish

51. Which of the following is the cleanest fossil fuel?
a) **Natural gas**
b) Petrol
c) Petroleum
d) Coal

52. What is IPCC?
a) A government organization that provides scientific information regarding climate change and its effects
b) **An intergovernmental body of UN that provides scientific information regarding climate change and its effects**
c) An intergovernmental organization that provides scientific information regarding climate change and its effects
d) A private company that sells scientific information regarding climate change

53. What is the objective of the main international treaty on climate change?
a) To provide scientific information on climate change
b) To destabilise the greenhouse gas concentrations so that anthropogenic actions interfere with the climate system
c) **To stabilise the greenhouse gas concentrations so that anthropogenic actions do not interfere with the climate system**
d) To bring peace between all countries

54. . What is the aim of Paris Agreement in 2015? Note that C indicates Celsius.
a) To keep the decrease in global average temperature to below 2 degree C
b) To keep the decrease in global average temperature to above 2 degree C

c) To keep the increase in global average temperature to above 2 degree C
d**) To keep the increase in global average temperature to below 2 degree C**

55. What is a solar collector?
a**) A system to collect heat by absorbing sunlight**
b) A system to collect rainwater using sunlight
c) A system to collect electricity by using sunlight
d) A device to reflect sunlight back

56. What is aperture area in a solar collector?
a) Area of the system
b) **Area in the receiver that receives the solar radiation**
c) Area occupied by the system after installation
d) Cross-sectional area of the receiver

57. Aperture area of a solar collector is roughly equal to _____
a) Coolant area
b) Generator area
c) **Absorber area**
d) System area

58. What are the components of a flat plate collector?
a) Flat box, a plate with reflective coating and fluid circulation passageways, an opaque cover, a circulating fluid
b) Flat box, a dark coloured plate with fluid circulation passageways, an opaque, a circulating fluid
c) Flat box, a dark coloured plate with fluid circulation passageways, a transparent cover
d**) Flat box, a dark coloured plate fluid circulation passageways, a transparent cover, a circulating fluid**

59. Why is a transparent cover used in a flat plate collector?
a**) To maximize transmission of the incident sunlight into the box**
b) To minimize transmission of the incident sunlight into the box
c) To entirely reflect the incident sunlight back
d) To ensure partial transmission of the incident sunlight into the box

60. Which of the following is generally used as circulating fluid in tropical and sub-tropical climates?
a) A mixture of ethylene glycol and water
b) Water
c) A mixture of propylene glycol and water
d) Glycerol

61. Which of the following is generally used as circulating fluid in freezing climates?
a) Liquid carbon dioxide
b) Water
c**) A mixture of propylene glycol and water**
d) Liquid nitrogen

62. Why are antifreeze solutions (antifreeze agents with water) used as coolants in freezing climates?
a) To increase boiling point of water
b) To decrease boiling point of water
c) To increase freezing point of water
d) **To decrease freezing point water**

63. Adding antifreeze agents to water _____
a) increases its durability as coolant
b) decreases its durability as coolant
c) turns water into a coolant
d) prevents water from acting as a coolant

64. Which of the following is a circulating fluid in evacuated flat-plate solar collectors?
a) Water
b) Steam
c) Nitrogen
d) Hydrogen

65. Which of the following are used as absorbers in evacuated-tube solar collectors?
a) Carbon tubes

b) Wooden or metallic tubes
c) Plastic or glass tubes
d) **Metallic or glass tubes**

66. What is solar water heater?
a**) Use solar energy to heat water**
b) Use solar energy to generate current which is then used to heat water
c) Use water to generate heat
d) Use solar energy to generate steam

67. Which of the following determines complexity and size of solar water heating system?
a) Food
b) Changes in ambient temperature
c) Chemicals
d) Solar radiation constant

68.What is freeze protection in a solar water heating system?
a) Ensures that the system is frozen
b) Prevents the operation of drainback system
c) **Prevents damage to system due to freezing of transfer fluid**
d) Ensures that the transfer fluid is frozen

69. Direct solar water heating systems _____
a) offer great overheating protection
b) are called pumped systems
c**) offer no overheating protection**
d) offer great freeze protection

