

Jupiter Academy

Subjects : Physics , Chemistry ,
Biology

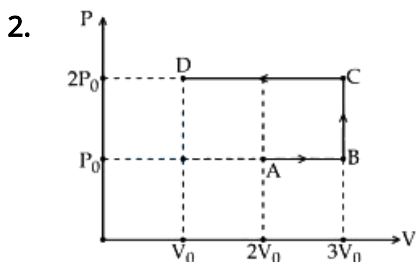
Full mock test 02

Total Marks : 720

Physics

1. What is the relative decrease in focal length of a lens for an increase in optical power by 0.1 D from 2.5D ? ['D' stands for dioptre]

- A) 0.01 B) 0.04 C) 0.40 D) 0.1



Using the given $P - V$ diagram, the work done by an ideal gas along the path ABCD is :

- A) $3P_0 V_0$ B) $-4P_0 V_0$
C) $-3P_0 V_0$ D) $4P_0 V_0$

3. The ground state energy of hydrogen atom is -13.6 eV . What is the potential energy of the electron in this state.....eV

- A) 0 B) -27.2
C) 1 D) 2

4. Which of the following is used to produce radio waves of constant amplitude

- A) Oscillator B) *FET*
C) Rectifier D) Amplifier

5. The half life of the isotope ${}_{11}\text{Na}^{24}$ is 15 hrs. How much time does it take for $\frac{7}{8}$ th of a sample of this isotope to decay.....hrs

- A) 75 B) 65 C) 55 D) 45

6. Light of frequency $4\nu_0$ is incident on the metal of the threshold frequency ν_0 . The maximum kinetic energy of the emitted photoelectrons is

- A) $3h\nu_0$ B) $2h\nu_0$
C) $\frac{3}{2}h\nu_0$ D) $\frac{1}{2}h\nu_0$

7. Imagine a Young's double slit interference experiment performed with waves associated with fast moving electrons produced from an electron gun. The distance between successive maxima will decrease maximum if

- A) the accelerating voltage in the electron gun is decreased
B) the accelerating voltage is increased and the distance of the screen from the slits is decreased
C) the distance of the screen from the slits is increased.
D) the distance between the slits is decreased.

8. When *EM* wave propagates through vacuum then

- A) *E*- field leads *B*- field
B) *E*- field lags *B*- field
C) *E*- field and *B*- field are in the same phase
D) Energy is stored only in *E*- field

9. A series *R - C* combination is connected to an *AC* voltage of angular frequency $\omega = 500 \text{ radian/s}$. If the impedance of the *R - C* circuit is $R\sqrt{1.25}$, the time constant (in millisecond) of the circuit is

- A) 5 B) 6 C) 4 D) 8

10. The magnetic flux through a circuit carrying a current of 2.0 A is 0.8 weber. If the current reduces to 1.5 A in 0.1 s, the induced *emf* be.....V

- A) 2 B) 4 C) 8 D) none of the above

11. Two short magnets with their axes horizontal and perpendicular to the magnetic meridian are placed with their centres 40 cm east and 50 cm west of magnetic needle. If the needle remains undeflected, the ratio of their magnetic moments $M_1 : M_2$ is

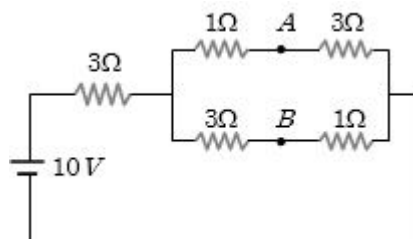
- A) 4 : 5 B) 16 : 25
C) 64 : 125 D) $2 : \sqrt{5}$

12. If a proton is projected in a direction perpendicular to a uniform magnetic field with velocity *v* and an electron is projected along the lines of force, what will happen to proton and electron

- A) The electron will travel along a circle with constant speed and the proton will move along a straight line

- B) Proton will move in a circle with constant speed and there will be no effect on the motion of electron
 C) There will not be any effect on the motion of electron and proton
 D) The electron and proton both will follow the path of a parabola

13. A battery of *e.m.f.* 10 V is connected to resistance as shown in figure. The potential difference $V_A - V_B$ between the points A and B is V



- A) -2 B) 2 C) 5 D) $\frac{20}{11}$

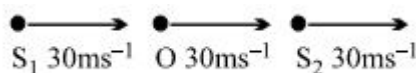
14. Consider the combination of 2 capacitors C_1 and C_2 , with $C_2 > C_1$, when connected in parallel, the equivalent capacitance is $\frac{15}{4}$ time the equivalent capacitance of the same connected in series. Calculate the ratio of capacitors, $\frac{C_2}{C_1}$

- A) $\frac{15}{11}$ B) $\frac{111}{80}$
 C) $\frac{29}{15}$ D) None of these

15. The radius of two metallic spheres A and B are r_1 and r_2 respectively ($r_1 > r_2$). They are connected by a thin wire and the system is given a certain charge. The charge will be greater

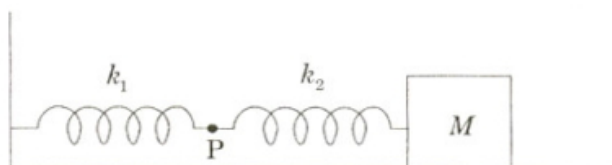
- A) On the surface of the sphere B
 B) On the surface of the sphere A
 C) Equal on both
 D) Zero on both

