SCIENCE

Reg. No | | | | | | | | | | | |

Time: ***2 Hours***
Max. ***Marks: 100***

Name of the student: ..... Div: .....

Name of the school : .....

Instructions:

- *All questions are compulsory.*
- *Each question carries 1 mark.*
- *Choose the most appropriate answer from the given options.*
- *Use the OMR sheet provided to mark your answers.*

1. The electric field lines for a single positive point charge are:

A) Radially inwards
B) Radially outwards
C) Circular and concentric
D) Parallel straight lines

2. A parallel plate capacitor has a capacitance of C. If the distance between the plates is halved and the area is doubled, the new capacitance will be:

A) C/2
B) 2C
C) 4C
D) C/4

3. Kirchhoff's first law (junction rule) is a statement of the conservation of:

A) Energy
B) Charge
C) Momentum
D) Mass

4. The magnetic field inside a long, current-carrying solenoid is:

A) Zero
B) Non-uniform and weak
C) Strongest at the ends
D) Uniform and strong

5. A transformer operates on the principle of:

A) Self-induction
B) Mutual induction
C) The heating effect of current
D) Static electricity

6. The phenomenon of Total Internal Reflection is used in:

A) Periscopes
B) Telescopes
C) Optical fibres
D) Microscopes

7. The energy of a photon is given by E = hv. If the frequency (v) of light is doubled, the energy of the photon becomes:

A) Halved
B) Unchanged
C) Doubled
D) Quadrupled

8. In Bohr's model of the hydrogen atom, the electron revolves in discrete orbits where the _____ is quantized.

A) Linear momentum
B) Angular momentum
C) Kinetic energy
D) Potential energy

9. The nuclei of atoms having the same mass number but different atomic numbers are called:

A) Isotopes
B) Isobars
C) Isotones
D) Isomers

10. In a p-type semiconductor, the majority charge carriers are:

A) Electrons
B) Holes
C) Protons
D) Neutrons

11. The SI unit of magnetic flux is the:

A) Tesla
B) Henry
C) Weber
D) Gauss

12. According to Lenz's law, the direction of an induced current is such that it _____ the change that produced it.

A) aids
B) opposes
C) has no effect on
D) doubles

13. The resolving power of a microscope can be increased by:

A) Increasing the wavelength of light used
B) Decreasing the wavelength of light used
C) Decreasing the diameter of the objective lens
D) Using an eyepiece of lower power

14. The work function of a metal is the minimum energy required to:

A) Excite an electron to a higher energy level
B) Eject an electron from the metal surface
C) Start conduction in the metal
D) Cause nuclear fission in the metal

15. An ideal diode allows current to flow:

A) In both directions
B) Only in the forward-biased condition
C) Only in the reverse-biased condition
D) Only when it is heated

16. The phenomenon that demonstrates the transverse nature of light waves is:

A) Interference
B) Diffraction
C) Polarization
D) Refraction

17. If a wire of resistance R is stretched to double its original length, its new resistance will be:

A) R/2
B) 2R
C) 4R
D) R/4

18. The unit of the rate constant for a zero-order reaction is:

A) s^{-1}
B) $L\ mol^{-1}\ s^{-1}$
C) $mol\ L^{-1}\ s^{-1}$
D) $L^2\ mol^{-2}\ s^{-1}$

19. The oxidation state of Manganese (Mn) in $KMnO_4$ is:

A) +2
B) +4
C) +7
D) +5

20. Which of the following is a primary alcohol?

A) Propan-2-ol
B) Butan-1-ol
C) 2-Methylpropan-2-ol
D) Acetone

21. The process of converting a solid directly into a gas is called:

A) Evaporation
B) Condensation
C) Sublimation
D) Fusion

22. A solution that resists changes in pH upon the addition of a small amount of acid or base is known as a(n):

A) Isotonic solution
B) Saturated solution
C) Buffer solution
D) Ideal solution

23. The electrolysis of an aqueous solution of sodium chloride (NaCl) produces:

A) Na at cathode, Cl_2 at anode
B) H_2 at cathode, Cl_2 at anode
C) Na at cathode, O_2 at anode
D) H_2 at cathode, O_2 at anode

