ENGINEERING SCIENCE

1. The yield of an open well can be computed by conducting

|  |  |
| --- | --- |
| (A) | Porosity test  |
| (B) | Field permeability test |
| (C) | Recuperation test |
| (D) | Equilibrium test |

2. The valve that regulates water in an outflow pipe of an overhead reservoir is

|  |  |
| --- | --- |
| (A) | Gate valve |
| (B) | Reflux valve |
| (C) | Scour valve |
| (D) | Air-relief valve |

3. Very fine suspended and colloidal particles are removed from water by a process called

|  |  |
| --- | --- |
| (A) | Softening |
| (B) | Coagulation |
| (C) | Disinfection |
| (D) | Plain-sedimentation |

4. The amount of chlorine available in water after disinfection is called

|  |  |
| --- | --- |
| (A) | Residual chlorine |
| (B) | Free chlorine |
| (C) | Free available chlorine |
| (D) | Combined available chlorine |

5. Aeration of water is done to remove

|  |  |
| --- | --- |
| (A) | Suspended impurities |
| (B) | Floating impurities |
| (C) | Dissolved salts |
| (D) | Dissolved gases |

6. The average domestic water consumption per capita per day for an Indian city is taken as …………… as per IS:1172-1963.

|  |  |
| --- | --- |
| (A) | 85 litres |
| (B) | 100 litres |
| (C) | 135 litres |
| (D) | 200 litres |

7. Nitrates more than 50 ppm in water leads to a disease called

|  |  |
| --- | --- |
| (A) | Typhoid |
| (B) | Methemoglobinemia |
| (C) | Gastroenteritis |
| (D) | COVID-19 |

8. The product of Young’s modulus and moment of inertia is known as

|  |  |
| --- | --- |
| (A) | Modulus of rigidity |
| (B) | Bulk modulus |
| (C) | Flexural rigidity |
| (D) | Torsional rigidity  |

9. When a body of mass *m* attains a velocity *v* from rest in time *t*, then the kinetic energy of translation is

|  |  |
| --- | --- |
| (A) | *mv*2 |
| (B) | *mgv*2 |
| (C) | 0.5 *mv*2 |
| (D) | 0.5 *mgv*2 |

10. Mass moment of inertia of a uniform thin rod of mass ‘*M*’ and length ‘*l*’ about its mid-point and perpendicular to its length is

|  |  |
| --- | --- |
| (A) | (2/3)*Ml*2 |
| (B) | (1/3)*Ml*2 |
| (C) | (3/4) *Ml*2 |
| (D) | (4/3)*Ml*2 |

11. When a body is subjected to a direct tensile stress (*p*) in one plane, then maximum normal stress occurs at a section inclined at …………… to the normal of the section.

|  |  |
| --- | --- |
| (A) | 0o |
| (B) | 30o |
| (C) | 45o |
| (D) | 90o |

12. The presence of Coliform Bacteria in water is an indication of

|  |  |
| --- | --- |
| (A) | Radioactive wastes |
| (B) | Excess fertilizer |
| (C) | Decaying animals and plants |
| (D) | Human feces |

13. Which of the following sanitizers is a surface active agent?

|  |  |
| --- | --- |
| (A) | Meta phosphate |
| (B) | Tetra phosphate |
| (C) | Teepol |
| (D) | None of the above |

14. Which of the following is found in the intermediate zone of a waste stabilisation pond?

|  |  |
| --- | --- |
| (A) | Aerobic bacteria |
| (B) | Algae |
| (C) | Organic solids |
| (D) | Facultative bacteria |

15. …………… is formed when temporary hard water is boiled.

|  |  |
| --- | --- |
| (A) | Calcium bicarbonate |
| (B) | Carbon dioxide |
| (C) | Hydrogen chloride |
| (D) | Calcium sulphite |

16. The most commonly used non-empirical formula for calculating the flow velocity of underground water is

|  |  |
| --- | --- |
| (A) | Hazen’s formula |
| (B) | Bernoulli’s equation |
| (C) | Darcy’s formula |
| (D) | Lacy’s formula |

17. The type of trap commonly used for receiving waste water from kitchen sinks and bathrooms is

|  |  |
| --- | --- |
| (A) | Gully trap |
| (B) | Intercepting trap |
| (C) | Reverse trap |
| (D) | Floor trap |

18. The purpose of providing a surge chamber in a water conveyance system is to

|  |  |
| --- | --- |
| (A) | Store water |
| (B) | Increase the velocity in a pipeline |
| (C) | Prevent overflow |
| (D) | Absorb sudden rises of pressure |

19. The dimensionless number that signifies the ratio of inertial forces to viscous forces is

|  |  |
| --- | --- |
| (A) | Prandtl number |
| (B) | Mach number |
| (C) | Reynolds number |
| (D) | Sherwood number |

