25/03/2026

Code-B_(Phase-1)

Aakash
Medical | IIT-JEE | Foundations

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MM : 720 **Final Test Series(P1)_NEET2026_Test-03B** **Time : 180 Min.**

Topics Covered:
Physics: Gravitation, Mechanical Properties of Solid, Mechanical Properties of Fluids, Thermal Properties of Matter
Chemistry: The p-Block Elements (Group 15-18), The d and f-Block Elements, Coordination Compounds
Botany: Principles of Inheritance and Variation, Molecular Basis of Inheritance
Zoology: Breathing and Exchange of Gases, Body Fluids and Circulation

General Instructions :
Duration of Test is 3 hrs.
The Test consists of 180 questions. The maximum marks are 720.
There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
Use blue/black ballpoint pen only to darken the appropriate circle.
Mark should be dark and completely fill the circle.
Dark only one circle for each entry.
Dark the circle in the space provided only.
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

PHYSICS

1. If potential at surface of earth is taken as zero, then find potential at centre of earth. (Where *M* denotes mass of earth and *R* denotes radius of earth)?

(1) $-\frac{3}{2}\frac{GM}{R}$

(2) $-\frac{GM}{2R}$

(3) $\frac{3}{2}\frac{GM}{R}$

(4) $\frac{GM}{2R}$

2. The Kepler's law of area is a consequence of the law of conservation of

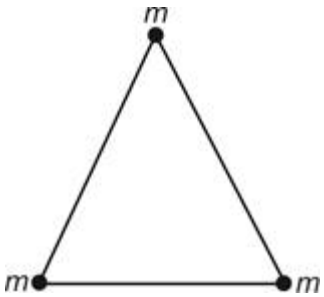
(1) Energy

(2) Mass

(3) Linear momentum

(4) Angular momentum

3. Three equal masses each having mass *m* are kept fixed at the vertices of an equilateral triangle of side '*a*' as shown in figure. The gravitational potential energy of the system will be



(1) 0

(2) $\frac{-3Gm^2}{a}$

(3) $\frac{-3\sqrt{3}Gm^2}{a}$

(4) $\frac{3Gm^2}{2a}$

4. Consider the following statements regarding satellite:
A. Total energy of a satellite having circular orbit is negative.
B. For a satellite in elliptical orbit, both K.E and P.E are of opposite sign.
C. Satellite motion obeys Kepler's law of periods.
D. An astronaut experiences weightlessness in a space satellite.
Based on above information, pick correct option.

(1) Only A, B and D are correct

(2) Only B, C and D are correct

(3) Only A, C and D are correct

(4) All A, B, C and D are correct

5. The escape velocity of a body from a planet

(1) Depends on angle of projection

(2) Is independent of mass of the planet

(3) Depends on mass of the body

(4) Depends on height of projection

6. Two satellites of mass m and $4m$ are orbiting around same planet in orbit of radius R. The ratio of their respective time period of revolution will be

(1) 1 : 1

(2) 1 : 2

(3) 1 : 4

(4) 4 : 1

7. At height h above the earth's surface, the acceleration due to gravity is same as that of depth 50 km below the surface of earth, then h will be

(1) 25 km

(2) 50 km

(3) 100 km

(4) 200 km

8. Choose the physical quantity that is vector (symbols have usual meaning)

(1) Universal gravitational constant, G

(2) Gravitational potential, $V(r)$

(3) Gravitational potential energy, $U(r)$

(4) Acceleration due to gravity, g

9. Consider the following two statements:
Statement I: The deformation of a ductile metal is reversible upto the elastic limit of the metal in stress-strain diagram.
Statement II: Hooke's law does not apply to elastomers.
In the light of the above statements, choose the correct option.