24. Which of the following elements is a lanthanoid?

A) Uranium (U)
B) Calcium (Ca)
C) Cerium (Ce)
D) Cadmium (Cd)

25. The IUPAC name for CH_3COCH_3 is:

A) Propanal
B) Propanone
C) Ethanol
D) Ethanal

26. In the Haber process for ammonia synthesis, the catalyst used is:

A) Platinum
B) Vanadium pentoxide
C) Finely divided Iron
D) Nickel

27. Which of the following is an example of a biodegradable polymer?

A) PVC
B) Polythene
C) Nylon 6,6
D) PHBV

28. The vitamin that is essential for blood clotting is:

A) Vitamin A
B) Vitamin C
C) Vitamin D
D) Vitamin K

29. An Aldol condensation reaction is characteristic of aldehydes and ketones having:

A) No α-hydrogen atom
B) At least one α-hydrogen atom
C) A phenyl group attached
D) A conjugated double bond

30. Which of the following is a strong reducing agent?

A) F_2
B) Cl_2
C) I_2
D) Li

31. The main commercial ore of iron is:

A) Bauxite
B) Haematite
C) Galena
D) Cryolite

32. The geometry of the XeF_4 molecule is:

A) Tetrahedral
B) Trigonal planar
C) Square planar
D) Octahedral

33. Tincture of iodine is an antiseptic solution of:

A) Iodine in water
B) Iodine in alcohol
C) Iodine in potassium iodide
D) Iodine in chloroform

34. The linkage that connects monosaccharide units in a polysaccharide is called a:

A) Peptide bond
B) Glycosidic linkage
C) Hydrogen bond
D) Ester linkage

35. The process of formation of a mature female gamete is called:

A) Spermatogenesis
B) Oogenesis
C) Gametogenesis
D) Embryogenesis

36. A typical angiosperm embryo sac at maturity is:

A) 8-nucleate and 7-celled
B) 7-nucleate and 8-celled
C) 8-nucleate and 8-celled
D) 7-nucleate and 7-celled

37. A genetic disorder caused by the presence of an extra copy of chromosome 21 is:

A) Turner's Syndrome
B) Klinefelter's Syndrome
C) Down's Syndrome
D) Phenylketonuria

38. According to Watson and Crick's model, the DNA molecule is a:

A) Single helix
B) Double helix with parallel strands
C) Double helix with anti-parallel strands
D) Triple helix

39. The process of converting information from mRNA into a protein is called:

A) Transcription
B) Translation
C) Replication
D) Transformation

40. Which of the following is a vector for transferring a piece of DNA into a host organism?

A) Plasmid
B) Enzyme
C) Ribosome
D) Amino acid

41. The organs that have a similar structure but different functions are known as:

A) Analogous organs
B) Homologous organs
C) Vestigial organs
D) Adaptive organs

42. The "Ringworm" disease in humans is caused by a:

A) Bacterium
B) Virus
C) Fungus
D) Protozoan

43. The primary role of a restriction enzyme in biotechnology is to:

A) Join DNA fragments
B) Cut DNA at specific sites
C) Synthesize DNA
D) Separate DNA fragments

44. The gradual and predictable change in the species composition of a given area is known as:

A) Evolution
B) Ecological succession
C) Speciation
D) Extinction

45. The "Biochemical Oxygen Demand" (BOD) is a measure of:

A) The amount of oxygen in the water
B) The industrial pollution in a water body
C) The organic matter present in water, measured by oxygen consumed by microbes
D) The amount of dissolved carbon dioxide

46. The functional unit of the kidney is the:

A) Neuron
B) Alveolus
C) Nephron
D) Sarcomere

47. The universal donor blood group is:

A) A positive
B) AB positive
C) O positive
D) O negative

48. The hormone responsible for regulating the basal metabolic rate (BMR) is:

A) Insulin
B) Adrenaline
C) Thyroxine
D) Cortisol

49. Double fertilization is a unique feature of:

A) Algae
B) Fungi
C) Gymnosperms
D) Angiosperms

50. The technique of Polymerase Chain Reaction (PCR) is used for:

A) DNA sequencing
B) DNA amplification
C) Protein synthesis
D) RNA transcription

51. Read the passage and identify the author's primary intention: "While asteroid mining presents immense potential for resource acquisition, the ethical frameworks for celestial property rights and environmental impact are dangerously underdeveloped."