20. A non Newtonian fluid that behaves as a rigid body at low stresses but flows as a viscous fluid at high stress is

|  |  |
| --- | --- |
| (A) | Bingham plastic |
| (B) | Pseudoplastic |
| (C) | Rheopectic |
| (D) | Dilatant |

21. The components of velocity along the *x*-axis and the *y*-axis are *u* = *ax*2 **+** *bxy* **+** *cy*2 and *v* = *cxy* respectively in a two dimensional flow. Under what condition will the flow field be continuous?

|  |  |
| --- | --- |
| (A) | *a* ***+*** *c =* 0 |
| (B) | 2*a* ***+*** *c* = 0 |
| (C) | 2*b* ***+*** *c* = 0 |
| (D) | *b* ***+*** *c* = 0 |

22. The type of motion exhibited by a fluid element that moves from one position to another and undergoes change in its dimensions is

|  |  |
| --- | --- |
| (A) | Rotation |
| (B) | Angular Deformation |
| (C) | Linear Deformation |
| (D) | Linear Translation |

23. …………… is the flow of a viscous fluid in the space between two surfaces, one of which is moving tangentially relative to the other.

|  |  |
| --- | --- |
| (A) | Poiseuille flow |
| (B) | Couette flow |
| (C) | Froude flow |
| (D) | Rotational flow |

24. A submerged orifice 1 metre wide has height of water 3 metres from the bottom of the orifice and 2 metres from the top of the orifice. The difference in water levels on both sides of the orifice is 1 metre. What is the discharge through the orifice if *Cd* = 0.6?

|  |  |
| --- | --- |
| (A) | 6.5 m3/sec |
| (B) | 8.5 m3/sec |
| (C) | 3.9 m3/sec |
| (D) | 2.6 m3/sec |

25. Which of the following can be used to predict pressure drop for fully developed flow in a circular pipe?

|  |  |
| --- | --- |
| (A) | Moody chart |
| (B) | Mollier chart |
| (C) | Reynolds chart |
| (D) | Scatter chart |

26. Which of the following is not the reason for minor head loses in a pipe?

|  |  |
| --- | --- |
| (A) | Valves |
| (B) | Bends |
| (C) | Friction |
| (D) | Tees |

27. Water flows through a pipe of 0.5 m diameter and 9 km length at a velocity of 1.09 m/sec. What is the head loss due to friction if the coefficient of friction is 0.005?

|  |  |
| --- | --- |
| (A) | 21.8 m |
| (B) | 26.5 m |
| (C) | 15.5 m |
| (D) | 32.8 m |

28. The line which gives the sum of pressure head and datum head of a flowing fluid in a pipe with respect to some reference line is called

|  |  |
| --- | --- |
| (A) | Total energy gradient line |
| (B) | Isotropic line |
| (C) | Hydraulic gradient line |
| (D) | Isobaric line |

29. Which nozzle is used to accelerate a hot, pressurized gas passing through it to a higher supersonic speed in the thrust direction?

|  |  |
| --- | --- |
| (A) | Pascal nozzle |
| (B) | de Laval’ nozzle |
| (C) | Bernouille’s nozzle |
| (D) | Toricelli’s nozzle |

30. A rectangular earthen channel is 1.2 m wide and 1 m deep. It has a longitudinal slope of 1 in 1000. The hydraulic mean depth of the channel will be

|  |  |
| --- | --- |
| (A) | 0.55 m |
| (B) | 1 m |
| (C) | 0.68 m |
| (D) | 0.37 m |

31. Which of the following does not belong to the category of grey water?

|  |  |
| --- | --- |
| (A) | Wastewater from bathroom sinks |
| (B) | Wastewater from showers and tubs |
| (C) | Wastewater from washing machines |
| (D) | Wastewater from toilet flushing |

32. Identify the instrument used to detect and measure odour dilution

|  |  |
| --- | --- |
| (A) | Chromatography |
| (B) | Olfactometer |
| (C) | Spectrophotometer |
| (D) | Anemometer |

33. Which of the following is not an advantage of circular sewer?

|  |  |
| --- | --- |
| (A) | A circular section gives the least perimeter for a given area, and therefore has the maximum hydraulic mean depth for running full and half full conditions |
| (B) | It is the most economical section since it requires minimum quantity of material for its construction |
| (C) | The section has uniform curvature and hence prevents the possibility of deposits anywhere within the section |
| (D) | Circular sewers are suitable where variation in discharge of sewage is very large |

34. …………… allow storm water or wastewater sewers to pass under obstructions such as rivers.

|  |  |
| --- | --- |
| (A) | Lateral sewer |
| (B) | Outfall sewer |
| (C) | Depressed sewer |
| (D) | Main sewer |