16. Consider two sound sources S_1 and s_2 having same frequency 100 Hz and the observer O located between them as shown in the fig. All the three are moving with same velocity in same direction. The beat frequency of the observer is Hz



- A) 50 B) 5 C) 0 D) 2.5

17. The mass M shown in the figure oscillates in simple harmonic motion with amplitude A . The amplitude of the point P is

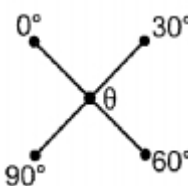


- A) $\frac{k_1 A}{k_2}$ B) $\frac{k_2 A}{k_1}$
 C) $\frac{k_1 A}{k_1 + k_2}$ D) $\frac{k_2 A}{k_1 + k_2}$

18. Initially a gas of diatomic molecules is contained in a cylinder of volume V_1 at a pressure P_1 and temperature 250 K . Assuming that 25% of the molecules get dissociated causing a change in number of moles. The pressure of the resulting gas at temperature 2000 K , when contained in a volume $2V_1$ is given by P_2 . The ratio $\frac{P_2}{P_1}$ is.

- A) 5 B) 10 C) 13 D) 9

19. Four rods of same material and having the same cross section and length have been joined, as shown. The temperature of the junction of four rods will be $^{\circ}\text{C}$



- A) 20 B) 30 C) 45 D) 60

20. On heating a liquid of coefficient of cubical expansion γ in a container having coefficient of linear expansion $\gamma/3$, the level of liquid in the container will

- A) Rise
 B) Fall
 C) Will remain almost stationary
 D) It is difficult to say

21. 5 g of ice at 0°C is dropped in a beaker containing 20 g of water at 40°C . The final temperature will be..... $^{\circ}\text{C}$

- A) 32 B) 16 C) 8 D) 24

22. A capillary tube is immersed vertically in water and the height of the water column is x . When this arrangement is taken into a mine of depth d , the height of the water column is y . If R is the radius of earth, the ratio $\frac{x}{y}$ is

- A) $(1 - \frac{d}{R})$ B) $(1 - \frac{2d}{R})$
 C) $(\frac{R-d}{R+d})$ D) $(\frac{R+d}{R-d})$

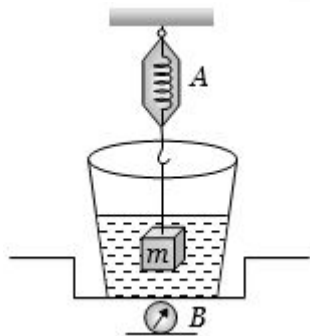
23. A drop of water breaks into two droplets of equal size. In this process, which of the following statement is correct

- A) The sum of temperature of the two droplets together is equal to the original temperature of the drop
- B) The sum of masses of the two droplets is equal to the original mass of the drop
- C) The sum of the radii of two droplets is equal to the radius of the original drop
- D) The sum of the surface areas of the two droplets is equal to the surface area of the original drop

24. If the atmospheric pressure is P_a , then the pressure P at depth h below the surface of liquid of density ρ open to the atmosphere is

- A) $p_a - \frac{\rho gh}{2}$
- B) $p_a - \rho gh$
- C) P_a
- D) $p_a + \rho gh$

25. The spring balance A reads 2 kg with a block m suspended from it. A balance B reads 5 kg when a beaker filled with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid as shown in figure. In this situation



- A) The balance A will read more than 2 kg
- B) The balance B will read more than 5 kg
- C) The balance A will read less than 2 kg and B will read more than 5 kg
- D) Both (b) and (c)

26. In a wire of length L , the increase in its length is l . If the length is reduced to half, the increase in its length will be

- A) l
- B) $2l$
- C) $\frac{l}{2}$
- D) None of the above

27. In steel, the Young's modulus and the strain at the breaking point are $2 \times 10^{11}\text{ Nm}^{-2}$ and 0.15 respectively. The stress at the breaking point for steel is therefore

- A) $1.33 \times 10^{11}\text{ Nm}^{-2}$
- B) $1.33 \times 10^{12}\text{ Nm}^{-2}$
- C) $7.5 \times 10^{-13}\text{ Nm}^{-2}$

D) $3 \times 10^{10}\text{ Nm}^{-2}$

28. *Assertion* : Space rocket are usually launched in the equatorial line from west to east

Reason : The acceleration due to gravity is minimum at the equator.

- A) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- B) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- C) If the Assertion is correct but Reason is incorrect.
- D) If both the Assertion and Reason are incorrect.

29. In case of an orbiting satellite, if the radius of orbit is decreased

- A) Its kinetic energy decreases
- B) Its potential energy increases
- C) Both (A) and (B) are correct
- D) Both (A) and (B) are wrong

30. The densities of two solid spheres A and B of the same radii R vary with radial distance r as $\rho_A(r) = k\left(\frac{r}{R}\right)$ and $\rho_B(r) = k\left(\frac{r}{R}\right)^5$, respectively, where k is a constant. The moments of inertia of the individual spheres about axes passing through their centres are I_A and I_B , respectively. If $\frac{I_B}{I_A} = \frac{n}{10}$, the value of n is

- A) 5
- B) 6
- C) 7
- D) 8

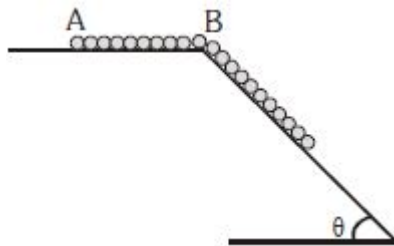
31. Two rotating bodies A and B of masses m and $2m$ with moments of inertia I_A and I_B ($I_B > I_A$) have equal kinetic energy of rotation. If L_A and L_B be their angular momenta respectively, then

- A) $L_B > L_A$
- B) $L_A > L_B$
- C) $L_A = \frac{L_B}{2}$
- D) $L_A = 2L_B$

32. KE acquired by a mass m in travelling a certain distance d , starting from rest, under the action of a constant force F is

- A) Directly proportional to \sqrt{m}
- B) Directly proportional to m
- C) Directly proportional to $\frac{1}{m}$
- D) None of these

33. A chain of length L and mass m is placed upon a smooth surface. The length of BA is $L - b$. Calculate the velocity of the chain when its end reaches B .