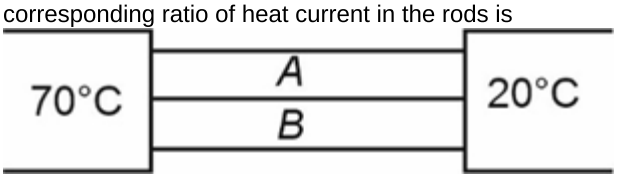
(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

10. Two rods A and B having same length and cross-sectional area are connected in parallel. A temperature difference is maintained across the combination as shown below. If thermal conductivity of the rods is in ratio 1 : 3, then corresponding ratio of heat current in the rods is



(1) 1 : 1

(2) 1 : 3

(3) 3 : 1

(4) 9 : 1

11. If the angle of contact for a liquid-solid pair is acute, then liquid meniscus inside the capillary is

(1) Plane in shape

(2) Convex upward in shape

(3) Concave upward in shape

(4) Cylindrical in shape

12. Water flows through a horizontal pipe of varying cross-section at a rate of 0.5 $m^3 s^{-1}$. The speed of water at a point where area of cross-section is 500 cm^2, is

(1) 10 ms^{-1}

(2) 50 ms^{-1}

(3) 2 ms^{-1}

(4) 5 ms^{-1}

13. When a solid melts into liquid

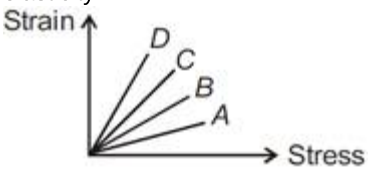
(1) It absorbs energy

(2) It releases energy

(3) Its temperature increases

(4) Its temperature decreases

14. Which graph represents minimum Young's modulus of elasticity?



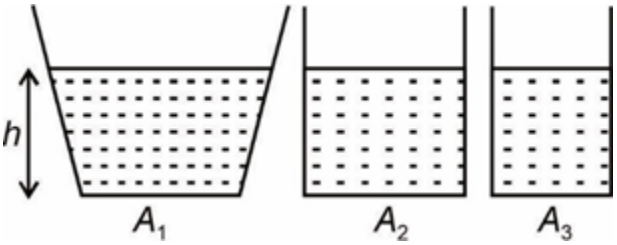
(1) A

(2) B

(3) C

(4) D

15. Three vessels contain same liquid, filled upto the same height h, then pressure at the bottom is ($A_1 > A_2 > A_3$)



(1) Maximum in A_3

(2) Same in all three cases

(3) Maximum in A_2

(4) Maximum in A_1

16. The venturi-meter works on

(1) Bernoulli's principle

(2) Pascal's law

(3) Huygen's principle

(4) Stoke's law

17. In the following question, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**
Assertion (A): Almost for all metals, the modulus of elasticity decreases with rise in temperature.
Reason (R): By increasing temperature intermolecular force decreases.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

18. A solid ball of metal has concentric spherical cavity within it. If the ball is heated, the volume of cavity will

(1) Decrease

(2) Increase

(3) Remain unaffected

(4) None of these

19. The correct dimensional formula for compressibility will be

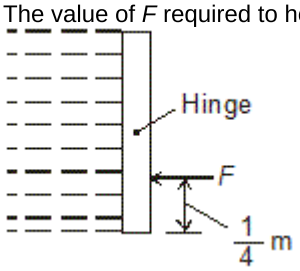
(1) $[MLT^{-2}]$

(2) $[M^{-1}L^{1}T^{2}]$

(3) $[ML^{-1}T^{-2}]$

(4) $[ML^{2}T^{2}]$

20. A square gate of size 1 m × 1 m is hinged at the mid point, as shown in figure. A fluid of density ρ fills the space to the left of gate. The force F applied on gate as shown in figure. The value of F required to hold the gate stationary is



(1) $\frac{\rho g}{2}$

(2) $\frac{\rho g}{3}$

(3) $\frac{\rho g}{4}$

(4) $\frac{\rho g}{6}$

21. Two spheres each of mass M and radius R are kept in contact. The gravitational force between them is

(1) Zero

(2) Infinity

(3) $\frac{GM^2}{4R^2}$

(4) $\frac{GM^2}{R^2}$

22. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. The ratio of their volumes will be