35. When …………… is present in water at a concentration greater than 0.3 ppm, the water will have a brown tinge.

|  |  |
| --- | --- |
| (A) | Manganese |
| (B) | Magnesium |
| (C) | Iron |
| (D) | Zinc |

36. Which of the following processes adds dissolved oxygen to a natural stream?

|  |  |
| --- | --- |
| (A) | Oxidation of organic matter |
| (B) | Photosynthesis |
| (C) | Nitrification |
| (D) | Respiration by aquatic life |

37. The process of overgrowth of plants and algae in lakes is known as

|  |  |
| --- | --- |
| (A) | Photosynthesis |
| (B) | Eutrophication |
| (C) | Respiration |
| (D) | Transpiration |

38. One of the reasons for rising sludge in the secondary clarifiers of activated sludge plants is

|  |  |
| --- | --- |
| (A) | Sedimentation |
| (B) | Coagulation |
| (C) | Flocculation |
| (D) | Denitrification |

39. Which of the following activated sludge process has the maximum BOD removal efficiency?

|  |  |
| --- | --- |
| (A) | Extended aeration |
| (B) | Step aeration |
| (C) | Modified aeration |
| (D) | Conventional |

40. Settling of particles takes place by the contact of impurities present in wastewater with each other in …………… settling.

|  |  |
| --- | --- |
| (A) | Flocculent settling |
| (B) | Discrete settling |
| (C) | Compression settling |
| (D) | Hindered settling |

41. Which of the following statements is not true for a rapid sand filter?

|  |  |
| --- | --- |
| (A) | High filter rate (4000 – 12000 litres per hour per square metre of surface), small land requirements |
| (B) | Effective in removing bacteria, viruses, fluoride, arsenic, salts, odour and organic matter |
| (C) | Backwashing takes only a few minutes and filters can be put back into operation instantly |
| (D) | Highly effective for removal of turbidity (usually < 0.1-1 NTU) |

42. Which of the following aerobic processes is based on the symbiotic action between algae and bacteria?

|  |  |
| --- | --- |
| (A) | Oxidation ditch |
| (B) | Rotating biological contactor |
| (C) | Oxidation pond |
| (D) | Membrane bioreactor |

43. Temperature inversion occurs in

|  |  |
| --- | --- |
| (A) | Stratosphere |
| (B) | Troposphere |
| (C) | Ionosphere |
| (D) | Exosphere |

44. Which of the following is not a secondary pollutant?

|  |  |
| --- | --- |
| (A) | Ozone |
| (B) | Peroxyacyl nitrates |
| (C) | Nitric acid |
| (D) | Sulphur dioxide |

45. What is the emf if the current changes from 6A to 4A in 2 seconds and the inductance is 8H?

|  |  |
| --- | --- |
| (A) | 8 V |
| (B) | 2 V |
| (C) | 4 V |
| (D) | 6 V |

46. What is the current leaving a parallel circuit if the currents in the three branches of the circuit are 5A, 6A and 7A?

|  |  |
| --- | --- |
| (A) | 7 A |
| (B) | 18 A |
| (C) | 11 A |
| (D) | 5 A |

47. A RC circuit consists of a 100microF capacitor in series with a 80ohm resistor. What is the time constant?

|  |  |
| --- | --- |
| (A) | 125 sec |
| (B) | 0.008 sec |
| (C) | 0.01 sec |
| (D) | 12.5 sec |

48. The relative permeability of a substance is less than that of free space. The substance will be

|  |  |
| --- | --- |
| (A) | Ferromagnetic |
| (B) | Paramagnetic |
| (C) | Diamagnetic |
| (D) | Both paramagnetic and ferromagnetic |

49. …………… is the ability of a material to allow the passage of magnetic lines of flux.

|  |  |
| --- | --- |
| (A) | Permeance |
| (B) | Reluctance |
| (C) | Resistance |
| (D) | Conductance |

50. An inductor with a ferromagnetic core has an inductance of 2000 H. The current changes from 5A to 6A and the flux changes from 760 to 800 Wb. Calculate the number of turns.

|  |  |
| --- | --- |
| (A) | 100 |
| (B) | 200 |
| (C) | 300 |
| (D) | 50 |

51. The current flowing in the inductive circuit is 2A in 4s. The inductance is 15H. What will be the power in the circuit?

|  |  |
| --- | --- |
| (A) | 120 W |
| (B) | 60 W |
| (C) | 30 W |
| (D) | 240 W |

52. Excavation is to be carried out on a moderately firm ground for a depth of 1.5 m. Which arrangement will you use to prevent the sleep of earth in foundation trenches?

|  |  |
| --- | --- |
| (A) | Vertical sheeting |
| (B) | Sheet piling |
| (C) | Stay bracing |
| (D) | Runner |