70. How is the heat transferred from transfer fluid to potable water in indirect solar water heating systems?
a) By directly exposing the substance to sunlight
b) By using an electrical heater
c) By circulating potable water through the collector
d**) By using heat exchanger**

71. How is water heated in a direct solar water heating system?
a**) By circulating potable water through the collector**
b) By directly exposing water to sunlight
c) By using convection from a different transfer fluid
d) By using heat exchanger

72. Passive systems rely on heat-driven convection.
a) False
b) True

73. Which of the following is an example of direct solar water heating system?
a) Pressurised antifreeze system
b) Pumped systems to circulate transfer fluid
c) **Convection heat storage system**
d) Drainback system

74 What is solar heating and cooling?
a**) Use solar energy to regulate the internal temperature of a given space**
b) Use solar energy to regulate the temperature of environment
c) Use solar energy to monotonically increase the internal temperature of a given space
d) Use solar energy to monotonically decrease the temperature of a given space

75. Which of the following is used to regulate temperature in solar heating and cooling system?
a) Air conditioners
b**) Specific building systems**
c) Water heaters
d) Room heaters

76. Which of the following is **not** used in a passive solar heating/cooling system?
a) Building walls
b) Building roofs
c**) Air conditioners**
d) Building floors

77. What is a passive solar heating and cooling system?
a) Uses building design with mechanical systems to regulate the temperature outside a given space
b) Uses building design with mechanical systems to monotonically increase the temperature inside a given space
c) Uses building design without any solar heating (and cooling) system to regulate the temperature outside a given space
d) **Uses building design without any solar heating (and cooling) system to regulate the temperature inside a given space**

78. . Which of the following is extremely important with respect to a passive solar heating and cooling system?
a**) Materials used to construct the building**
b) Electrical systems used to perform heating/cooling operation
c) Mechanical systems used to perform heating/cooling operation
d) Material used to build heating/cooling systems

79. Which of the following is an example of passive solar technology?
a) Photovoltaic
b**) Solar furnace**
c) Active solar water heating systems
d) Solar thermo-mechanical systems

80. Which of the following process is involved in heat transfer through building?
a) Seebeck effect
b) Peltier effect
c) Hall effect
d**) Conduction**

81. Which part of a house receives majority of solar radiation?
a**) Roof**
b) Side walls
c) Floor
d) Doors

82. Which of the following is a site-specific design consideration for a passive solar heating and cooling system?

a) Orientation of the building
b) Latitude
c) Building window size
d) Placement of rooms

83. Which of the following is a design element for residential buildings in temperate and tropical climates?
a) Latitude
b) Diurnal variations in temperature
c) **Using thermal mass to store excess solar energy during winter**
d) Obstacles

84. A building with excessive glass cover _____
a) results in freezing
b) results in a pleasant temperature within the building
c) damages the building material
d**) results in overheating**

85. What is solar cooker?
a) Uses direct sunlight to produce heat and cook food
b) Uses solar energy to evaporate water and collect it within the same closed system
c) Uses solar energy to dry substances
d) Uses concentrated solar power to for industry

86. What is pasteurization?
a) Process of treating water by biological techniques
b**) Process of treating water by heating it mildly**
c) Process of producing water
d) Process of capturing sun's heat

87. Which of the following principles is used to concentrate sunlight in solar cookers?
a) Rarefaction
b) Evaporation
c) Specular reflection
d) Radiation

88. What is the typical temperature (range) used in domestic cooking? Note that C indicates Celsius.
a) **50 – 70 degree C**
b) 1000 degree C
c) 3500 degree C
d) 300 – 500 degree C

89. The cooking pan used in solar cookers convert _____ energy to _____ energy.
a) electrical, heat
b) heat, light
c**) light, heat**
d) electrical, light

90. Which of the following materials are used to make the cooking pan in a solar cooker?
a) Wood
b) Plastic
c) Rubber
d) **Iron**

91. . Which of the following pot surfaces are preferred for solar cookers?
a) White coloured
b**) Black coloured**
c) Red coloured
d) Silver coloured

92. Covering the pot with a glass lid _____ convection.
a) increases
b) does not affect
c) changes the direction of
d) reduces

