COMMON P. G. ENTRANCE TEST – 2024 (CPET-2024)

Test Booklet No. : 00003

Subject Code : 25

Hall Ticket No. :

Subject : MARINE SCIENCE – OCEANOGRAPHY

TEST BOOKLET

*Time Allowed : **60** Minutes*

*Full Marks : **80***

: INSTRUCTIONS TO CANDIDATES :

1. The Test Booklet contains **15** pages including the cover page and **80** (Question Nos. 1 to 80) multiple choice questions.
2. DO NOT break open the seal of the Test Booklet until the invigilator instructs to do so.
3. The candidates must check discrepancy, if any (like up-printed or torn or missing pages or missing questions) in the Test Booklet immediately after breaking the seal of the Test Booklet. If detected, the invigilator may be requested to replace the same.
4. Candidates are required to fill up and darken the **Hall Ticket No., Test Booklet Serial No.** and OMR Answer Sheet Serial No. in attendance sheet carefully. Wrongly filled in OMR Answer Sheet is liable for rejection.
5. Each question has four choices / answers marked (A), (B), (C), (D). Candidate has to select the most appropriate choice / answer to each question and darken the oval completely against the question number provided in the OMR Answer Sheet.
6. Indicate only one choice / answer from the options provided by darkening the appropriate oval in the OMR Answer Sheet. More than one response to a question shall be treated as a wrong answer.
7. Use only **Black Ball Point Pen** for darkening the oval for answering.
8. All the questions are compulsory and they carry equal marks. The total marks scored by a candidate depends on the number of correct choices / answers darkened in the OMR Answer Sheet. There will be no negative marking for wrong answers.
9. No candidate shall be allowed to leave the Examination Hall / Room till all OMR Answer Sheets have been collected by the invigilator.
10. On completion of the entrance test, the original OMR Answer Sheet be handed over to the invigilator. Candidates are allowed to take the second copy of the OMR Answer Sheet along with the used Test Booklet for reference.
11. Candidates are not allowed to carry any personal belongings including electronic devices such as scientific calculator, cell phones, headphones, earbuds, or any other type of devices that allow communication of any kind inside the Examination Room / Hall.
12. The candidates are advised not to scribble or make any mark on the OMR Answer Sheet except marking the answers at the appropriate places and filling up the details required. Rough work, if any, may be done in the blank sheet(s) provided at the end of the Test Booklet.
13. Any malpractice / use of unfair means will lead to your disqualification from the entrance test / admission process and may also lead to appropriate legal action as deemed fit.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

