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

Test Booklet No. : 00162

Subject Code : 23

Hall Ticket No. :

Subject : ATMOSPHERIC SCIENCE

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 No. 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. Which layer of the Earth's atmosphere contains the ozone layer ?

(A) Troposphere (B) Stratosphere

(C) Mesosphere (D) Thermosphere

2. What is the primary cause of the Earth's seasons ?

(A) Changes in the distance between the Earth and the Sun

(B) The tilt of the Earth's axis

(C) Changes in the Earth's orbital eccentricity

(D) Variation in solar output

3. What is the approximate composition of dry air by volume ?

(A) 78% nitrogen, 21% oxygen, 1% other gases

(B) 21% nitrogen, 78% oxygen, 1% other gases

(C) 99% nitrogen, 1% oxygen

(D) 99% oxygen, 1% nitrogen

4. The layer of the Earth's atmosphere where most of the weather phenomena occurs:

(A) Troposphere (B) Stratosphere

(C) Mesosphere (D) Thermosphere

5. The process by which a substance changes directly from a solid to a gas is called :

(A) Melting (B) Sublimation

(C) Condensation (D) Evaporation

6. Which of the following is not a primary greenhouse gas ?

(A) Methane (B) Water vapor

(C) Nitrous oxide (D) Oxygen

7. The Coriolis effect is caused by :

(A) Earth's rotation (B) Earth's magnetic field

(C) Solar radiation (D) Gravitational forces

8. What is the primary cause of the Earth's magnetic field ?

(A) Convection currents in the outer core (B) Earth's rotation

(C) Solar radiation (D) Plate tectonics

9. The lapse rate is the rate at which :

(A) Temperature decreases with altitude

(B) Pressure decreases with altitude

(C) Humidity decreases with altitude

(D) Wind speed decreases with altitude

10. The primary source of energy for Earth's atmosphere is :

(A) Geothermal energy (B) Solar radiation

(C) Nuclear energy (D) Wind energy

11. What is the study of the Earth's physical properties and processes called ?

(A) Meteorology (B) Geology

(C) Geophysics (D) Oceanography

12. Which layer of the Earth is primarily composed of solid iron and nickel ?

(A) Mantle (B) Outer core

(C) Inner core (D) Lithosphere

13. Which of the following waves are capable of travelling through both solid and liquid materials ?

(A) P-waves (Primary waves) (B) S-waves (Secondary waves)

(C) Surface waves (D) Rossby waves

14. What type of seismic wave causes the most damage during an earthquake ?

(A) P-waves (B) S-waves

(C) Surface waves (D) Kelvien waves

15. In the hydrostatic balance, what force opposes the pressure gradient force ?

(A) Coriolis force (B) Frictional force

(C) Gravitational force (D) Centrifugal force

16. From the following gases, which is the heaviest gas ?

(A) Nitrogen (B) Oxygen

(C) Carbon dioxide (D) Water vapor

17. As the temperature increase what happens to the air between two pressure levels ?

(A) It expands and air becomes thicker

(B) It expands and air becomes thinner

(C) It compresses and air becomes thicker

(D) It compresses and air becomes thinner

18. Which is not included in geophysical fluid dynamics ?

(A) Atmospheric circulation (B) Motion of Cyclone

(C) Thermohaline circulation (D) Motion of fluid in pipe lines

19. The concept of the greenhouse effect is associated with trapping which type of radiation ?

(A) Ultraviolet (B) Infrared

(C) Visible (D) X-rays

20. In which region the incoming short wave radiation is nearly same as outgoing long wave radiation ?

(A) Equatorial region (About 0° Latitude)

(B) Tropical Region (About 30° Latitude)

(C) Polar Region (About 60° Latitude)

(D) Poles (About 90° Latitude)

21. Davisson-Germer experiment confirms the existence of :

(A) Matter wave (B) Atomic energy level

(C) Electron spin (D) Nuclear force

22. The compressibility of a body is reciprocal of its :

(A) Young's Modulus (B) Bulk Modulus

(C) Modulus of Rigidity (D) Poisson's Ratio

23. The thermodynamic probability of a system in equilibrium is :

(A) Maximum (B) 1

(C) Minimum (D) 0

24. Frequency of AC mains in India is :

(A) 30 Hz (B) 40 Hz

(C) 50 Hz (D) 60 Hz

25. The unit vector normal to the surface $x^2 + 2y = z$ at the point (1, 2, 3) is :

(A) $(\hat{i} + 2\hat{j} + 3\hat{k}) / \sqrt{14}$ (B) $(2\hat{i} + 2\hat{j} + \hat{k}) / 3$

(C) $(\hat{i} + 2\hat{j} - 3\hat{k}) / \sqrt{14}$ (D) $(2\hat{i} + 2\hat{j} - \hat{k}) / 3$