93. Solar cookers do have operating costs.
a) True
b) False

94. Which of the following provides energy for winds to blow naturally?
a) Sun
b) Water
c) Man
d) Food

95. Wind flows from _____ pressure area to _____ pressure area.
a) high, high
b) **high, low**
c) low, high
d) low, low

96. What is a gust?
a) No change in wind speed
b) A brief decrease in wind speed for a very long period of time
c**) A brief increase in wind speed for a very short period of time**
d) A brief increase in wind speed for a very long period of time

97. . What is a squall?
a) A sudden, sharp increase in wind speed lasting for a few hours
b) A sudden, sharp decrease in wind speed lasting for a few minutes
c) A sudden, sharp decrease in wind speed lasting for a few hours
d**) A sudden, sharp increase in wind speed lasting for a few minutes**

98. When looking for a wind site, assessors start by _____
a**) determining the direction of prevailing wind at the site**
b) looking for a good source of water
c) looking for a location with good sunlight
d) determining all the directions of the local wind

99. . Which of the following is required for the installation of a wind turbine system?
a) A weak wind flow
b**) A consistent and strong wind flow**
c) Still air
d) A consistent wind flow with obstructions

100. Which of the following is not an application of wind energy?
a) Electricity
b**) Steam engine**
c) Agriculture
d) Energy storage for emergencies

101. Which of the following wind turbine is mostly used to extract wind energy?
a) DC generator
b) Vertical-axis wind turbines
c) Sailing boat
d**) Horizontal-axis wind turbines**

102. Wind energy is not used to pump water to a higher level.
a) True
b) False

103. Which of the following is a mechanical application of wind energy?
a) Lighting
b) Electricity
c**) Pumping water**
d) Wind surfing

104. Which of the following is a potential application of wind energy?
a) Converting heat to wind energy
b) Converting electrical energy to wind energy
c) Transportation of electrical energy
d) **Converting the wind flow due to speeding cars into electricity on highways**

105. What are the two primary aerodynamic forces acting on wind turbine rotors?
a) **Lift, drag**
b) Drag, gravitational force
c) Gravitational force, lift
d) Gravitational force, electrical force

106. Lift is an aerodynamic force acting _____
a) opposite to the direction of wind flow
b) parallel to the direction of wind flow

c) diagonal to the direction of wind flow
d) **perpendicular to the direction of wind flow**

107. Drag is an aerodynamic force acting _____
a) perpendicular to the direction of wind flow
b**) parallel to the direction of wind flow**
c) diagonal to the direction of wind flow
d) opposite to the direction of wind flow

108. What happens on the upwind side of the wind mill blade?
a) No pressure is exerted
b) Low pressure area
c**) High pressure area**
d) Wind is trapped

109. Wind turbines convert wind energy to _____

a**) mechanical energy**
b) electrical energy
c) heat energy
d) solar energy

110. Which of the following components of a wind turbine system is arranged in the order in which energy is being converted?
a) Blades – rotor – electric generator – shaft
b) **Blades – rotor – shaft – electric generator**
c) Shaft – blades – rotor – electric generator
d) Electric generator – blades – rotor — shaft

111. Which of the following are commonly used commercial wind turbines?
a) Vertical and DFIG
b) Horizontal and SCIG
c) Horizontal and vertical
d) DFIG and SCIG

112. What are horizontal wind turbines?
a) Wind turbines are rotate about an axis perpendicular to the plane of ground
b) Wind turbines are rotate about an axis diagonal to the plane of ground

c) Wind turbines are rotate about an axis 30 degrees to the plane of ground
d) Wind turbines are rotate about an axis parallel to the plane of wind streamlines

113. Which of the following is an advantage of a horizontal axis wind turbine?
a**) Blades are to the side of turbine's center of gravity**
b) Blades are parallel to the vertical axis passing through the turbine's center of gravity
c) Blades are parallel to the horizontal axis passing through the turbine's center of gravity
d) Blades are positioned perpendicular to the plane of the ground

114. What is an upwind turbine?
a) Rotor of the turbine is behind the unit
b**) Rotor of the turbine is in front of the unit**
c) Rotor is positioned at the bottom of the tower
d) Rotor is positioned at the center of the tower