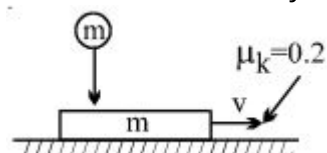


- A) $\sqrt{\frac{2g \sin \theta}{L} (L^2 - b^2)}$
 B) $2\sqrt{\frac{g \sin \theta}{L} (L^2 - b^2)}$
 C) $\sqrt{\frac{g \sin \theta}{L} (L^2 - b^2)}$
 D) $\sqrt{\frac{g \sin \theta}{2L} (L^2 - b^2)}$
34. Maximum value of static friction is called
- A) Limiting friction
 B) Rolling friction
 C) Normal reaction
 D) Coefficient of friction

35. A mass is supported on a frictionless horizontal surface. It is attached to a string and rotates about a fixed centre at an angular velocity ω_0 . If the length of the string and angular velocity are doubled, the tension in the string which was initially T_0 is now

- A) T_0
 B) $T_0/2$
 C) $4T_0$
 D) $8T_0$

36. A ball of mass m falls vertically from a height h and collides with a block of equal mass m moving horizontally with a velocity v on a surface. The coefficient of kinetic friction between the block and the surface is 0.2, while the coefficient of restitution e between the ball and the block is 0.5. There is no friction acting between the ball and the block. The velocity of the block decreases by



- A) 0
 B) $0.1\sqrt{2gh}$
 C) $0.3\sqrt{2gh}$
 D) can't be said
37. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of 1 m/s^2 . The mass of this body must be

- A) 15 kg
 B) 20 kg
 C) $10\sqrt{2} \text{ kg}$
 D) $2\sqrt{10} \text{ kg}$

38. In projectile motion, the modulus of rate of change of velocity

- A) is constant
 B) first increases then decreases
 C) first decreases then increases
 D) None of the above

39. A particle is moving on a circular path with constant speed, then its acceleration will be

- A) Zero
 B) External radial acceleration
 C) Internal radial acceleration
 D) Constant acceleration

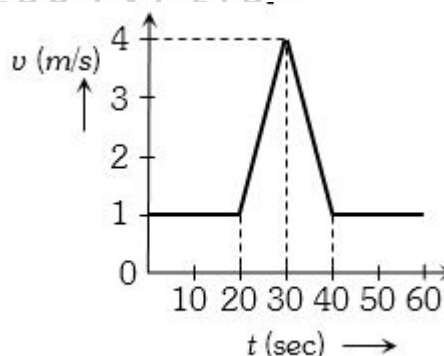
40. If a particle of mass m is moving with constant velocity v parallel to X -axis in $x-y$ plane as shown in fig. Its angular momentum with respect to origin at any time t will be

- A) $mvb\hat{k}$ B) $-mvb\hat{k}$ C) $mvb\hat{i}$ D) $mv\hat{i}$

41. Three concurrent forces of the same magnitude are in equilibrium. What is the angle between the forces. Also name the triangle formed by the forces as sides

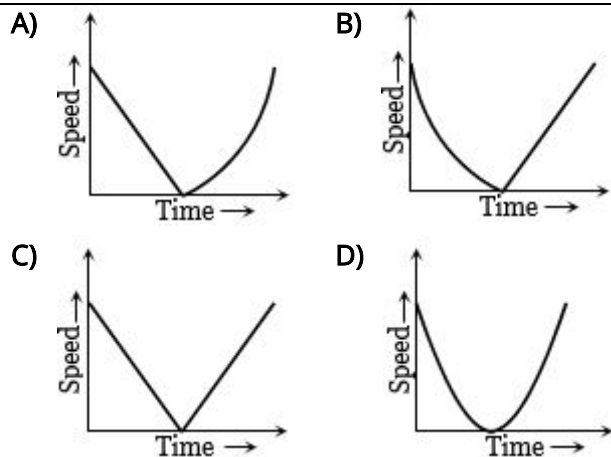
- A) 120° equilateral triangle
 B) 60° equilateral triangle
 C) $120^\circ, 30^\circ, 30^\circ$ an isosceles triangle
 D) 120° an obtuse angled triangle

42. Velocity-time ($v-t$) graph for a moving object is shown in the figure. Total displacement of the object during the time interval when there is non-zero acceleration and retardation is.....m



- A) 60 B) 50 C) 30 D) 40

43. A ball is thrown vertically upwards. Which of the following plots represents the speed-time graph of the ball during its height if the air resistance is not ignored



44. If time (t), velocity (u), and angular momentum (I) are taken as the fundamental units. Then the dimension of mass (m) in terms of t , u and I is

- A) $[t^{-1}u^{-2}I^1]$
 B) $[t^1u^2I^{-1}]$
 C) $[t^{-2}u^{-1}I^1]$
 D) $[t^{-1}u^1I^{-2}]$