53. …………… is a temporary framework used in construction demolition, maintenance or repair works.

|  |  |
| --- | --- |
| (A) | Shoring |
| (B) | Grouting |
| (C) | Underpinning |
| (D) | Scaffolding |

54. Which of the following compounds tend to retard the setting of cement and discourage the strength of concrete in early stages?

|  |  |
| --- | --- |
| (A) | Chlorides |
| (B) | Sulphates |
| (C) | Nitrates |
| (D) | Phosphates |

55. “Loudness which corresponds to the magnitude of the sensation is proportional to the logarithm of the intensity of the sound”. Which of the following laws governs this statement?

|  |  |
| --- | --- |
| (A) | Weber and Fechner’s law |
| (B) | Huygens–Fresnel law |
| (C) | Loretz law |
| (D) | Beer-Lambert law |

56. The total set of greenhouse gas emissions caused by an individual, event, organisation or product is known as

|  |  |
| --- | --- |
| (A) | Ecological footprint |
| (B) | Carbon footprint |
| (C) | Ecological pyramid |
| (D) | Energy pyramid |

57. The loss of …………… in wastewater may make it septic.

|  |  |
| --- | --- |
| (A) | Organic compounds |
| (B) | Nitrates |
| (C) | Dissolved oxygen |
| (D) | Carbon content |

58. Which of the following is not a ‘waste-to-energy conversion’ technique for solid waste?

|  |  |
| --- | --- |
| (A) | Incineration |
| (B) | Gasification |
| (C) | Pyrolysis |
| (D) | Composting |

59. The number of steps involved in sulphur cycle is

|  |  |
| --- | --- |
| (A) | Six |
| (B) | Five |
| (C) | Eight |
| (D) | Three |

60. Which of the following microorganism performs nitrification in the natural environment?

|  |  |
| --- | --- |
| (A) | Diazotrophs |
| (B) | Cyanobacteria |
| (C) | Nitrobacter |
| (D) | Nitrosomonas |

61. Hot spots of biodiversity have

|  |  |
| --- | --- |
| (A) | high density of hot springs |
| (B) | high density of biodiversity |
| (C) | high density of endangered species only |
| (D) | None of the above |

62. Cultivation, and harvesting of timber is permitted in …………… if they do not interfere with the project.

|  |  |
| --- | --- |
| (A) | National parks |
| (B) | Biosphere reserves |
| (C) | Sanctuaries |
| (D) | Protected areas |

63. Which of the following is not a design consideration for highways?

|  |  |
| --- | --- |
| (A) | Sight distance |
| (B) | Cross section |
| (C) | Settlement |
| (D) | None of the above |

64. An environmental impact assessment carried out for a policy or programme is known as

|  |  |
| --- | --- |
| (A) | Strategic EIA |
| (B) | Cumulative EIA |
| (C) | Project EIA |
| (D) | Rapid EIA |

65. …………… is a system where water is distributed under low pressure through the piped network in a pre-determined pattern and applied to each plant.

|  |  |
| --- | --- |
| (A) | Micro irrigation |
| (B) | Nano irrigation |
| (C) | Petite irrigation |
| (D) | Flood irrigation |

66. Which of the following weirs has less head loss?

|  |  |
| --- | --- |
| (A) | Ogee shaped |
| (B) | Broad crested |
| (C) | Sharp crested |
| (D) | Narrow crested |

67. Earth’s curvature is considered in …………… survey.

|  |  |
| --- | --- |
| (A) | Plane |
| (B) | Basement |
| (C) | Geodetic |
| (D) | None of the above |

68. The value of …………… is zero at point of contraflexure.

|  |  |
| --- | --- |
| (A) | Shear force |
| (B) | Bending moment |
| (C) | Strain energy |
| (D) | Centre of gravity |

69. …………… support offers resistance against vertical and horizontal moments.

|  |  |
| --- | --- |
| (A) | Hinged |
| (B) | Simple |
| (C) | Fixed |
| (D) | Inclined |

70. …………… is the phenomenon of slow growing strain under a stress for a period of time.

|  |  |
| --- | --- |
| (A) | Yielding |
| (B) | Breaking |
| (C) | Creeping |
| (D) | None of the above |

71. The process of finding area of plane curves is often called

|  |  |
| --- | --- |
| (A) | Quadrature |
| (B) | Revolution |
| (C) | Convolution |
| (D) | Mapping |

72. The probability of hitting a target is 0.3. What is the mean and variance?

|  |  |
| --- | --- |
| (A) | 0.7, 0.21 |
| (B) | 0.3, 0.21 |
| (C) | 0.4, 0.75 |
| (D) | 0.1, 0.75 |

73. …………… is the dot product of two vectors A and B.

|  |  |
| --- | --- |
| (A) | Cartesian product |
| (B) | Outer product |
| (C) | Inner product |
| (D) | Final product |