115. What is the main disadvantage of an upwind turbine?
a) Increased tower shadow effect
b) Reduced tower shadow effect
c**) A rotor that needs to be placed at some distance from the tower**
d) An inflexible rotor that needs to be placed close to the tower

116. What is the main disadvantage of a horizontal axis wind turbine?
a) Easy operation at near ground winds
b) Does not self-start
c) Difficult operation at near ground winds
d) High starting torque

117. . Which of the following materials are used to make a rotor blade of a wind turbine?
a**) Glass fibre reinforced polyester**
b) Salt
c) Sugar
d) Plastic

118. Which of the following materials can be used to make a rotor blade of a wind turbine apart from glass fibre reinforced polyester (GRP)?
a) Silicon, germanium
b) **Epoxy, carbon fibre**
c) Plastic
d) Salt

119. Which of the following are the major parts of a wind turbine system?
a) Tower, rotor, water storage tank, air compressor
b) Tower, rotor and blades, air compressor, vacuum pump, electricity generator
c) Electricity generator, nacelle, rotor and blades, power converter, building
d) **Tower, nacelle, rotor and blades, power converter, electricity generator**

120. Which of the following towers is used for small wind turbines?
a) Hybrid tower
b) Guyed pole tower
c) Electric pole
d**) Wooden pole**

121. What is a hybrid type tower?
a) Guyed tower
b) Guyed tower and wooden tower
c) **Thin and tall lattice type guyed tower**
d) Guyed tower and electric pole

122. Nacelle is a kiosk that houses _____
a) a MOSFET
b) a diode
c) a wifi router
d) a yaw drive

123. . What is the main function of gearbox in a wind turbine system?
a**) Multiples rotation speed to generate electricity**
b) Divides rotation speed to generate electricity
c) Multiples rotation speed to consume wind energy
d) Divides rotation speed to consume wind energy

124. What is a pitch drive motor?
a) A motor that senses wind direction
b) A motor to control the angle of blades
c) A motor to ensure nacelle faces in the direction of the wind
d) A motor to rotate the blades

125. What is a yaw drive?
a) A device used to support and stabilize other components
b) A device used to house various energy conversion components
c**) A motor to ensure that nacelle faces the wind**
d) A device used to track wind direction\

126. Wind turbines require regular maintenance.
a) False
b) **True**

127. What are wind energy conversion systems designed for?
a**) To convert wind energy to mechanical energy**
b) To convert wind energy to potential energy
c) To convert wind energy to electrical energy
d) To convert mechanical energy to wind energy

128. . Which of the following is a part of a general wind energy conversion system?
a) Server
b) **Wind turbine**
c) Cloud User
d) Service Provider

129. . What are the two types of gear boxes used in wind turbine?
a) VAWT and HAWT
b) Differential
c) **Parallel shaft and planetary shaft**
d) Manual transmission

130. . What are parallel shaft gears?
a) Motor shaft and the speed controller shaft are on perpendicular planes

b) Motor shaft and the speed controller shaft are on skewed planes
c) Motor shaft and the speed controller shaft are on diagonal planes
d**) Motor shaft and the speed controller shaft are on parallel planes**

131. What is a planetary shaft gearbox?
a**) Input shaft and output shaft are aligned**
b) Motor shaft and the speed controller shaft are on perpendicular planes
c) Motor shaft and the speed controller shaft are on parallel planes
d) Input shaft and output shaft are parallel

132. Power generation contains _____
a) mechanical systems
b) kinetic systems
c**) electromagnetic and electrical subsystems**
d) nuclear systems

133. What is a fixed speed WECS?
a) WECS operating at differential speeds
b) WECS operating at non-differential speeds
c) WECS operating at variable speeds
d**) WECS operating at constant speed**

134. Fixed speed WECS are equipped _____ generators.
a**) squirrel-cage induction**
b) squirrel induction
c) induction squirrel
d) doubly-fed induction

135. How is the speed varied in limited variable speed WECS?
a**) Variable rotor resistance**
b) Fixed rotor resistance
c) Fixed capacitance
d) Variable rotor

136. Which generator is used in variable speed WECS?
a) Squirrel-cage induction
b) **Doubly-fed induction**

c) Induction squirrel
d) Induction generator

137. Which of the following components are used as converters in power electronics converter?
a) BJT
b) Earphone
c) IGBT
d) Wi-Fi driver

