

*Note: Attempt all questions. The question paper contains 70 MCQ type questions. Each question carries equal marks. Select the answer and fill the bubble corresponding to that question in the attached OMR sheet.*

1. Which Ministry is mainly responsible for research and development in renewable energy sources such as wind power, small hydro, biogas and solar power?  
(A) Ministry of Petroleum and Natural Gas  
(B) Ministry of New and Renewable Energy  
(C) Ministry of Non-Renewable Energy  
(D) Ministry of Oil
2. Where is the first oil well drilled in Asia?  
(A) Karachi, Pakistan  
(B) Assam, India  
(C) Tokyo, Japan  
(D) Kandy, Sri Lanka
3. Which of the following non renewable energy is not classified under a fossil fuel?  
(A) Nuclear  
(B) Petroleum  
(C) Oil  
(D) Natural gas
4. The world's first 100% solar powered airport located at  
(A) Cochin, Kerala  
(B) Bengaluru, Karnataka  
(C) Chennai, Tamil Nadu  
(D) Mumbai, Maharashtra
5. A Solar cell is an electrical device that converts the energy of light directly into electricity:  
(A) Photovoltaic effect  
(B) Chemical effect  
(C) Atmospheric effect  
(D) Physical effect
6. Boiling water reactor and pressurised water reactors are:  
(A) Solar reactor  
(B) OTEC  
(C) Biogas reactor  
(D) Nuclear reactor
7. The average distance between the sun and the earth is \_\_\_\_\_.  
(A)  $1.5 \times 10^8$  km  
(B)  $1.5 \times 10^5$  km  
(C)  $1.5 \times 10^6$  km  
(D) None
8. A fuel cell, in order to produce electricity, burns:  
(A) Hydrogen  
(B) Nitrogen  
(C) Helium  
(D) None of the above
9. The process that converts solid coal into liquid hydrocarbon fuel is called:  
(A) Cracking

- (B) Catalytic conversion  
 (C) Carbonation  
 (D) Liquefaction
10. Which of the following is the correct arrangement in the increasing order of use of non-conventional energy source in India?
- (A) Biomass < Small hydro plants < Wind energy < Solar  
 (B) Biomass < Small hydro plants < Wind energy < Solar  
 (C) Biomass < Solar < Small hydro plants < Wind energy  
 (D) Small hydro plants < Biomass < Wind energy < Solar
11. The hole on earth's surface from where the steam from the earth comes out is called as
- (A) Gash  
 (B) Mud pot  
 (C) Void  
 (D) Fumarole
12. What is time period for one tide to occur in a day?
- (A) 6h, 12.5 min  
 (B) 6h, 40.5 min  
 (C) 6h, 0 min  
 (D) 6h, 25.6 min
13. Which of the following statement/s is/are correct?
- (i) Biomass is a renewable energy resource derived from plants and animal waste.
- (ii) However, burning of biomass increases atmospheric carbon dioxide.
- (A) Only (i)  
 (B) Only (ii)  
 (C) Both (i) and (ii)  
 (D) None of the above
14. On what is two-pool tidal system is less dependent?
- (A) Barrage  
 (B) Tidal fluctuation  
 (C) Reservoir  
 (D) Gravitational force
15. Reflector mirrors used for exploiting the solar energy are called
- (A) Mantle  
 (B) Heliostats  
 (C) Diffusers  
 (D) Ponds
16. Consider the following statements:
- (i) The transfer of heat through horizontal movement of air is called Advection
- (ii) The short wave radiation on earth are absorbed by the carbon dioxide and the other green house gases where as long wave radiation pass through them without any heating
- (iii) The Earth as a whole doesn't accumulate or loose heat and its temperature has remained

constant Select the correct answer

- (A) (i) only  
~~(B)~~ (i) and (ii) only  
(C) (i), (ii) and (iii)  
(D) (i) and (iii) only
17. The collection efficiency of Flat plate collector can be improved by  
(A) putting a selective coating on the plate  
(B) evacuating the space above the absorber plate  
~~(C)~~ Both (A) and (B)  
(D) None of the above
18. Consider the following statements:  
(i) The incoming solar radiation on earth is known as insolation  
(ii) The farthest distance of the earth from the Sun is 152 million Km on 4th July  
(iii) The position of the earth when it is nearest to the Sun is called Perihelion
- Select the correct answer  
(A) (i) only  
(B) (i) and (ii) only  
~~(C)~~ (i), (ii) and (iii)  
(D) (ii) and (iii) only
19. Which of these factors are responsible for variation in Insolation?  
(i) The angle of inclination of the sun's rays  
(ii) The length of the day