74. ……………in columns is a type of mechanical failure which occurs in materials due to the application of compressive load.

|  |  |
| --- | --- |
| (A) | Sagging |
| (B) | Creeping |
| (C) | Melting |
| (D) | Buckling |

75. The number of shear stress components that can act on a 3-D object is

|  |  |
| --- | --- |
| (A) | 3 |
| (B) | 6 |
| (C) | 9 |
| (D) | 2 |

76. A transformer has a primary current of 300 mA rms and is plugged into a 120 V rms source. The secondary is providing 20 V across a 12 omega.gif load. What is the efficiency of the transformer?

|  |  |
| --- | --- |
| (A) | 92% |
| (B) | 80% |
| (C) | 98% |
| (D) | 85% |

77. …………… is the distance travelled by a signal's energy in the time it takes for one cycle to occur.

|  |  |
| --- | --- |
| (A) | Frequency |
| (B) | Amplitude |
| (C) | Wavelength |
| (D) | Period |

78. The majority carriers in a “p” type material is

|  |  |
| --- | --- |
| (A) | Dopants |
| (B) | Electrons |
| (C) | Holes |
| (D) | Bonds |

79. …………… are found in the upper part of an aquatic ecosystem.

|  |  |
| --- | --- |
| (A) | Nektons |
| (B) | Benthos |
| (C) | Arthropods |
| (D) | Plankton |

80. The tendency of biological systems to resist change is called

|  |  |
| --- | --- |
| (A) | Heliotropism |
| (B) | Homeostasis |
| (C) | Home tropism |
| (D) | Evolution |

81. …………… is considered as a common indicator organism of sewage pollution in a water body.

|  |  |
| --- | --- |
| (A) | Escherichia coli |
| (B) | Eicchornia Crassipes |
| (C) | Lemna paucicostata |
| (D) | Entamoeba histolytica |

82. The concentration of DDT …………… as it travels along the food chain.

|  |  |
| --- | --- |
| (A) | decreases |
| (B) | remains constant |
| (C) | increases |
| (D) | fluctuates randomly |

83. …………… acts as an absorbing barrier for ultraviolet radiations in the stratosphere.

|  |  |
| --- | --- |
| (A) | Argon |
| (B) | Ozone |
| (C) | Oxygen |
| (D) | Fluorocarbon |

84. The international treaty that aims at the reduction of ozone depleting substances

|  |  |
| --- | --- |
| (A) | Kyoto protocol |
| (B) | Montreal protocol |
| (C) | Basel convention |
| (D) | Ramsar treaty |

85. Which of the following is the most harmful environmental pollutant?

|  |  |
| --- | --- |
| (A) | Animal waste |
| (B) | Sewage |
| (C) | Nutrients in excess |
| (D) | Non-biodegradable chemicals |

86. The concentration of many harmful pollutants has been found to increase in higher trophic levels. This phenomenon is known as

|  |  |
| --- | --- |
| (A) | Biomagnification |
| (B) | Eutrophication |
| (C) | Biodegradation |
| (D) | Bioremediation |

87. Fish death occurs in water bodies contaminated by sewage. The main reason for such occurrences is

|  |  |
| --- | --- |
| (A) | Pathogen |
| (B) | Reduction in oxygen concentration |
| (C) | Foul smell |
| (D) | Clogging of grills by silt |

88. Which of the following is a non-ionizing radiation with specific biological effects?

|  |  |
| --- | --- |
| (A) | Gamma rays |
| (B) | X-rays |
| (C) | UV radiation |
| (D) | Beta rays |

89. …………… is considered as an indicator of sulphur dioxide pollution

|  |  |
| --- | --- |
| (A) | Mosses |
| (B) | Lichens |
| (C) | Climbers |
| (D) | Grasses |

90. The phenomenon by which an organism produces one or more biochemicals that influence the germination, growth, survival, and reproduction of other organisms is known as

|  |  |
| --- | --- |
| (A) | Allelopathy |
| (B) | Ecological suppression |
| (C) | Eutrophication |
| (D) | Biomagnification |

91. Which of the following techniques can be used to remove fluorides from water?

|  |  |
| --- | --- |
| (A) | Lime softening |
| (B) | Ion exchange |
| (C) | Reverse osmosis |
| (D) | All of the above |

92. Which of the following is a water borne disease?

|  |  |
| --- | --- |
| (A) | Scabies |
| (B) | Hepatitis |
| (C) | Asthma |
| (D) | Rabies |

93. The pressure inside a water droplet is 0.075 N/cm2 greater than the outside pressure. What will be the diameter of the droplet? The surface tension may be assumed as 0.075 N/m.