138. What is the function of rotor side converter?
a) To control the DC-link voltage
b) To ensure operation at large power factor
c**) To control generator in terms of active and reactive power**
d) To ensure operation at low power factor

139. What is the function of grid side converter?
a) To ensure operation at low power factor
b) To control generator in terms of reactive power
c) To control generator in terms of active power
d**) To control the DC-link voltage**

140. What is sub-synchronous mode in doubly-fed induction generator (DFIG)?
a**) Rotor runs below synchronous speed**
b) Rotor runs above synchronous speed
c) Rotor runs at synchronous speed
d) Slip power is fed into AC power supply

141. What is super-synchronous mode in doubly-fed induction generator (DFIG)?
a) Rotor runs below synchronous speed
b**) Rotor runs above synchronous speed**
c) Rotor runs at synchronous speed
d) Rotor takes power from AC mains

142. Which of the following generators are mostly used in WECS?
a) PMSG and SCIG
b) DFIG and SCIG

c) **DFIG and PMSG**
d) VAWT and HAWT

143. Which of the following is a flowchart depicting WECS modelling?
a) Wind turbine aerodynamic model → gear train model → power grid → generator (PMSG/DFIG)
b) Wind turbine aerodynamic model → generator (PMSG/DFIG) → gear train model → power grid
c) Wind turbine aerodynamic model → generator (PMSG/DFIG) → power grid → gear train model
d**) Wind turbine aerodynamic model → gear train model → generator (PMSG/DFIG) → power grid**

144. _____ speed WECS is the most flexible in terms of the generator used.
a) Full variable
b) Limited variable
c) Half variable
d) Fixed

145. What happens to wind speed when many turbines operate collectively?
a**) Wind speed reduces**
b) Wind speed increases
c) Wind speed does not change
d) Wind speed increases exponentially and then decreases linearly

146. Which of the following is true?
a) More than 50% of the land area on earth can generate 1W per square meter
b) Less than 5% of the land area on earth can generate 1W per square meter
c) 60 – 80% of the land area on earth can generate 1W per square meter
d) More than 80% of the land area on earth can generate 1W per square meter

147. Lower wind speeds result in _____
a) higher wind energy obtained
b) no wind energy obtained
c) **lower wind energy obtained**
d) 100% energy conversion for half the operation time and less than 10% energy conversion for the remaining half of the operation time

148. What happens to the output power when the wind turbine blades rotate faster for the entire operation time?
a) The output power first increases then decreases
b) The output power first decreases then monotonically increases
c) The output power decreases
d**) The output power increases**

149. Higher wind speeds _____ the speed of rotation of the wind blades.
a**) increase**
b) decrease
c) monotonically decrease
d) first increase and then decrease

150. What is cut-in wind speed?
a) Wind turbine stops generating output power
b) **Wind turbine starts generating output power**
c) Wind turbine stops functioning
d) Wind turbine starts functioning

151. What is rated speed?
a) Wind turbines generate least output power
b) Wind turbines do not generate any output power
c**) Wind turbines generate maximum output power**
d) Wind turbines have no rated speed as the output power always increases

152. . Which of the following are the limits of the range of wind speeds for which the turbines are designed?
a) Elasticity
b) Threshold voltage
c) Networking
d) Cut-in speed and cut-out speed

153. How does the output power vary between cut-in speed and the rated speed?
a**) cubically**
b) linearly
c) square
d) exponential

154. What is the cut-out speed?
a) Wind turbine starts generating output power
b**) Wind turbine must be shut down**
c) Wind turbine stops functioning
d) Wind turbine starts functioning but does not generate output power

.155. Power output is not related to the local air density.
a) **False**
b) True

156. Which of the following does the local air density depend upon?
a) Soil
b) Lightning
c) **Altitude and pressure**
d) Nitrogen and oxygen

157. What is feather of wind turbine blades?
a) Adding feathers to the blades
b) Reducing the weight of wind turbine blades
c) Reducing the angle of pitch
d) **Increasing the angle of pitch**

158. . Why is feathering of wind turbine blades required?
a) To increase drag
b) To reduce drag
c) **To prevent the blades from being destroyed by strong winds**
d) To extract power from strong winds originating from storms