(iii) the configuration of land

Select the correct answer

- (A) (i) only  
~~(B)~~ (i) and (ii) only  
(C) (i), (ii) and (iii)  
(D) (ii) and (iii) only
20. Maximum efficiency of solar collector is obtained in  
(A) Flat plate collector  
(B) Evacuated tube collector  
(C) Line focussing collector  
~~(D)~~ Paraboloid dish collector
21. The following is (are) laws of black body radiation.  
(A) Plank's law  
(B) Stefan-Boltzmann law  
~~(C)~~ Both (A) and (B)  
(D) None of the above
22. Calculate the angle of declination for March 31 in a leap year at Delhi ( $28.70^\circ \text{ N}, 77.10^\circ \text{ E}$ )  
(A)  $4.016^\circ$   $23.45^\circ$   
~~(B)~~  $-4.016^\circ$   
(C)  $2.016^\circ$   
(D)  $-2.016^\circ$
23. The zenith angle is the angle made by the sun's rays with the \_\_\_\_\_ to a \_\_\_\_\_ surface.  
~~(A)~~ normal, horizontal  
(B) tangent, horizontal  
(C) normal, vertical  
(D) tangent, vertical
24. Calculate the hour angle at 1:30 pm  
~~(A)~~  $12.5^\circ$

- (B)  $16.5^\circ$   
(C)  $22.5^\circ$   
(D)  $20.5^\circ$
25. The complement of zenith angle is  
(A) Solar altitude angle  
(B) Surface azimuth angle  
(C) Solar azimuth angle  
(D) Slope
26. Following is (are) the function(s) of Flywheel.  
(A) To store and release energy when needed during the work cycle  
(B) To reduce the amplitude of speed fluctuations  
(C) To reduce the power capacity of motor  
(D) All of the above
27. When two batteries are connected in parallel, it should be ensured that  
(A) They have same EMF  
(B) They have same make  
(C) They have same ampere hour capacity  
(D) They have identical internal resistance
28. The open circuit voltage of any storage cell depends wholly upon  
(A) Its chemical constituents  
(B) On the strength of its electrolyte  
(C) Its temperature  
(D) All of the above
29. Magnetohydrodynamics power generation requires:  
(A) Rotating permanent magnets  
(B) Fixed turbine  
(C) Fixed magnets  
(D) Rotating turbine attached to a generator
30. Fuel cell converts chemical energy to electrical energy using a reaction that  
(A) eliminates combustion of fuel  
(B) requires combustion of fuel  
(C) requires no ignition of fuel  
(D) fuel is not required
31. In dry steam hydrothermal plant, we use  
(A) Carnot cycle  
(B) Brayton cycle  
(C) Rankine Cycle  
(D) None of the above
32. Hydrothermal fluids are \_\_\_\_\_ in nature.  
(A) Corrosive  
(B) Abrasive  
(C) Both (A) and (B)  
(D) None of the above
33. The fuel cell is considered a battery in which \_\_\_\_\_ is continuously replaced.  
(A) Fuel only  
(B) Oxidizer  
(C) Both fuel and oxidizer  
(D) None of the above

34. Which of these should not be a properties of fuel cell electrodes?
- (A) Good electrical conductors
  - (B) Highly resistant to corrosive environment
  - (C) Should perform charge separation
  - (D) Take part in chemical reactions
35. The hydrocarbons cracked with steam in fuel cells do not give rise to
- (A) CO
  - (B) CO<sub>2</sub>
  - (C) H<sub>2</sub>
  - (D) H<sub>2</sub>O
36. Which of these fuel cells operates at high temperatures ?
- (A) Solid oxide fuel cell
  - (B) Alkaline fuel cell
  - (C) Molten carbon fuel cell
  - (D) Phosphoric acid fuel cell
37. The following is (are) type(s) of Geothermal resource
- (A) Hydrothermal
  - (B) Hot dry rock
  - (C) Geopressurised
  - (D) All of the above
38. The following plant runs on binary cycle
- (A) Vapour dominated plant
  - (B) Liquid dominated high temperature plant
  - (C) Liquid dominated low temperature plant
  - (D) All of the above
39. The following is (are) the visible sign(s) of the large amount of heat lying in the earth's interior.
- (A) Volcanoes
  - (B) Geysers
  - (C) Hot springs
  - (D) All of the above
40. Binary geothermal powerplants, the hot water is passed by a secondary fluid with less boiling point than
- (A) Water
  - (B) 0°C
  - (C) 50°C
  - (D) 100°C
41. Energy means
- (A) The portion of the input heat, which can be converted into work
  - (B) The portion of the input heat, which is nonconvertible into work
  - (C) The ability of a system to do work
  - (D) The inability of a system to do work
42. What is the working fluid in closed cycle MHD system?
- (A) Helium and argon
  - (B) Coal
  - (C) Natural gas
  - (D) Potassium
43. Which type of wind mills are termed as "Cross-wind axis" machines:
- (A) Horizontal axis wind mills