45. A body travels uniformly a distance of $(13.8 \pm 0.2)m$ in a time $(4.0 \pm 0.3)s$. Its velocity with error limits and percentage error is

- A) $(4.0 \pm 0.31), \pm 8\%$ B) $(3.5 \pm 0.31), \pm 9\%$
 C) $(5.0 \pm 0.37), \pm 9\%$ D) $(3.8 \pm 0.34), \pm 7\%$

Chemistry

46. When hemiacetals react with one more molecule of alcohol, what type of compound is formed?

- A) Alkoxyal B) Hemiacetal C) Acetal D) Ketal

47. What is the electrical conductivity of low-density polythene (LDP)?

- A) Good conductor of electricity
 B) Excellent conductor of electricity
 C) Poor conductor of electricity
 D) Non-conductor of electricity

48. How is the configuration of a compound related to the letters 'D' and 'L'?

- A) It indicates the optical activity of the compound.
 B) It specifies the number of asymmetric carbon atoms.
 C) It refers to the relative configuration compared to glyceraldehyde.
 D) It denotes the absolute configuration of the compound.

49. What is a common use of the reaction of primary aliphatic amines with nitrous acid?

- A) Formation of diazonium salts
 B) Synthesis of aromatic compounds
 C) Estimation of amino acids and proteins
 D) Production of alcohols

50. What is the product formed when a primary alcohol is oxidised using PCC (pyridinium chlorochromate)?

- A) Carboxylic acid B) Ketone
 C) Aldehyde D) Alkene

51. What is the result of β -elimination?

- A) Formation of a halogen atom
 B) Formation of an alkene
 C) Formation of an alkane
 D) Formation of a hydrogen atom

52. In a coordination compound, what is collectively termed the coordination sphere?

- A) The central atom/ion and the ligands attached to it
 B) The ionisable groups
 C) The counter ions
 D) The central atom/ion alone

53. What is the color of Ni^{2+} when it is in the 3d8 state?

- A) Green B) Blue C) Pink D) Yellow

54. Which halogen is known for its blue-violet color?

- A) Chlorine B) Fluorine C) Bromine D) Iodine

55. Why are only p-orbital electrons involved in bonding for some elements in the group 13?

- A) Due to their high ionization enthalpies
 B) Due to the poor shielding effect of intervening d and f orbitals
 C) Due to their low melting points
 D) Due to their low electronegativity

56. Which compound leads to the formation of blister copper?

- A) FeO B) SO_2 C) Cu_2O D) Cu_2S

57. What is the role of surface particles in adsorption?

- A) They possess balanced forces.
 B) They possess unbalanced or residual attractive forces.
 C) They lack attractive forces.
 D) They are surrounded by atoms or molecules of their kind.

58. What does the peak of the curve in the kinetic energy distribution represent?

- A) The minimum kinetic energy
 B) The maximum kinetic energy
 C) The average kinetic energy
 D) The total kinetic energy
59. What does the standard electrode potential of lithium metal indicate about its reactivity?
- A) It is highly reducing.
 B) It is ly reducing.
 C) It is ly oxidizing
 D) It is highly oxidizing.
60. What are two solutions with the same osmotic pressure at a given temperature called?
- A) Hypertonic solutions
 B) Hypotonic solutions
 C) Isotonic solutions
 D) Normal saline solutions
61. Which of the following substances is an example of a diamagnetic material?
- A) Iron (Fe) B) Oxygen (O₂)
 C) Water (H₂O) D) Copper (Cu)
62. What is the primary reason for the differences in properties between crystalline and amorphous solids?
- A) Their color
 B) Their mass
 C) The arrangement of constituent particles
 D) Their density
63. What are the primary sources of water pollution?
- A) Industrial and municipal discharge pipes
 B) Agricultural runoff and storm-water drainage
 C) Acid rain and pollution-free sources
 D) Non-point sources and point sources
64. Atmospheric pollution is generally studied in which two layers?
- A) Troposphere and Mesosphere
 B) Stratosphere and Thermosphere
 C) Troposphere and Stratosphere
 D) Mesosphere and Thermosphere
65. Which halogenation reaction is typically not used for practical synthesis due to its low reactivity?
- A) Chlorination B) Bromination
 C) Iodination D) Fluorination
66. What is the order of reactivity of halogens towards alkanes?
- A) F₂ > Cl₂ > Br₂ > I₂
 B) I₂ > Br₂ > Cl₂ > F₂
 C) Cl₂ > F₂ > Br₂ > I₂
 D) Br₂ > I₂ > Cl₂ > F₂
67. What does the solvent used in paper chromatography rise up due to in the paper strip?
- A) Capillary action B) Boiling point
 C) Gravity D) Magnetic force
68. What is the name for benzene when it is considered as a substituent?
- A) Phenyl B) Benzyl C) Benzoyl D) Phenol
69. What is the primary color observed in solutions of alkaline earth metals in liquid ammonia?
- A) Red B) Blue C) Yellow D) Green
70. What happens to the paramagnetic nature of alkali metal solutions in liquid ammonia when they stand for some time?
- A) It remains paramagnetic.
 B) It becomes diamagnetic.
 C) It becomes non-magnetic.
 D) It becomes ferromagnetic.
71. What is the result of treating hard water with washing soda?
- A) The water becomes acidic.
 B) The hardness of the water increases.
 C) The water becomes soft.
 D) The water becomes more saline.
72. What is the name of the mixture of CO and H₂ produced by the reaction of steam on hydrocarbons or coke at high temperatures?
- A) Carbon gas B) Hydrocarbon gas
 C) Synthesis gas D) Methane gas
 (syngas)
73. Which substance oxidizes the indicator diphenylamine to produce an intense blue color in titrations?
- A) Mn²⁺ B) Fe³⁺ C) MnO₄⁻ D) Cr₂O₇²⁻
74. What is the reducing agent in the given reaction, 2 Na (s) + H₂ (g) → 2 NaH (s)?
- A) NaH B) H₂ C) Na D) None of the above