SEAL

1. What is the primary composition of seawater ?

(A) Hydrogen (B) Nitrogen

(C) Salt (D) Water

2. What drives the surface currents in the ocean ?

(A) Aquatic animals (B) Underwater volcanoes

(C) Wind (D) Sunlight

3. What is a common method to measure salinity ?

(A) Barometer (B) Salinometer

(C) Anemometer (D) Thermometer

4. Which gas is most abundant in the Earth's atmosphere ?

(A) Oxygen (B) Nitrogen

(C) Carbon dioxide (D) Argon

5. What phenomenon describes the rise and fall of sea levels ?

(A) Tides (B) Tsunamis

(C) Currents (D) Storm surges

6. Which layer of the Earth is composed mostly of liquid nickel and iron ?

(A) Crust (B) Mantle

(C) Outer core (D) Inner core

7. What does GIS stand for ?

(A) Geographic Information System (B) Geologic Investigation Study

(C) General Internal System (D) Geographical Interface Scenario

8. Which gas is most important for sustaining life on Earth ?

(A) Oxygen (B) Hydrogen

(C) Nitrogen (D) Carbon dioxide

9. The El Niño phenomenon originates in which ocean ?

(A) Atlantic Ocean (B) Pacific Ocean

(C) Indian Ocean (D) Arctic Ocean

10. Which of the following is a primary producer in the ocean ?

(A) Dolphin (B) Shark

(C) Phytoplankton (D) Squid

11. Which principle explains why colder, saltier water sinks in the ocean ?

(A) Conservation of energy (B) Thermohaline circulation

(C) Bernoulli's principle (D) Archimedes' principle

12. What instrument measures atmospheric pressure ?

(A) Barometer (B) Hygrometer

(C) Anemometer (D) Thermometer

13. Which satellite is primarily used for oceanographic studies ?

(A) Hubble Space Telescope (B) International Space Station

(C) Jason1 (D) Sputnik

14. What term describes the Earth's water cycle involving evaporation, condensation, and precipitation ?

(A) Hydrological cycle (B) Carbon cycle

(C) Nitrogen cycle (D) Oxygen cycle

15. What does the Beaufort scale measure ?

(A) Earthquake intensity (B) Wind strength

(C) Ocean depth (D) Solar radiation

16. What type of current flows horizontally in the upper part of the ocean's surface ?

(A) Thermocline current (B) Rip current

(C) Density current (D) Surface current

17. Which of the following nutrients is most commonly limiting marine productivity ?

(A) Nitrogen
(B) Phosphorus
(C) Potassium
(D) Magnesium

18. What is the primary cause of tides on Earth ?

(A) Wind
(B) Earth's rotation
(C) Gravitational pull of the moon
(D) Solar flares

19. The term 'bathymetry' refers to the study of what ?

(A) Underwater depth of lake or ocean floors
(B) Atmospheric pressure
(C) Earth's crustal movements
(D) Surface wind patterns

20. What technology is primarily used for detailed sea floor mappings ?

(A) Radar
(B) SONAR
(C) LIDAR
(D) SODAR

21. Which of the following is a primary standard substance in titration ?

(A) Sodium hydroxide
(B) Potassium permanganate
(C) Oxalic acid
(D) Hydrochloric acid

22. What is the principle of Chromatography ?

(A) Separation based on size and shape
(B) Separation based on solubility
(C) Separation based on adsorption and partition
(D) Separation based on charge

23. Which type of spectroscopy uses the absorption of light to measure the concentration of a substance ?

(A) Infrared spectroscopy
(B) UV-Visible spectroscopy
(C) Nuclear Magnetic Resonance spectroscopy
(D) Mass spectroscopy

24. What is the role of a buffer in an analytical procedure ?

(A) To change the color of the solution

(B) To maintain a constant pH

(C) To act as a reactant

(D) To precipitate impurities

25. In titration, what is the point at which the indicator changes color called ?

(A) End point (B) Equivalence point

(C) Stoichiometric point (D) Reaction point

26. According to Boyle's law, what happens to the volume of a gas if the pressure is doubled while the temperature remains constant ?

(A) It doubles (B) It halves

(C) It remains the same (D) It becomes zero

27. What does Charles's law state about the volume of a gas ?

(A) It is directly proportional to its pressure at constant temperature

(B) It is inversely proportional to its pressure at constant temperature

(C) It is directly proportional to its absolute temperature at constant pressure

(D) It is inversely proportional to its absolute temperature at constant pressure

28. Which gas law combines Boyle's law, Charles's law and Avogadro's law ?

(A) Ideal gas law (B) Combined gas law

(C) Dalton's law (D) Graham's law

29. What is the value of the universal gas constant (R) in J/mol·K ?

(A) 8.314 (B) 0.0821

(C) 1.987 (D) 6.022

30. In an ideal gas, which two variables are directly proportional to each other at constant pressure ?

(A) Volume and temperature
(B) Volume and pressure
(C) Pressure and temperature
(D) Pressure and volume

31. Henry's law states that at constant temperature, the solubility of a gas in a liquid is :

(A) Directly proportional to the pressure of the gas above the liquid
(B) Inversely proportional to the pressure of the gas above the liquid
(C) Directly proportional to the volume of the liquid
(D) Inversely proportional to the volume of the liquid