(1) 4 : 9

(2) 3 : 2

(3) 27 : 8

(4) 27 : 4

23. The minimum energy required to launch a satellite of mass m from earth's surface to a circular orbit of altitude $2R$, [Where R denotes radius of earth and M denotes mass of earth]

(1) $\frac{5GMm}{6R}$

(2) $\frac{3GMm}{4R}$

(3) $\frac{2GMm}{3R}$

(4) $\frac{GMm}{2R}$

24. 0.1 m^3 of water at 80°C is mixed with 0.3 m^3 of water at 60°C. The final temperature of mixture is

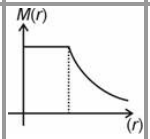
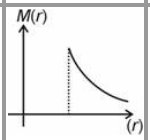
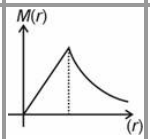
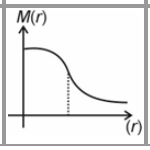
(1) 65°C

(2) 70°C

(3) 60°C

(4) 75°C

25. If $M(r)$ denotes the magnitude of physical quantity as a function of r (Distance from centre of spherical distribution of radius R), then match entries in column-I with entries in column-II.

	Column-I		Column-II
a.		(i)	$M(r)$ denotes variation of gravitational field due to a spherical shell
b.		(ii)	$M(r)$ denotes variation of gravitational potential due to a spherical shell
c.		(iii)	$M(r)$ denotes variation of gravitational potential due to uniform solid sphere
d.		(iv)	$M(r)$ denotes variation of gravitational field due to uniform solid sphere

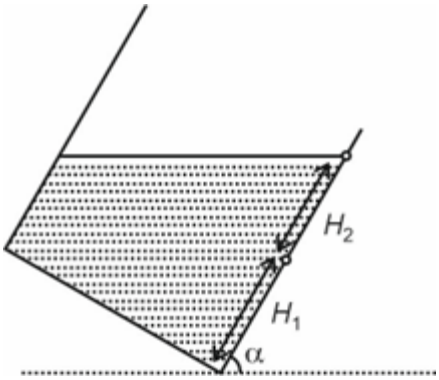
(1) a(ii), b(i), c(iv), d(iii)

(2) a(i), b(ii), c(iv), d(iii)

(3) a(ii), b(i), c(iii), d(iv)

(4) a(iv), b(iii), c(ii), d(i)

26. Consider a container filled with water and inclined at certain angle α with the horizontal. An orifice is made and water oozes out of the orifice. The horizontal range covered by water as it oozes out of the orifice will be



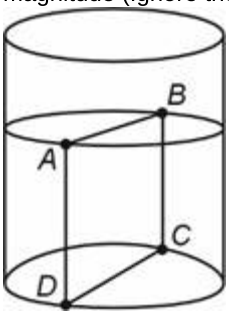
(1) $\sqrt{2H_1H_2}cos\alpha$

(2) $2\sqrt{H_1H_2}sin\alpha$

(3) $\sqrt{2H_1H_2}sin\alpha$

(4) $2\sqrt{H_1H_2}cos\alpha$

27. Water is filled upto to a height h in a beaker of radius R as shown. The density of water is ρ and atmospheric pressure is P_0. Consider a vertical section $ABCD$ of water column through diameter of the beaker. The force on water on one side of this section by water on other side of this section has magnitude (Ignore the effect of surface tension)



(1) $2P_0Rh + 2\rho gRh^2$

(2) $2P_0Rh - \rho gRh^2$

(3) $P_0Rh + \rho gRh^2$

(4) $2P_0Rh + \rho gRh^2$

28. A copper sphere is suspended in an evacuated chamber maintained at 300 K. The sphere is maintained at a constant temperature of 500 K by heating it electrically. The electric power needed to do it is α. When the surface of copper is completely blackened (assume it as perfectly black body), the electric power needed to maintain the same temperature of sphere is β then the emissivity of copper is