75. How does water's dielectric constant affect the electrostatic interactions between ions in a substance like sodium chloride?
- A) It has no effect on electrostatic interactions.
 B) It increases the electrostatic interactions.
 C) It decreases the electrostatic interactions.
 D) It facilitates the ions to move freely in the solution.
76. What is the defining characteristic of an acid in the Lewis concept?
- A) It donates an electron pair.
 B) It accepts an electron pair.
 C) It provides a proton.
 D) It provides a hydroxide ion.
77. What is the key role of a catalyst in a chemical reaction?
- A) To change the reactants into products
 B) To increase the equilibrium constant
 C) To decrease the activation energy for the reverse reaction
 D) To provide a new low energy pathway for the reaction
78. At what temperature and pressure are ice and water in equilibrium?
- A) 0°C and atmospheric pressure
 B) 100°C and atmospheric pressure
 C) 273 K and atmospheric pressure
 D) 0 K and vacuum conditions
79. What is the enthalpy change for the ionization of sodium atoms (Na) to form sodium ions (Na⁺), given the equation: $\text{Na(g)} \rightarrow \text{Na}^+(\text{g}) + \text{e}^-$; $\Delta_f H = 496 \text{ kJ mol}^{-1}$?
- A) -496 kJ mol⁻¹ B) +496 kJ mol⁻¹
 C) +108.4 kJ mol⁻¹ D) -108.4 kJ mol⁻¹
80. In an exothermic reaction, how does ΔH relate to the surroundings?
- A) ΔH absorbs heat from the surroundings.
 B) ΔH releases heat to the surroundings.
 C) ΔH remains constant with the surroundings.
 D) ΔH is unrelated to the surroundings.
81. Under normal conditions, how do the densities of liquids compare to gases?
- A) Liquids are less dense than gases.
 B) Liquids are denser than gases.
 C) Liquids and gases have the same density.
 D) The densities of liquids and gases vary widely.
82. In 1811, which scientist attempted to combine the conclusions of Dalton's atomic theory and Gay Lussac's law of combining volumes to propose a new law?
- A) Robert Boyle B) Charles
 C) Amedeo Avogadro D) Joseph Gay Lussac
83. What does the ψ_{MO} represent in the equation $\psi_{\text{MO}} = \psi_{\text{A}} + \psi_{\text{B}}$?
- A) A mathematical constant
 B) Molecular orbitals
 C) The Schrödinger wave equation
 D) The linear combination of atomic orbitals
84. What is the general principle for selecting the lowest energy Lewis structure?
- A) The one with the largest formal charges on the atoms.
 B) The one with the smallest formal charges on the atoms.
 C) The one with the most atoms.
 D) The one with the fewest lone pairs.
85. Which elements are bordering the line and running diagonally across the Periodic Table?
- A) Sodium, potassium, and calcium
 B) Silicon, germanium, arsenic, antimony, and tellurium
 C) Oxygen, nitrogen, and fluorine
 D) Iron, nickel, and cobalt
86. What is the maximum covalency of the first member of each group?
- A) 2 B) 4 C) 6 D) 9
87. How many p orbitals are there in a given subshell?
- A) One B) Two C) Three D) Four
88. How many subshells are there in the third principal shell ($n = 3$)?
- A) One B) Two C) Three D) Four
89. Why is it necessary to consider the existence of isotopes and their relative abundances when calculating the average atomic mass of an element?
- A) To determine the most common isotope
 B) To identify the heaviest isotope
 C) To account for variations in atomic mass within the element
 D) To simplify the calculation process

90. What did Antoine Lavoisier conclude from his experimental studies of combustion reactions?
- A) Matter can be created but not destroyed
 - B) There is a net change in mass during chemical changes
 - C) Matter can neither be created nor destroyed
 - D) Mass changes in all physical changes but not in chemical changes

Biology - (Zoology)

91. What is the function of a mammal's external ears or pinnae?
- A) To produce milk
 - B) To hear
 - C) To see
 - D) To swim
92. How do amphibians respire?
- A) By lungs only
 - B) By gills only
 - C) Through skin only
 - D) By gills, lungs and through skin
93. What are the paired appendages of Vertebrates?
- A) Fins
 - B) Limbs
 - C) Both A) and B)
 - D) None of the above
94. What is the level of organization in cnidarians?
- A) Cellular
 - B) Tissue
 - C) Organ
 - D) None of the above
95. What is the effect of *Bacillus thuringiensis* on insect larvae?
- A) It leaves them unharmed
 - B) It enhances their growth
 - C) It makes them more resistant to attack
 - D) It kills them
96. These microbes consume the major part of the organic matter in the effluent, significantly reducing the BOD of the effluent. What is the BOD test?
- A) A measure of the rate of uptake of oxygen by micro-organisms in a sample of water
 - B) A measure of the organic matter present in the water
 - C) A measure of the pollution potential of waste water
 - D) A measure of the physical removal of particles
97. What was the first antibiotic discovered?
- A) Penicillin
 - B) Streptomycin
 - C) Tetracycline
 - D) Erythromycin