|  |  |
| --- | --- |
| (A) | 0.4 mm |
| (B) | 4 mm |
| (C) | 0.04 mm |
| (D) | 0.6 mm |

94. The force due to pressure gradient for fluid at rest is considered as

|  |  |
| --- | --- |
| (A) | Body force |
| (B) | Surface force |
| (C) | Force due to motion |
| (D) | None of the above |

95. A uniform body of size 5 m long × 3 m wide × 1.4 m deep floats in water. What is the weight of the body if depth of immersion is 1 m?

|  |  |
| --- | --- |
| (A) | 143 kN |
| (B) | 73 kN |
| (C) | 206 kN |
| (D) | 412 kN |

96. Kinetic energy factor for a fully developed laminar flow is around

|  |  |
| --- | --- |
| (A) | 4 |
| (B) | 1 |
| (C) | 6 |
| (D) | 2 |

97. …………… is a graph that indicates the power available at different streams of water.

|  |  |
| --- | --- |
| (A) | Hydrograph |
| (B) | Powergraph |
| (C) | Isobaric graph |
| (D) | Flow graph |

98. The sum of enthalpy and kinetic energy remains a constant in

|  |  |
| --- | --- |
| (A) | Isentropic flow |
| (B) | Polytropic flow |
| (C) | Adiabatic flow |
| (D) | Isothermal flow |

99. …………… is defined as the similarity between motion of the model and the prototype.

|  |  |
| --- | --- |
| (A) | Kinematic similarity |
| (B) | Geometric similarity |
| (C) | Dynamic similarity |
| (D) | Potential similarity |

100. …………… is used to quantify the resistance of an object in a fluid environment.

|  |  |
| --- | --- |
| (A) | Viscosity |
| (B) | Drag coefficient |
| (C) | Momentum coefficient |
| (D) | Diffusion coefficient |

101. A structure made of slender members which are joined together at their end points is called

|  |  |
| --- | --- |
| (A) | Support |
| (B) | Pillar |
| (C) | Beam |
| (D) | Truss |

102. The moment of inertia of a body does not depend on its

|  |  |
| --- | --- |
| (A) | Angular velocity |
| (B) | Distribution |
| (C) | Axis of rotation |
| (D) | Mass |

103. Steam is heated from 110oC to 114oC. Its specific heat at constant pressure is 105 J/oC. The corresponding enthalpy change is

|  |  |
| --- | --- |
| (A) | 105 J |
| (B) | 210 J |
| (C) | 420 J |
| (D) | 315 J |

104. One percent of the people of country P are taller than 1.8 m. Two percent of the people of country Q are taller than 1.8 m. There are thrice as many people in country P as in country Q. Taking both countries together, what is the percentage of people taller than 1.8 m?

|  |  |
| --- | --- |
| (A) | 3.0% |
| (B) | 2.5% |
| (C) | 1.5% |
| (D) | 1.25% |

105. Identify the group of nontoxic metals commonly found in natural water.

|  |  |
| --- | --- |
| (A) | Arsenic, lead and mercury |
| (B) | Calcium, sodium and silver |
| (C) | Iron, manganese and magnesium |
| (D) | Cadmium, chromium and copper |

106. One kg of methane is to be completely oxidised to its end products. The amount of CO2 generated (in kg) during the process will be

|  |  |
| --- | --- |
| (A) | 2.75 Kg |
| (B) | 3.2 Kg |
| (C) | 2.5 Kg |
| (D) | 2.1 Kg |

107. At one end of a structural member subjected to compression, translation is restrained at one end and both translation and rotation are restrained at the other end. The effective length factor recommended by IS 456 : 2000 in this case is

|  |  |
| --- | --- |
| (A) | 0.80 |
| (B) | 0.70 |
| (C) | 0.65 |
| (D) | 0.50 |

108. Which of the following is used to determine the liquid limit of soil?

|  |  |
| --- | --- |
| (A) | Le Chatelier apparatus |
| (B) | Casagrande’s apparatus |
| (C) | Vicat apparatus |
| (D) | Briquette testing apparatus |

109. The entries in each column of a square matrix 𝑀 add up to 1. Then an eigenvalue of 𝑀 is

|  |  |
| --- | --- |
| (A) | 1 |
| (B) | 3 |
| (C) | 2 |
| (D) | 4 |

110. The initial setting and early strength gain of ordinary Portland cement is due to the presence of

|  |  |
| --- | --- |
| (A) | C3A |
| (B) | C3S |
| (C) | C2S |
| (D) | C4AF |

111. The maximum allowable shear stress for the design of reinforced concrete beam depends on the

|  |  |
| --- | --- |
| (A) | Grade of steel only |
| (B) | Grade of concrete only |
| (C) | Grade of concrete and grade of steel |
| (D) | Grade of concrete and percentage of reinforcement |