A) To advocate for immediate and large-scale space mining.
B) To warn about the technical challenges of asteroid mining.
C) To highlight the urgent need for regulatory and ethical guidelines for space mining.
D) To discuss the composition of asteroids.

52. Assertion (A): In scientific writing, active voice is often preferred for clarity and directness. Reason (R): Passive voice can sometimes make the subject of the action ambiguous.

A) Both A and R are true, and R is the correct explanation of A.
B) Both A and R are true, but R is not the correct explanation of A.
C) A is true, but R is false.
D) A is false, but R is true.

53. Identify the logical fallacy: "Two of my friends took this supplement and felt better, so it must be an effective treatment for everyone."

A) Ad Hominem
B) Appeal to Authority
C) Hasty Generalization
D) Straw Man

54. If "EARTH" (5+1+18+20+8 = 52) is coded based on the sum of its alphabetical positions, what would be the code for "VENUS"?

A) 71
B) 73
C) 79
D) 81

55. For a formal research paper, which tone is most appropriate?

A) Subjective and emotional
B) Objective, precise, and impersonal
C) Casual and conversational
D) Sarcastic and critical

56. In scientific communication, a peer-reviewed publication is considered reliable because:

A) It is written by a famous scientist.
B) It has been critically evaluated by other experts in the field.
C) It is published in a popular magazine.
D) It contains many complex diagrams.

57. A bar chart is to quantitative data as a flowchart is to a:

A) Structure
B) Process
C) Comparison
D) Location

58. Identify the correct logical conclusion: "All enzymes are proteins. All catalysts are not proteins."

A) All enzymes are catalysts.
B) Some enzymes are not catalysts.
C) All proteins are enzymes.
D) No definitive conclusion can be drawn.

59. Rearrange for coherence: (1) leads to (2) uncontrolled cell division (3) genetic mutation (4) cancer

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

60. The term 'citation' in academic writing refers to:

A) The summary of the research paper.
B) Acknowledging the source of information or ideas.
C) A list of future research questions.
D) The hypothesis of the experiment.

61. Choose the grammatically correct and most formal sentence.

A) The data is supporting our hypothesis.
B) The data are supporting our hypothesis.
C) The data support our hypothesis.
D) The data do support our hypothesis.

62. What is the underlying assumption in the statement: "Implementing green technology is the only solution to climate change"?

A) Green technology is affordable and accessible to all.
B) Climate change is a serious problem.
C) No other factors, like policy changes or lifestyle adjustments, are effective.
D) Green technology has no negative environmental impact.

63. If "PHYSICS" is coded as "RJAUKEU," then "CHEMISTRY" would be coded as:

A) EKGOUKVTA
B) EKGOUKVUB
C) EKGPQKVTA
D) EJGOKUVTA

64. The most significant barrier to effective cross-cultural communication is often:

A) Difference in time zones
B) Ethnocentrism and stereotypes
C) Lack of technology
D) Different clothing styles

65. Identify the statement with the most logical inference: If all vertebrates have a spine, and a snake is a vertebrate, then:

A) All creatures with a spine are snakes.
B) A snake has a spine.
C) Some snakes do not have a spine.
D) All reptiles are vertebrates.

66. A "double-blind study" is a research method used to:

A) Reduce bias by ensuring neither participants nor researchers know who is receiving a particular treatment.
B) Test two different hypotheses simultaneously.
C) Make the research process faster.
D) Ensure the results are kept secret from the public.