26. The resistivity of a semiconductor :

(A) Increases as the temperature increases

(B) Decreases as the temperature increases

(C) Remains constant with the variation of temperature

(D) May increase or decrease as the temperature increases

27. Which of the following statement is true ?

(A) In a crystalline substance, atoms are arranged irregularly

(B) Crystal lattice cannot have five-fold symmetry

(C) The number of atoms per unit body centered cubic cell is 4

(D) Diamond is an example of body centered cubic lattice

28. Optical fibres work on the principle of :

(A) Dispersion (B) Total internal reflection

(C) Refraction (D) Scattering

29. Which of the following gases possesses maximum root mean square (rms) velocity, all being at same temperature ?

(A) Oxygen (B) Carbon dioxide

(C) Air (D) Hydrogen

30. In which of the following decays, neither the atomic number nor the mass number changes ?

(A) α decay (B) β^+ decay

(C) β^- decay (D) γ decay

31. An ice cube is floating in a beaker full of water. If it completely melts, then water level in beaker :

(A) Increases (B) Decreases

(C) Remains same (D) Overflows

32. The eigenvalues of the matrix $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ are :

(A) 1, 0 (B) 1, 1

(C) 1, 2 (D) 2, 0

33. A set of linear equations is represented by the matrix equation $Ax = b$. The necessary condition for the existence of a solution for the system is :

(A) A must be invertible

(B) b must be linearly depended on the columns of A

(C) b must be linearly independent of the columns of A

(D) b must be non-linearly independent of the columns of A

34. A domain that is not simply connected is said to be :

(A) Contour (B) Multiple connected

(C) Connected (D) Residue

35. Which of the following is not a partial differential equation of second order ?

(A) $r + 4s + t + rt - s^2 = 2$ (B) $r + 2x^2 - 3xr = 0$

(C) $2xp + 3yq = 2$ (D) $q^2r - 2pqs + p^2t = 0$

36. Residue of the function $\frac{4}{1-z}$ at the singular point is :

(A) 4 (B) -4

(C) 2 (D) -2

37. Which of the following is true ?

(A) Real part of an analytic function is harmonic,but imaginary part is not

(B) Real part of an analytic function is not harmonic,but imaginary part is harmonic

(C) The real part and the imaginary part of an analytic function is harmonic

(D) Real part and imaginary part is not harmonic

38. The Rank of a 3×3 matrix C(= AB),found by multiplying a non-zero column matrix A of size 3×1 and a non-zero row matrix B of size 1×3, is :

(A) 0 (B) 1

(C) 2 (D) 3

39. The partial differential equation corresponding to $z = f\left(\frac{xy}{z}\right)$ is :

(A) $py = qx$ (B) $px = qy$

(C) $px + qy = 0$ (D) $\frac{p}{q} = xy$

40. The radius of convergence of the series $\sum_{n=0}^{\infty} \frac{z^n}{n!}$ is :

(A) 1 (B) 0

(C) -1 (D) Infinite

41. The most potent greenhouse gas among the following is :

(A) Carbon Dioxide (B) Methane

(C) Water Vapor (D) Ozone

42. Mineral water bottles are made up of which compound ?

(A) Polyvinyl chloride (B) Polyethylene terephthalate

(C) High density polyethylene (D) Low density polyethylene

43. Very toxic gas which causes headache, visual difficulty, paralysis and even death in the human beings is :

(A) CO (B) CO_2

(C) O_3 (D) None of these

44. Swimming for a long time in salt water makes skin of one's fingertips wrinkled. Which one of the following properties is responsible for this observation ?