112. The faintest sound that a normal healthy individual can hear has a sound pressure of

|  |  |
| --- | --- |
| (A) | 0.2 μPa |
| (B) | 2 μPa |
| (C) | 55 μPa |
| (D) | 20 μPa |

113. Two curves 𝑥2 = 4𝑦 and 𝑦2 = 4𝑥 intersect at point (0, 0). What is the angle of intersection?

|  |  |
| --- | --- |
| (A) | 0o |
| (B) | 30o |
| (C) | 45o |
| (D) | 90o  |

114. The shear force at a section of beam under bending is equal to zero then the bending moment at the section is

|  |  |
| --- | --- |
| (A) | Maximum |
| (B) | Minimum |
| (C) | Zero |
| (D) | None of the above |

115. The minimum essential treatment to be given to the water from a deep tube well to make it potable

|  |  |
| --- | --- |
| (A) | Coagulation and flocculation |
| (B) | Disinfection |
| (C) | Filtration |
| (D) | Settling |

116. The analysis of river water shows that nitrates are present in excess. This indicates

|  |  |
| --- | --- |
| (A) | recent pollution of water with sewage |
| (B) | immediate pollution of water with sewage |
| (C) | past pollution of water with sewage |
| (D) | no pollution of water with sewage |

117. It is proposed to use Lacey’s method for designing a stable channel for a discharge of *Q* m3/s with silt factor ‘*f*’. The mean flow velocity (m/s) in the channel will be

|  |  |
| --- | --- |
| (A) | (*Qf*2/140)1/6 |
| (B) | (*Qf*/140)1/3 |
| (C) | (*Q*2*f*2/140)1/6 |
| (D) | 0.48 (*Q/f*) 1/3 |

118. Which of the following can be used to measure the amount of actual evapotranspiration released by plants?

|  |  |
| --- | --- |
| (A) | Lysimeter |
| (B) | Bolometer |
| (C) | Thermoscope |
| (D) | Manometer |

119. It is required to maintain a minimum dissolved oxygen content of …………… in a river for the survival of aquatic life.

|  |  |
| --- | --- |
| (A) | 0 mg/L |
| (B) | 2 mg/L |
| (C) | 4 mg/L |
| (D) | 8 mg/L |

120. …………… is a dimensionless parameter measuring the ratio of "the inertia force on an element of fluid to the weight of the fluid element".

|  |  |
| --- | --- |
| (A) | Reynolds number |
| (B) | Froude number |
| (C) | Nusselt number |
| (D) | Prandtl number |

121. Which of the following waste water treatment operations involves mass transfer?

|  |  |
| --- | --- |
| (A) | Aeration |
| (B) | Sedimentation |
| (C) | Screening |
| (D) | Equalisation |

122. The dimensionless number which is defined as the ratio of the convective mass transfer to the mass diffusivity

|  |  |
| --- | --- |
| (A) | Schmidt number |
| (B) | Prandtl number |
| (C) | Sherwood number |
| (D) | Grashoff number |

123. Which of the following has the highest capability of producing precise output when compared to the remaining methods?

|  |  |
| --- | --- |
| (A) | Theodolite surveying |
| (B) | Traverse surveying |
| (C) | Terrestrial photogrammetry |
| (D) | Aerial photogrammetry |

124. Identify the feature which is not applicable to remote sensing.

|  |  |
| --- | --- |
| (A) | Electro-magnetic spectrum |
| (B) | Interaction of energy with atmosphere |
| (C) | Interaction of energy with satellite |
| (D) | Electromagnetic energy |

125. ………….. indicates the process of measuring depth below the water surface.

|  |  |
| --- | --- |
| (A) | Contouring |
| (B) | Sounding |
| (C) | Triangulation |
| (D) | Traversing |

126. The average percentage of water present in human body is

|  |  |
| --- | --- |
| (A) | 60 |
| (B) | 40 |
| (C) | 90 |
| (D) | 20 |

127. The largest producer of biofuel in the world is

|  |  |
| --- | --- |
| (A) | India |
| (B) | Argentina |
| (C) | Brazil |
| (D) | United States of America |

128. Which of the following is not essential for growing plants in hydroponics?

|  |  |
| --- | --- |
| (A) | Water |
| (B) | Air |
| (C) | Soil |
| (D) | Nutrients |

129. Identify the organism which acts as primary decomposers and recyclers of most of the dead plant material.

|  |  |
| --- | --- |
| (A) | Bacteria |
| (B) | Fungi |
| (C) | Protozoa |
| (D) | Plankton |

130. …………… is a symbiotic association between a fungus and a plant.

|  |  |
| --- | --- |
| (A) | Fungal mantle |
| (B) | Mycelium |
| (C) | Mycorrhizae |
| (D) | Thallus |