32. Which of the following correctly expresses Henry's law ?

(A) $P = kC$
(B) $C = kP$
(C) $V = kP$
(D) $P = kV$

33. What happens to the solubility of a gas in a liquid when the temperature increases ?

(A) It increases
(B) It decreases
(C) It remains the same
(D) It becomes zero

34. What is the effect of increasing pressure on the solubility of carbon dioxide in water ?

(A) Increases
(B) Decreases
(C) Remains the same
(D) Becomes zero

35. Which gas is most likely to obey Henry's law at high pressure and low temperature ?

(A) Oxygen
(B) Nitrogen
(C) Hydrogen
(D) Carbon dioxide

36. What is the pH of a neutral solution at 25°C ?

(A) 0
(B) 7
(C) 14
(D) 10

37. Which of the following solutions is the most acidic ?

(A) pH = 3 (B) pH = 5

(C) pH = 7 (D) pH = 9

38. What is the relationship between pH and hydrogen ion concentration ?

(A) $pH = -\log[H^+]$ (B) $pH = \log[H^+]$

(C) $pH = -\log[OH^-]$ (D) $pH = \log[OH^-]$

39. Which of the following acids is a strong acid ?

(A) Acetic acid (B) Hydrochloric acid

(C) Formic acid (D) Citric acid

40. If the pH of a solution decreases from 5 to 3, the hydrogen ion concentration :

(A) Increases by a factor of 2 (B) Increases by a factor of 10

(C) Increases by a factor of 100 (D) Decreases by a factor of 100

41. What type of oceanographic data does an 'XBT' provide ?

(A) Temperature profile (B) Salinity profile

(C) Current direction (D) Marine biodiversity

42. Which term describes the boundary between two different seawater masses ?

(A) Halocline (B) Thermocline

(C) Pycnocline (D) Chemocline

43. The principle that explains the conservation of angular momentum in fluid dynamics is called :

(A) Pascal's law (B) Archimedes' principle

(C) Coriolis effect (D) Bernoulli's theorem

44. Ocean acidification affects the ocean's chemistry by decreasing :

(A) Oxygen levels (B) pH levels

(C) Salinity (D) Temperature

45. 'Photic zone' in the ocean refers to :

(A) The upper layer where sunlight penetrates

(B) The deep ocean floor

(C) Regions near hydrothermal vents

(D) The middle layer of the ocean

46. What is the major driver of deep ocean currents ?

(A) Wind

(B) Density differences

(C) Solar heating

(D) Coriolis force

47. Which technology is primarily used to track sea level changes globally ?

(A) Sonar

(B) Satellite altimetry

(C) Radar

(D) LiDAR

48. Which is considered a 'blue carbon' ecosystem ?

(A) Open oceans

(B) Rivers

(C) Mangroves

(D) Thermal vents

49. What does the 'Albedo effect' refer to in the context of climate science ?

(A) Reflectivity of the Earth's surface

(B) Absorption of infrared radiation by the atmosphere

(C) Diffusion of solar radiation in the ocean

(D) Thermal inertia of the Earth's crust

50. Which computational model is used for simulating the ocean and atmosphere interactions ?

(A) Linear regression model

(B) Coupled Ocean Atmosphere Model

(C) Single variable statistical model

(D) Purely deterministic model

51. What term describes the accumulation of substances, such as pesticides or other chemicals, in an organism ?

(A) Bioaccumulation
(B) Biomagnification
(C) Both (A) and (B)
(D) None of these

52. Which is a primary effect of ocean acidification on marine life ?

(A) Increased oxygen levels
(B) Decreased salinity
(C) Coral bleaching
(D) Increased nutrient levels

53. What is the main cause of the increase in sea levels ?

(A) Decreased salinity
(B) Underwater volcanism
(C) Melting of polar ice caps and glaciers
(D) Increased marine life biomass

54. Which gas is most responsible for warming the Earth's atmosphere by trapping heat ?

(A) Oxygen
(B) Carbon dioxide
(C) Nitrogen
(D) Argon

55. What method is commonly used to study the history of ocean temperatures, ice volume, and productivity ?

(A) Marine sediment cores
(B) Satellite imagery
(C) Direct temperature measurement
(D) Sonar mapping

56. What phenomenon significantly affects marine biodiversity in the Pacific Ocean due to unusually warm ocean temperatures ?

(A) Gulf Stream
(B) El Niño
(C) North Atlantic Drift
(D) Indian Ocean Dipole

57. What is a significant indicator of climate change observed in marine settings ?

(A) Decreased fish migration
(B) Increasing frequency of coral bleaching
(C) Decrease in salt concentrations
(D) Reduction in wave heights

58. Which instrument is used to measure the absorption of light in water and thus infer the amount of organic material or chlorophyll ?