67. Which of the following best represents analytical thinking in a scientific context?

A) Following a lab manual without deviation.
B) Memorizing the periodic table.
C) Identifying patterns in experimental data to formulate a conclusion.
D) Guessing the outcome of a reaction.

68. The sentence "The experiment was conducted by us" is in the passive voice. The active voice equivalent is:

A) The experiment was conducted.
B) We conducted the experiment.
C) We were conducting the experiment.
D) The experiment has been conducted by us.

69. In formal logic, the 'contrapositive' of the statement "If P, then Q" is:

A) If Q, then P.
B) If not P, then not Q.
C) If not Q, then not P.
D) P if and only if Q.

70. "Correlation does not imply causation" means that:

A) If two variables are correlated, one must have caused the other.
B) A relationship between two variables does not mean one is the direct cause of the other.
C) Correlated variables are always independent.
D) Causation is impossible to prove.

71. 'Emotional Intelligence' (EI) in a professional setting primarily helps an individual to:

A) Manipulate colleagues' emotions for personal gain.
B) Suppress all personal feelings at work.
C) Collaborate effectively, manage stress, and navigate social complexities.
D) Focus solely on technical tasks, ignoring interpersonal dynamics.

72. The S.M.A.R.T. acronym in goal setting stands for:

A) Simple, Meaningful, Action-oriented, Realistic, Timely
B) Specific, Measurable, Achievable, Relevant, Time-bound
C) Scientific, Methodical, Actionable, Reviewed, Tested
D) Strategic, Major, Aspirational, Responsible, Thoughtful

73. Which career path most directly involves the application of genetic engineering principles?

A) Civil Engineering
B) Marine Biology
C) Biotechnology
D) Astrophysics

74. When facing a complex problem with an approaching deadline, the most effective strategy is to:

A) Procrastinate until the last minute, hoping for a breakthrough.
B) Break the problem down into smaller, manageable tasks and create a timeline.
C) Ask a colleague to solve the entire problem for you.
D) Focus on the easiest parts first, ignoring the difficult aspects.

75. An ethical dilemma arises in a research setting when:

A) The results of an experiment are unexpected.
B) A conflict exists between personal values and professional obligations.
C) The research methodology is complex.
D) The research receives a large amount of funding.

76. 'Adaptability' in the context of a career is the ability to:

A) Stick to a single method or technology regardless of changes.
B) Adjust to new conditions, learn new skills, and embrace change.
C) Avoid any form of professional development.
D) Change careers frequently without any clear goal.

77. The most critical first step to take in case of a chemical spill in a lab is:

A) Immediately clean it up yourself, regardless of the chemical.
B) Ignore it and hope someone else handles it.
C) Inform the lab supervisor or authority and follow established safety protocols.
D) Take a picture for social media.

78. A career in 'Data Science' primarily requires strong skills in:

A) Public speaking and creative writing.
B) Laboratory techniques and fieldwork.
C) Statistics, programming, and analytical reasoning.
D) Physical education and sports coaching.

79. The principle of 'informed consent' is most crucial in which field?

A) Software development
B) Clinical research involving human subjects
C) Architectural design
D) Financial auditing

80. A 'resume' or 'curriculum vitae' should be viewed as:

A) A comprehensive autobiography of your life.
B) A marketing document tailored to highlight your skills and qualifications for a specific job.
C) A list of all your hobbies and personal interests.
D) A mandatory government form.

81. Find the next number in the series: 2, 5, 11, 23, 47, ?

A) 95
B) 94
C) 96
D) 97

82. Analogy: Neuron is to Nervous System as Transistor is to:

A) Battery
B) Resistor
C) Integrated Circuit
D) Switch

83. In a certain code, 'HYDROGEN' is written as 'JCIQKPIG'. How will 'ANTIMONY' be written in that code?

A) CPVKOQPA
B) CRVKOQPA
C) CRVKOQPZ
D) CPVKOQPZ

84. Pointing to a man, a woman says, "His brother's father is the only son of my grandfather." How is the woman related to the man?