131. The presence and role of ……………. within an ecosystem has a disproportionate effect on other organisms within the system.

|  |  |
| --- | --- |
| (A) | Keystone species |
| (B) | Dominant species |
| (C) | Super species |
| (D) | Precious species |

132. ………….. are special ecosystems in which the water level fluctuates dramatically in different seasons.

|  |  |
| --- | --- |
| (A) | Coral reefs |
| (B) | Wetlands |
| (C) | Deep oceans |
| (D) | Brackish water |

133. Sunderbans, a delta of Ganges River is an example of

|  |  |
| --- | --- |
| (A) | Lake ecosystems |
| (B) | Pond ecosystem |
| (C) | Brackish water ecosystem |
| (D) | River ecosystem |

134. Which of the following is a multilateral treaty to promote shared responsibilities in relation to importation of hazardous chemicals?

|  |  |
| --- | --- |
| (A) | Montreal protocol |
| (B) | Stockholm convention |
| (C) | Basel convention |
| (D) | Rotterdam convention |

135. …………… is a suspension of fine solid particles or liquid droplets in air or another gas.

|  |  |
| --- | --- |
| (A) | Smoke |
| (B) | Aerosol |
| (C) | Dust |
| (D) | Particulates |

136. The controlled use of …………… in conjunction with waste stabilization increases the BOD removal capacity.

|  |  |
| --- | --- |
| (A) | Water hyacinth |
| (B) | Moses |
| (C) | Lichen |
| (D) | Eupatorium |

137. Which of the following techniques can be used for the effective removal of emulsified oil from water?

|  |  |
| --- | --- |
| (A) | Gravity separation |
| (B) | Screening |
| (C) | Filtration |
| (D) | Dissolved air floatation |

138. Removal of sand, and gravel in the primary treatment of waste water is known as

|  |  |
| --- | --- |
| (A) | Coagulation |
| (B) | Screening |
| (C) | Grit removal |
| (D) | Adsorption |

139. Which of the following characteristics does not make a waste hazardous?

|  |  |
| --- | --- |
| (A) | Toxicity |
| (B) | Viscosity |
| (C) | Flammability |
| (D) | Reactivity |

140. …………… is a chemical process in which the combustible portion of the waste is combined with oxygen forming carbon dioxide and water, which are released into the atmosphere.

|  |  |
| --- | --- |
| (A) | Incineration |
| (B) | Pyrolysis |
| (C) | Composting |
| (D) | Stabilisation |

141. Chairperson of the National Crisis Management Committee is the

|  |  |
| --- | --- |
| (A) | Principal Secretary to the Prime Minister |
| (B) | Cabinet Secretary |
| (C) | Home Secretary |
| (D) | Home Minister |

142. …………… is an area of land that feeds all the water running under it and draining off of it into a body of water.

|  |  |
| --- | --- |
| (A) | Water cycle |
| (B) | Catchment area |
| (C) | Water shed |
| (D) | Water reservoir |

143. Which of the following greenhouse gases has the highest global warming potential on a 100 year scale?

|  |  |
| --- | --- |
| (A) | Carbon tetra fluoride |
| (B) | Nitrous oxide |
| (C) | Methane |
| (D) | Water vapour |

144. A disease that affects a large number of people within a community, population, or region is known as

|  |  |
| --- | --- |
| (A) | Pandemic |
| (B) | Endemic |
| (C) | Epidemic |
| (D) | Outbreak |

145. Any substance that can disturb the development of an embryo or foetus is called

|  |  |
| --- | --- |
| (A) | Carcinogen |
| (B) | Teratogen |
| (C) | Mutagen |
| (D) | Antibody |

146. Discrete groups of organisms of the same kind are called

|  |  |
| --- | --- |
| (A) | Community |
| (B) | Colony |
| (C) | Biome |
| (D) | Species |

147. …………… is an electrical device consisting of two dissimilar electrical conductors forming an electrical junction.

|  |  |
| --- | --- |
| (A) | Pyrometer |
| (B) | Thermocouple |
| (C) | Galvanometer |
| (D) | Resistance thermometer |

148. …………… is the torque which acts on the moving system of the instrument when it is moving.

|  |  |
| --- | --- |
| (A) | Vibrational torque |
| (B) | Damping torque |
| (C) | Rotational torque |
| (D) | Inertial torque |

149. Orifice plate flow meters require ……………. for accurate operation.

|  |  |
| --- | --- |
| (A) | Fully developed turbulent flow |
| (B) | Laminar flow |
| (C) | Plug flow |
| (D) | Transitional flow |

150. Rapid growth of bacteria is observed in the …………… phase of the growth curve.

|  |  |
| --- | --- |
| (A) | Lag phase |
| (B) | Stationary phase |
| (C) | Endogenous phase |
| (D) | Log phase |