98. What type of immunity is responsible for the rejection of grafts?
- A) Humoral immunity
 - B) Cell-mediated immunity
 - C) Active immunity
 - D) Passive immunity
99. What do certain sportspersons misuse to enhance their performance?
- A) Narcotic analgesics, anabolic steroids, diuretics and certain hormones
 - B) Infected blood
 - C) Sexual contact
 - D) Sharing of infected needles and syringes
100. What is the life cycle of *Plasmodium* dependent on?
- A) One host - human
 - B) One host - mosquitoes
 - C) Two hosts - human and mosquitoes
 - D) None of the above
101. What did the first mammals resemble?
- A) Shrews
 - B) Fish
 - C) Birds
 - D) Reptiles
102. What is the term used to describe similarities in the structure of different animals that indicate a common ancestor?
- A) Convergent evolution
 - B) Divergent evolution
 - C) Adaptive evolution
 - D) Homology
103. What is the main focus of the study of Evolutionary Biology?
- A) The evolution of the earth
 - B) The evolution of the stars
 - C) The evolution of the universe
 - D) The history of life forms on earth
104. What is a recessive allele?
- A) An allele that is modified and produces no enzyme
 - B) An allele that produces the same phenotype as the unmodified allele
 - C) An allele that produces a non-functional enzyme
 - D) Both A) and C)
105. Thalassaemia can be classified according to which chain of the haemoglobin molecule is affected. Which of the following is not a type of Thalassaemia?
- A) α Thalassaemia
 - B) β Thalassaemia

- C) δ Thalassemia D) γ Thalassemia
106. Which of the following genotypic symbols represents dominant yellow seed colour?
 A) R B) r C) Y D) y
107. What is the function of cervical caps, diaphragms and vaults in barrier methods of contraception?
 A) To block the entry of sperms
 B) To increase contraceptive efficiency
 C) To protect the user from contracting STIs and AIDS
 D) To cover the male penis
108. What is the role of ART in assisting infertile couples to have children?
 A) Correction of disorders
 B) Special techniques
 C) Both A and B
 D) None of the above
109. What is amniocentesis used for in the medical field?
 A) To determine the survivability of the foetus
 B) To detect the presence of certain genetic disorders
 C) To check for the sex of the foetus
 D) To test for maternal diseases
110. Can the hymen be torn during activities like horseback riding, cycling, etc ?
 A) No B) Sometimes C) Rarely D) Yes
111. What is the purpose of the zona pellucida formed around the secondary oocyte?
 A) To protect the secondary oocyte
 B) To facilitate fertilization
 C) To facilitate meiosis
 D) None of the above
112. What are the regions in the testis that contain immunologically competent cells?
 A) Interstitial spaces
 B) Seminiferous tubules
 C) Testicular lobules
 D) Olfactory epithelium
113. What is the purpose of a synaptic cleft?
 A) To separate pre- and post-synaptic neurons
 B) To increase the efficiency of impulse transmission
 C) To regulate the release of neurotransmitters
 D) To allow for direct current flow between neurons

114. What is the function of the limbic system in the brain?
 A) Involved in the regulation of sexual behavior
 B) Expression of emotional reactions
 C) Controls body temperature, urge for eating and drinking
 D) All of the above
115. What is the difference between myelinated and nonmyelinated nerve fibres?
 A) Myelinated nerve fibres have a myelin sheath while nonmyelinated do not
 B) Nonmyelinated nerve fibres have a myelin sheath while myelinated do not
 C) Both myelinated and nonmyelinated nerve fibres have a myelin sheath
 D) Both myelinated and nonmyelinated nerve fibres do not have a myelin sheath
116. What is involved in the amoeboid movement of cells in the human body?
 A) Pseudopodia B) Microfilaments
 C) Both A) and B) D) None of the above
117. How many bones are present in the wrist?
 A) 5 B) 6 C) 7 D) 8
118. What is the mechanism of muscle contraction?
 A) Sliding filament theory
 B) Contraction by release of neurotransmitter
 C) Binding of calcium ions to troponin
 D) Shortening of the sarcomere
119. What is the function of tropomyosin in the actin filament?
 A) To activate the binding sites for myosin on actin filaments
 B) To mask the active binding sites for myosin on actin filaments
 C) To run close to the "F" actins throughout its length
 D) To regulate the interaction between "F" actins and troponin
120. What is the function of juxta glomerular apparatus (JGA)?
 A) To regulate the glomerular blood flow
 B) To release renin
 C) To stimulate the glomerular filtration rate
 D) All of the above
121. What is the process by which the kidneys regulate glomerular filtration rate?
 A) reabsorption

- B) ultrafiltration
- C) juxta glomerular apparatus (JGA)
- D) secretion

122. What is Bowman's capsule?

- A) A Malpighian corpuscle
- B) A distal convoluted tubule
- C) A double walled capsule enclosing the glomerulus
- D) Henle's loop

123. How is ammonia produced from metabolism excreted from ureotelic animals?

- A) Directly through the skin
- B) As uric acid in the form of pellet or paste
- C) Through the kidneys after conversion into urea in the liver
- D) As solid waste

124. How are human blood grouped based on surface antigens on RBCs?

- A) By the presence or absence of antigen A
- B) By the presence or absence of antigen B
- C) By the presence or absence of antigen A and B
- D) By the presence or absence of Rh factor