- (B) Vertical axis wind mills  
 (C) Both (a) and (b)  
 (D) None of the above
44. The particles emitted from hot cathode surface are
- (A) negative ions  
 (B) positive ions  
 (C) protons  
 (D) electrons
45. At room temperature, the electron cannot escape metal surface due to
- (A) attractive forces of nucleus  
 (B) repulsive forces of electrons  
 (C) repulsive forces of nucleus  
 (D) pulling force of protons
46. The thermionic generator is essentially which kind of device?
- (A) low voltage & high current  
 (B) high voltage & high current  
 (C) low voltage & low current  
 (D) high voltage and high current
47. Operation of thermocouple is governed by
- (A) Peltier effect  
 (B) Seebeck effect  
 (C) Thomson effect  
 (D) All of the mentioned
48. Total Seebeck effect can be found as
- (A) Total Peltier effect  
 (B) Total Thomson effect  
 (C) Partly Peltier and partly Thomson effect  
 (D) None of the mentioned
49. Disadvantage of thermoelectric effect
- (A) High Output  
 (B) Low efficiency (5 – 10 %)  
 (C) Low Cost  
 (D) None of the above
50. What are used to turn wind energy into electrical energy?
- (A) Turbine  
 (B) Generators  
 (C) Yaw motor  
 (D) Blades
51. The amount of energy available in the wind at any instant is proportional to \_\_\_ of the wind speed.
- (A) Square root power of two  
 (B) Square root power of three  
 (C) Square power  
 (D) Cube power
52. What are Wind Turbines?
- (A) Wind turbines are devices that convert the wind's kinetic energy into electrical energy  
 (B) Wind turbines are devices that convert the wind's kinetic energy into mechanical energy  
 (C) Wind turbines are devices that convert the wind's thermal energy into mechanical energy  
 (D) None of the above
53. Force is responsible for forcing the global winds towards western direction.

- (A) Coriolis  
 (B) Gravitational  
 (C) Centripetal  
 (D) Centrifugal
54. The following factor(s) affects the distribution of wind energy  
 (A) Mountain chains  
 (B) The hills, trees and buildings  
 (C) Frictional effect of the surface  
 (D) All of the above
55. Which of the following element is used as a thermocouple in nuclear reactor?  
 (A) Boron  
 (B) Platinum  
 (C) Copper  
 (D) Iron
56. The wind intensity can be described by  
 (A) Reynolds number  
 (B) Mach number  
 (C) Beaufort number  
 (D) Froude number
57. Difference between water height at high tide and water height at low tide is called \_\_\_\_\_  
 (A) Tidal Variation  
 (B) Tidal volume  
 (C) Tidal Range  
 (D) Tidal Current
58. What tide of tide is it called when two high tides and two low tides of approximately equal size occur?  
 (A) Diurnal tide  
 (B) Spring tide  
 (C) Neap tide  
 (D) Semi-Diurnal tide
59. The ocean thermal energy concept was proposed in 1881 by.  
 (A) Arsene D'Arsonval  
 (B) Alexander Edmond Becquerel  
 (C) James Prescott joule  
 (D) La Rance
60. The first OTEC plant is constructed in  
 (A) 1930  
 (B) 1924  
 (C) 1922  
 (D) 1926
61. In closed OTEC cycle, the working fluid is  
 (A) Propane  
 (B) Water  
 (C) Engine oil  
 (D) Iso-butane
62. The ocean thermal energy conversion is uses  
 (A) Energy difference  
 (B) Temperature difference  
 (C) Potential difference  
 (D) Kinetic difference
63. The open cycle OTEC system produces \_\_\_\_\_ water.  
 (A) Desalinated  
 (B) Impure  
 (C) Contaminated  
 (D) Chlorinated

64. In OTEC the heat exchanger \_\_\_\_\_ the vapour into a liquid which is recycled.
- (A) Condenses
  - (B) Heats
  - (C) Cools
  - (D) Evaporates
65. Waves are caused indirectly by
- (A) Wind energy
  - (B) Solar energy
  - (C) Geo-thermal energy
  - (D) Wave energy
66. Tides are produced by
- (A) Heavy Winds
  - (B) Slight earth quakes
  - (C) Gravitational interaction of moon with earth
  - (D) Gravitational interaction of moon and sun with earth
67. Neap tides occur when the earth, sun and moon forms an angle of
- (A)  $60^\circ$
  - (B)  $90^\circ$
  - (C)  $120^\circ$
  - (D)  $180^\circ$
68. Tidal energy utilize
- (A) Kinetic energy of water
  - (B) Potential energy of water
  - (C) Both (A) and (B)
  - (D) None of these
69. Anaerobic fermentation is how many stages process?
- (A) Single stage
  - (B) Two stage
  - (C) Three stage
  - (D) Four stage
70. Which is the most suitable temperature for the production of biogas in anaerobic fermentation?
- (A)  $32-35^\circ\text{C}$
  - (B)  $18-26^\circ\text{C}$
  - (C)  $40-48^\circ\text{C}$
  - (D)  $10-15^\circ\text{C}$