(A) CTD (Conductivity, Temperature, Depth)

(B) Spectrophotometer

(C) Secchi Disk

(D) ADCP (Acoustic Doppler Current Profiler)

59. How does marine debris primarily affect marine animals ?

(A) By increasing water temperatures

(B) By decreasing nutrient availability

(C) By causing entanglement and ingestion

(D) By increasing salinity levels

60. Which of the following is a method is used to mitigate the effects of ocean acidification on marine ecosystems ?

(A) Increasing use of fossil fuels

(B) Artificial reef creation

(C) Reduction in global planting of mangroves

(D) Enhanced coastal development

61. Which measure of central tendency is most affected by extreme values ?

(A) Mean (B) Median

(C) Mode (D) Range

62. What does a p-value indicate in hypothesis testing ?

(A) The probability of the null hypothesis being true

(B) The probability of observing the sample data given that the null hypothesis is true

(C) The probability of the alternative hypothesis being true

(D) The probability of the sample mean being equal to the population mean

63. Which of the following is not a measure of dispersion ?

(A) Variance
(B) Standard deviation
(C) Interquartile range
(D) Skewness

64. In a normal distribution, what percentage of data falls within one standard deviation of the mean ?

(A) 50%
(B) 68%
(C) 95%
(D) 99%

65. If a sample mean is 10, the population mean is 12, and the standard error of the mean is 1, what is the z-score ?

(A) –2
(B) 2
(C) –1
(D) 1

66. What is the slope of the line represented by the equation $y = 3x + 4$?

(A) 3
(B) 4
(C) –3
(D) – 4

67. The equation of a line is given by $2y - 6x = 12$. What is the slope of this line ?

(A) 1/3
(B) –1/3
(C) 3
(D) –3

68. Which of the following represents the slope-intercept form of a straight line ?

(A) $y = mx + c$
(B) $y = ax^2 + bx + c$
(C) $ax + by + c = 0$
(D) $y = kx + b$

69. If two lines are perpendicular, what is the product of their slopes ?

(A) 0
(B) 1
(C) –1
(D) Infinity

70. The equation $y - 2 = 3(x - 4)$ is in which form ?

(A) Point-slope form
(B) Slope-intercept form
(C) Standard form
(D) Quadratic form

71. Which mode of heat transfer does not require a medium ?

(A) Conduction (B) Convection

(C) Radiation (D) All of these

72. What is the primary mechanism of heat transfer in fluids ?

(A) Conduction (B) Convection

(C) Radiation (D) All of these

73. Which law states that the rate of heat transfer through a material is proportional to the negative gradient of the temperature and to the area through which the heat flows ?

(A) Fourier's Law (B) Newton's Law of Cooling

(C) Stefan-Boltzmann Law (D) Wien's Displacement Law

74. What is the unit of thermal conductivity ?

(A) W/mK (B) J/kgK

(C) W/m^2K (D) J/s

75. The emissivity of a perfect black body is :

(A) 0 (B) 0.5

(C) 1 (D) Infinite

76. According to Archimedes' principle, the buoyant force on a submerged object is equal to :

(A) The weight of the object

(B) The volume of the object

(C) The weight of the fluid displaced by the object

(D) The density of the fluid

77. An object will float in a fluid if :

(A) Its density is greater than the density of the fluid

(B) Its density is equal to the density of the fluid

(C) Its density is less than the density of the fluid

(D) None of these

78. What happens to the buoyant force if an object is fully immersed in a liquid and then taken deeper into the same liquid ?

(A) Increases
(B) Decreases
(C) Remains the same
(D) Varies depending on the liquid

79. Which of the following is an application of Archimedes' principle ?

(A) Hydrometer
(B) Barometer
(C) Hygrometer
(D) Manometer

80. If an object displaces 500 cm^3 of water, what is the buoyant force acting on it ? (Assume $g = 9.8\ m/s^2$)

(A) 0.49 N
(B) 4.9 N
(C) 49 N
(D) 490 N

SPACE FOR ROUGH WORK

SEAL