125. What type of valve guards the opening between the left atrium and left ventricle in the human heart?

- A) Bicuspid valve
- B) Tricuspid valve
- C) Septal valve
- D) Aortic valve

126. What is the thin, muscular wall called that separates the right and left atria in the human heart?

- A) Inter-atrial membrane
- B) Inter-ventricular septum
- C) Atrio-ventricular septum
- D) Cardiac wall

127. What initiates the mechanism of coagulation?

- A) Platelets
- B) Tissues
- C) Thrombin
- D) Calcium ions

128. What is the effect of the contraction of diaphragm on the thoracic chamber?

- A) It decreases the volume of the thoracic chamber
- B) It increases the volume of the thoracic chamber
- C) It has no effect on the volume of the thoracic chamber
- D) It increases the pressure in the thoracic chamber

129. What is oxyhaemoglobin?

- A) A dissolved form of oxygen
- B) A form of O₂ that is bound with haemoglobin in a reversible manner
- C) A form of CO₂ that is bound with haemoglobin in a reversible manner
- D) A dissolved form of CO₂

130. What is represented by pO₂?

- A) Pressure of CO₂
- B) Pressure of O₂
- C) Pressure of N₂
- D) Pressure of He

131. What type of respiratory system do mammals have?

- A) Simple diffusion system over their entire body surface
- B) A network of tubes
- C) Gills
- D) A well-developed respiratory system

132. What is the general colour of the dorsal side of a frog's body?

- A) Olive green
- B) Bright yellow
- C) Brown
- D) Black

133. What is the main function of the sensory papillae in a frog?

- A) Hearing
- B) Smelling
- C) Touching
- D) Tasting

134. What is the main function of the excretory system in frogs?

- A) To produce eggs or sperm
- B) To eliminate nitrogenous wastes
- C) To digest food
- D) To circulate oxygen throughout the body

135. What are the three types of blood cells found in frogs?

- A) RBCs, WBCs, and platelets
- B) Haemoglobin, leucocytes, and platelets
- C) Erythrocytes, lymphocytes, and thrombocytes
- D) Haemoglobin, erythrocytes, and leukocytes

Biology - (Botany)

136. What is the main source of fascination for humans regarding the diversity of life on Earth?

- A) The number of species
- B) The variety of organisms
- C) The study of evolution
- D) The habitats of each species

137. What is the name given to the four major causes of biodiversity loss?

- A) The Good Quartet
 B) The Evil Quartet
 C) The Neutral Quartet
 D) The Beneficent Quartet
138. What is the purpose of expressing the biomass of a species in terms of fresh or dry weight?
- A) To compare the biomass of different species
 B) To compare the biomass of the same species in different areas
 C) To compare the biomass of the same species at different times
 D) All of the above
139. What is the energy used for in various energy-requiring processes of the organisms?
- A) The energy released by oxidation in respiration
 B) The carbon skeleton produced during respiration
 C) The energy trapped in ATP
 D) The energy contained in respiratory substrates
140. What is the best way to describe the outcome of interspecific interactions?
- A) Beneficial interaction
 B) Detrimental interaction
 C) Neutral interaction
 D) All of the above
141. What is the intrinsic rate of natural increase (r) in the logistic growth model?
- A) The maximum number of individuals that a habitat can support
 B) The maximum number of births per capita
 C) The maximum number of deaths per capita
 D) The per capita increase or decrease in the population density during a unit time period
142. What is the function of restriction enzymes in the purification process of DNA?
- A) To remove RNA B) To remove proteins
 C) To cut the DNA D) To add ethanol
143. What are the genes encoding resistance to antibiotics commonly considered as useful selectable markers for *E. coli*?
- A) Ampicillin B) Chloramphenicol
 C) Tetracycline D) All of the above
144. What is the result of the RNAi mechanism in the transgenic host plant?
- A) The parasite survives
 B) The host plant is protected from the parasite
 C) The mRNA of the nematode is silenced
 D) The transgenic host is expressing specific interfering RNA
145. Are recombinant therapeutics commonly associated with unwanted immunological responses?
- A) Yes B) No C) Sometimes D) Rarely
146. Why is RNA better for the transmission of genetic information?
- A) RNA is more stable than DNA
 B) RNA directly codes for the synthesis of proteins
 C) RNA has a shorter life span than DNA
 D) DNA depends on RNA for synthesis of proteins
147. What is the length of DNA double helix in a typical mammalian cell?
- A) Approximately 10^{-6} m
 B) Approximately 0.34 nm
 C) Approximately 2.2 metres
 D) Approximately 6.6×10^9 bp
148. What are the two nuclei situated below the egg apparatus in the large central cell?
- A) Antipodals B) Polar nuclei
 C) Synergids D) Egg cells
149. What is the main component of the inner wall of the pollen grain called the intine?
- A) Sporopollenin B) Cellulose
 C) Pectin D) Pectocellulose
150. What are the extrinsic factors that control Plant Growth and Development?
- A) Light and temperature
 B) Soil type and humidity
 C) Fertilisers and water
 D) None of the above
151. What is the first phase of growth according to the paragraph?
- A) Maturation B) Elongation
 C) Meristematic D) Proximal
152. What is F_0 component of ATP synthase (complex V)?
- A) A peripheral membrane protein complex that contains the site for oxidation of NADH
 B) A peripheral membrane protein complex that contains the site for synthesis of ATP from ADP and inorganic phosphate