A) Mother
B) Aunt
C) Sister
D) Daughter

85. Find the odd one out:

A) Iron
B) Copper
C) Aluminium
D) Diamond

86. Analogy: DNA is to Genetic Information as Enzyme is to:

A) Energy Storage
B) Structural Support
C) Biological Catalysis
D) Information Transmission

87. Find the next term in the series: Z, X, V, T, R, ?, ?

A) P, N
B) O, M
C) P, M
D) Q, O

88. If Rohan starts from point A and walks 10 km East, then turns North and walks 3 km, then turns West and walks 10 km, how far is he from his starting point?

A) 10 km
B) 13 km
C) 7 km
D) 3 km

89. Analogy: Green Hydrogen is to Renewable Energy as Lithium-ion Battery is to:

A) Nuclear Fusion
B) Fossil Fuel
C) Energy Storage
D) Geothermal Power

90. Identify the missing number in the grid: (3, 4, 5) (6, 8, 10) (5, 12, ?)

A) 13
B) 14
C) 15
D) 17

91. The 2023 Nobel Prize in Physiology or Medicine was awarded to Katalin Karikó and Drew Weissman for their foundational discoveries that enabled the development of:

A) CRISPR gene editing
B) Monoclonal antibodies
C) mRNA vaccines against COVID-19
D) The Human Genome Project

92. India's "National Quantum Mission," as featured in recent Avenir magazines, primarily aims to foster research and development in:

A) Space exploration and satellite technology
B) Quantum computing, communication, and sensing
C) Agricultural biotechnology
D) Artificial intelligence for defense systems

93. You are leading a research project and discover a significant error in your team's initial data collection that could invalidate the results. The deadline is near. The most ethical and professionally responsible decision is to:

A) Ignore the error and publish the results to meet the deadline.
B) Manipulate the data to fit the expected outcome.
C) Immediately inform your supervisor, document the error, and recommend re-collecting the data, even if it means missing the deadline.
D) Blame a junior team member for the mistake.

94. The historic landing of India's Chandrayaan-3 mission in 2023 occurred near the:

A) Lunar equator
B) Lunar north pole
C) Lunar south pole
D) Sea of Tranquility

95. A student with strong analytical skills but weaker interpersonal communication skills wants to pursue a career in data analysis. The most effective career development strategy would be to:

A) Abandon the data analysis path and focus only on careers requiring communication.
B) Focus solely on advanced programming, assuming technical skills are all that matter.
C) Enroll in a data analytics certification course while actively participating in workshops on presentation skills and technical writing.
D) Wait until their communication skills improve naturally over time.

96. As reported in business sections of recent magazines, which company was the first to reach a market capitalization of $3 trillion?

A) Microsoft
B) Amazon
C) Alphabet (Google)
D) Apple

97. After analyzing career options, you find yourself equally interested in becoming a biotechnologist and a software developer. The most logical next step is to:

A) Flip a coin to decide, as both are good options.
B) Choose the one that seems to have a higher starting salary without further research.
C) Seek guidance from career counselors, talk to professionals in both fields, and look for internship opportunities to gain practical insight.
D) Indefinitely postpone the decision.

98. The "Gaganyaan-1" mission, a frequent topic in the Avenir magazines, is India's ambitious project for:

A) A second mission to Mars
B) The first human spaceflight mission
C) The deployment of a new satellite navigation system
D) A joint mission to Venus with another country

99. The "Digital Rupee" or "e-RUPI", which is being rolled out by the RBI, is a form of:

A) Private cryptocurrency like Bitcoin
B) A new type of mobile wallet
C) Central Bank Digital Currency (CBDC)
D) A stock market index

100. You are a member of a committee deciding on the allocation of a limited science budget. One proposal offers high-risk, high-reward fundamental research, while another promises guaranteed but modest advancements. The best approach for the committee is to:

A) Automatically reject the high-risk proposal as it might fail.
B) Fund only the safe proposal to guarantee some results.
C) Evaluate both proposals based on a portfolio approach, potentially funding a mix, considering long-term impact versus short-term gains.
D) Allocate the funds based on which project leader is more popular.