(A) Osmosis (B) Dialysis

(C) Electro dialysis (D) Coagulation

45. Which of the following method employs ion-selective membranes ?

(A) Reverse osmosis (B) Electro dialysis

(C) Super filtration (D) Flash evaporator

46. Calgon is a trade name given to :

(A) Sodium silicate (B) Calcium phosphate

(C) Sodium hexa metaphosphate (D) Sodium zeolite

47. Permanent hardness of water cannot be removed by :

(A) Adding soda (B) Distillation

(C) Boiling (D) Adding lime-soda

48. Nitrification is a process in which :

(A) Ammonia is converted into Nitrate (B) Ammonia is converted into Nitrite

(C) Nitrite is converted into Ammonia (D) Nitrate is converted into Ammonia

49. Hardness in water is caused by the presence of :

(A) Sodium chloride (B) Sodium carbonate

(C) Calcium chloride (D) Potassium nitrate

50. Purest form of natural water is :

(A) River water (B) Sea water

(C) Rain water (D) Lake water

51. Which instrument is used to record earthquake waves ?

(A) Seismograph (B) Seismogram

(C) Seismometer (D) Scintillometer

52. What are the cracks along with those blocks that have moved relative to one another ?

(A) Folds (B) Joints

(C) Faults (D) Intrusions

53. Who among the following rocks has a significant stratification ?

(A) Igneous rocks (B) Metamorphic rocks

(C) Sedimentary rocks (D) Fossil rocks

54. Quartzite is what type of rock ?

(A) Metamorphic rock (B) Argillaceous rock

(C) Calcareous rock (D) Silicious rock

55. Which among the following is comparatively cleaner fuel ?

(A) Coal (B) Marble

(C) Petroleum (D) Natural gas

56. Which of the following is obtained from coal tar ?

(A) Petrol (B) Coke

(C) Air (D) Naphthalene balls

57. The most ideal conditions for the chemical weathering are found in :

(A) Cold and dry regions
(B) Cold and humid regions
(C) Hot and dry regions
(D) Hot and humid regions

58. Which is the study of fossil spores and pollens ?

(A) Palaeobotany
(B) Palynology
(C) Palaeozoology
(D) Vertebrate paleontology

59. Remote sensing uses which of the following waves in its procedure ?

(A) Electric field
(B) Sonar waves
(C) Gamma-rays
(D) Electro-magnetic waves

60. On the basis of which content, the igneous rocks are classified as acid or basic rocks ?

(A) Magnetite
(B) Hematite
(C) Bauxite
(D) Silica

61. What is the main driving force behind the Earth's weather systems ?

(A) Earth's rotation
(B) Gravitational pull of the moon
(C) Solar radiation
(D) Ocean currents

62. Which phenomenon is associated with the warming of the Pacific Ocean and can influence global weather patterns ?

(A) El Niño
(B) La Niña
(C) Monsoon
(D) Cyclone

63. What is the term for a large body of air with relatively uniform temperature and humidity ?

(A) Cyclone
(B) Anticyclone
(C) Air Mass
(D) Front

64. Which type of cloud is typically associated with thunderstorms and severe weather ?

(A) Cirrus (B) Stratus

(C) Cumulonimbus (D) Altostratus

65. Which scale is used to measure the intensity of tornadoes ?

(A) Richter Scale (B) Saffir-Simpson Scale

(C) Fujita Scale (D) Beaufort Scale

66. Which ocean current is responsible for the mild climate of North-western Europe ?

(A) Canary Current (B) California Current

(C) Gulf Stream (D) Labrador Current

67. What is the term for the temperature at which air becomes saturated with moisture and condensation begins ?

(A) Dew Point (B) Humidity

(C) Relative Humidity (D) Vapor Pressure

68. What is the role of aerosols in cloud formation ?

(A) They absorb solar radiation, warming the atmosphere

(B) They act as cloud condensation nuclei

(C) They prevent precipitation

(D) They enhance the greenhouse effect

69. Which one of the following is the cloud that is dark-grey or black, found at very low height and brings the real rain ?

(A) Altocumulus (B) Cirrus

(C) Cirrostratus (D) Nimbostratus

70. If the rest mass of a body is m_0, then its mass when it is moving with speed $0.6c$ will be :

(A) m_0 (B) $\frac{5}{3} m_0$

(C) $\frac{5}{4} m_0$ (D) $\frac{4}{3} m_0$

71. The splitting of spectral lines under the effect of a magnetic field is called :

(A) Zeeman effect
(B) Stark Effect
(C) Villari effect
(D) Richardson effect

72. The scale of temperature on which the temperatures are only positive is :

(A) Celsius
(B) Fahrenheit
(C) Kelvin
(D) Reaumur

73. Equal masses of water and a liquid of density twice of water are mixed together, then the mixture has a density of :

(A) $\frac{2}{3}$
(B) $\frac{4}{3}$
(C) $\frac{1}{3}$
(D) $\frac{3}{2}$

74. Which of the following statement is correct ? If ψ represents a well-behaved wave function, then :

(A) ψ must be continuous but not single-valued.
(B) ψ must be square integrable.
(C) First derivatives of ψ must be continuous but not finite.
(D) ψ must be zero at the boundary.

75. Which of the following phenomenon can't take place with sound wave in air ?

(A) Interference
(B) Diffraction
(C) Polarisation
(D) Scattering

76. If a NOT gate operates on an binary input 1, then its output will be :

(A) Infinite
(B) 2
(C) 1
(D) 0

77. The wave nature of analog signal is :

(A) Sinusoidal
(B) Non-sinusoidal
(C) Square
(D) Rectangular

78. In an amplifier circuit, between output and input there will be a phase reversal of :

(A) 360 degree (B) 180 degree

(C) 90 degree (D) 45 degree

79. The three prime colours in a filter circuit are :

(A) Blue, Red, Green (B) Red, Blue ,Yellow

(C) Green, Yellow, Red (D) Blue, Yellow , Green

80. The different components of computer are connected to each other through :

(A) BUS (B) CMOS

(C) BIOS (D) South bridge

SPACE FOR ROUGH WORK

SEAL