- C) An integral membrane protein complex that forms the channel through which protons cross the inner membrane
- D) An integral membrane protein complex that forms the channel for transport of electrons from one carrier to another

153. What are facultative anaerobes?

- A) Organisms that can live in both aerobic and anaerobic conditions
- B) Organisms that can only live in anaerobic conditions
- C) Organisms that live in an atmosphere that lacks oxygen
- D) Organisms that can only live in aerobic conditions

154. What is the purpose of ATP and NADPH in the biosynthetic phase of photosynthesis?

- A) To synthesize food, more accurately, sugars
- B) To produce O₂
- C) To activate the Calvin cycle
- D) To produce CO₂

155. Can the Calvin cycle occur in all photosynthetic plants?

- A) Yes
- B) No
- C) Only in C₃ plants
- D) Only in C₄ plants

156. What is the saturation level for C₄ plants with regard to CO₂ concentration?

- A) 360 μL⁻¹
- B) 450 μL⁻¹
- C) 500 μL⁻¹
- D) 600 μL⁻¹

157. What is the composition of ribosomes?

- A) Proteins and lipids
- B) Proteins and carbohydrates
- C) RNA and proteins
- D) DNA and lipids

158. What are cilia and flagella?

- A) hair-like outgrowths of the cell membrane
- B) small structures that work like oars
- C) responsible for cell movement
- D) All of the above

159. How do fimbriae differ from flagella?

- A) Fimbriae are small bristle-like fibres and flagella are thin filamentous extensions from the cell wall.
- B) Fimbriae are thin filamentous extensions from the cell wall and flagella are small bristle-like fibres.
- C) Fimbriae are pili and flagella are fimbriae.
- D) Fimbriae and flagella are the same structure.

160. What is the R group in proteinaceous amino acids?

- A) A hydrogen
- B) A methyl group
- C) Hydroxy methyl
- D) All of the above

161. What is the difference between an exothermic and an endothermic reaction?

- A) Exothermic reactions are energy requiring, while endothermic reactions are spontaneous
- B) Endothermic reactions are energy requiring, while exothermic reactions are spontaneous
- C) Both exothermic and endothermic reactions are spontaneous
- D) Both exothermic and endothermic reactions are energy requiring

162. What is cellulose?

- A) A variant of starch
- B) A storehouse of energy in animal tissues
- C) A polymer of fructose
- D) A polymeric polysaccharide consisting of only one type of monosaccharide (glucose)

163. What happens to the centriole during the S phase in animal cells?

- A) It remains unchanged
- B) It undergoes mitosis
- C) It duplicates
- D) It undergoes DNA replication

164. What is the metaphase plate?

- A) The point of attachment of spindle fibres to the chromosomes
- B) The point where the chromosomes align along the spindle equator
- C) The point where the chromatids are separated
- D) The point where the centromeres are located

165. How does cell growth occur during the cell cycle?

- A) By the formation of new cells
- B) By the division of existing cells
- C) By the duplication of DNA
- D) By the synthesis of new cell components

166. What is the innermost layer of the cortex in a young dicotyledonous stem?

- A) Epidermis
- B) Hypodermis
- C) Endodermis
- D) Cortex

167. What type of cells surround the vascular bundles in a leaf?

- A) Epidermal cells

- B) Mesophyll cells
C) Bundle sheath cells
D) Palisade parenchyma cells
168. What are the main components of the epidermal tissue system?
A) Epidermal cells B) Stomata
C) Epidermal appendages D) All of the above
169. What is the term used to describe the arrangement of veins in the lamina of a leaf?
A) Venation B) Reticulate C) Parallel D) Network
170. What is imbricate aestivation?
A) When the margins of sepals or petals overlap one another but not in any particular direction
B) When sepals or petals overlap one another in a particular direction
C) When sepals or petals just touch one another at the margin, without overlapping
D) When one margin of the appendage overlaps that of the next one and so on
171. What is the function of the cells in the region of meristematic activity in a plant root?
A) To absorb water and minerals
B) To protect the tender apex of the root
C) To divide repeatedly
D) To promote root hair formation
172. How does the sporophyte stage in mosses compare to that in liverworts?
A) More elaborate B) Less elaborate
C) The same D) None of the above
173. Which part of the ovule develops into the female gametophyte?
A) Microsporangia B) Megasporangia
C) Nucellus D) Megaspore mother cell
174. What is the main component of the cell wall of green algae?
A) Cellulose B) Pectin C) Laminin D) Chitin
175. What are the sexual spores produced by basidiomycetes called?
A) Zoospores B) Conidia
C) Sporangiospores D) Basidiospores
176. What are bacteriophages?
A) Viruses that infect plants
B) Viruses that infect animals
C) Viruses that infect bacteria
D) None of the above
177. What is the difference between the reproductive events in males and females?
A) Sperm formation occurs even in old men, but formation of ovum ceases in women around the age of fifty years.
B) Formation of gametes occurs only in males.
C) Transfer of sperms occurs only in females.
D) Delivery of the baby occurs only in males.
178. What is the scope of systematics?
A) Identification and nomenclature
B) Identification, nomenclature, and classification
C) Identification and classification
D) Nomenclature and classification
179. Which category is the highest in the classification system of animals?
A) Phylum Chordata B) Kingdom Animalia
C) Order Primata D) Class Mammalia
180. What is the term used to describe the number and types of organisms present on Earth?
A) Biodiversity B) Forest exploration
C) Potted plants D) Species count