159. Which of the following technologies are used to convert biomass into useful energy forms?
a**) Bio-chemical process**
b) Galvanization
c) Doping
d) Photoelectric effect

160. What are the four main types of thermo-chemical processes?
a) Galvanization, photovoltaic effect, chemo-mechanical effect, pyrolysis

b**) Pyrolysis, gasification, combustion, hydrothermal processing**
c) Pyrolysis, gasification, combustion, doping
d) Photovoltaic effect, gasification, combustion, hydrothermal processing

161. What are the two primary processes under bio-chemical conversion?
a) Photosynthesis and respiration
b) Photosynthesis and photovoltaic
c**) Anaerobic digestion and fermentation**
d) Anaerobic digestion and photosynthesis

162. Which of the following is an example of physio-chemical conversion technique to convert biomass into usable forms of energy?
a) Pyrolysis
b) Gasification
c) Anaerobic Digestion
d**) Extraction with esterification**

163. Which of the following is a product of pyrolysis of biomass?
a**) Producer gas**
b) Steel
c) Agricultural residue
d) Sodium

164. Pyrolysis occurs in the presence of _____ oxygen.
a) large amounts of
b**) absence of**
c) extremely large amount of
d) low amounts of

165. Which of the following best indicates the process of gasification?
a) Biomass → carbon dioxide and water → producer gas and charcoal → carbon monoxide and hydrogen
b) Biomass → carbon monoxide and hydrogen → carbon dioxide and water → producer gas and charcoal
c) **Biomass → producer gas and charcoal → carbon dioxide and water → carbon monoxide and hydrogen**

d) Producer gas and charcoal → carbon dioxide and water → carbon monoxide and hydrogen → biomass

166. Which of the following is best suited for hydrothermal processing?
a) Forestry byproducts
b) Wheat
c) Corn
d) Sewage sludge

167. What is hydrothermal processing?
a**) Heating aqueous slurries of biomass at high pressures to produce products of greater energy density**
b) Heating aqueous slurries of biomass at high temperatures to produce products of lower energy density
c) Heating aqueous slurries of biomass at low pressures to produce products of greater energy density
d) Heating aqueous slurries of biomass at low temperatures to produce products of lower energy density

168. What is anaerobic digestion?
a) Produces biogas by heating the biomass
b) **Produces biogas using micro-organisms operating in anaerobic conditions**
c) Produces biogas by subjecting the biomass to high pressures
d) Produces biogas using micro-organisms operating in aerobic conditions

169. **Sugarcane is used to produce ethanol.**
a) True
b) False

170. Which of the following are used to produce ethanol when water is not available in plenty?
a) Sugarcane
b) Wheat
c) Corn
d) Sorghum

171. What are the two main products of anaerobic digestion?
a**) Biogas and bio-fertilizer**
b) Waste water
c) Producer gas
d) Syngas

171. Which of the following organic compounds are present in biogas?
a) Butane gas and carbon dioxide
b**) Methane gas and carbon dioxide**
c) Nitrogen
d) Sodium

172. . Which of the following are considered as contaminant gases in biogas?
a) Chlorine
b) Fluorine
c**) Nitrogen, hydrogen and carbon monoxide**
d) Methane gas and carbon dioxide

173. Which of the following products of anaerobic digestion consists of organic humus and nutrients?
a) Biogas
b) Chlorine
c) Top soil
d) Bio-fertilizer

174. Which of the following are used to store manure?
a) **Silos and cellars**
b) Plastic bottles
c) Glass bottles
d) Tin cans

175 What are the three methods of pre-treatment of influent for anaerobic digestion?
a) Galvanization, pyrolysis and pre-heating
b) **Mechanical treatment, pre-heating and thermal treatment**
c) Galvanization, pyrolysis and thermal treatment
d) Pyrolysis, thermal treatment and pre-heating

176. Which of the following is best suited to decompose lignin?
a) Anerobic digestion
b) Fermentation
c**) Thermo-chemical conversion techniques**
d) Bio-chemical conversion techniques

177. Which of the following are types of pyrolysis?
a) Flash and ablative
b) Intermediate and anaerobic digestion
c**) Anaerobic digestion and fermentation**
d) Fermentation and intermediate