(1) $\frac{\alpha}{\beta}$

(2) $\frac{\beta}{\alpha}$

(3) $\frac{\alpha}{2\beta}$

(4) $\frac{\beta}{2\alpha}$

29. A solid ball of density one third that of water falls freely under gravity from a height of 20 m and then enters water. The time taken by the ball to come again to the water surface will be (Take, g = 10 m/s^2)
[Consider the water to be an ideal fluid]

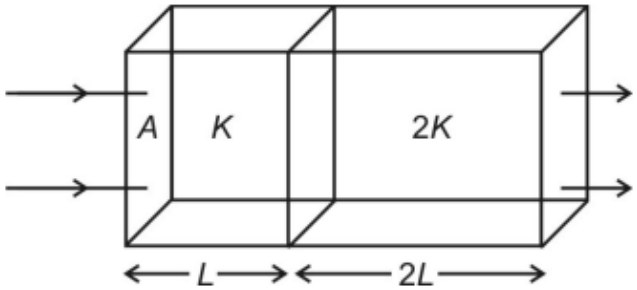
(1) 6 s

(2) 3 s

(3) 1 s

(4) 2 s

30. Two slabs with given lengths, area of cross section and conductivities are joined in series to form a composite slab as shown in figure. Then equivalent thermal conductivity of the composite slab will be



(1) 3*K*

(2) $\frac{4}{3}K$

(3) *K*

(4) $\frac{3}{2}K$

31. A metal sphere floats in container filled with mercury. The fraction of volume of sphere submerged in mercury is *F*. If coefficient of volumetric expansion of metal and mercury are γ_1 and γ_2 respectively, then the fraction of volume submerged when temperature of system is increased by ΔT is

(1) $\frac{F(1+\gamma_2\Delta T)}{(1+\gamma_1\Delta T)}$

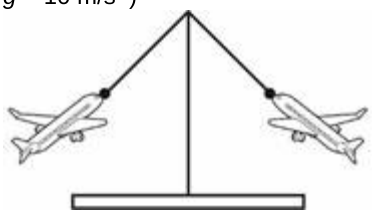
(2) $\frac{F(1+\gamma_1\Delta T)}{(1-\gamma_2\Delta T)}$

(3) $\frac{F(1+\gamma_1\Delta T)}{(1+\gamma_2\Delta T)}$

(4) $\frac{F(1-\gamma_1\Delta T)}{(1+\gamma_2\Delta T)}$

32. An amusement park ride consists of an airplane shaped cars attached to steel rods. Each rod has a length of 20 m and a cross-sectional area of 8 cm^2. Each car plus two people seated in it has a total weight of 2000 N. When operating the ride has a maximum angular speed of $\frac{\sqrt{19}}{5}$ rad/s, then the amount by which rod is stretched will be

(Assume the Young's modulus of steel to be 2×10^{11} N/m^2, g = 10 m/s^2)



(1) 3.8 mm

(2) 1.9 mm

(3) 0.19 mm

(4) 0.38 mm

33. Two spherical bodies each of mass *M*, are kept fixed with a separation 2*L* between their centres. A particle of mass *m* is projected from the mid-point of line joining their centres, perpendicular to the line joining them. The minimum initial velocity of the mass *m* to escape gravitational field of two bodies is

(1) $4\sqrt{\frac{GM}{L}}$

(2) $2\sqrt{\frac{GM}{L}}$

(3) $\sqrt{\frac{2GM}{L}}$

(4) $\sqrt{\frac{GM}{L}}$

34. Scientists dig a well of depth $\frac{R}{5}$ on Earth and lower a wire of same length and of linear mass density λ into it. If the wire is not touching anywhere, the force applied at the top of the wire by a person holding it in place is (Where *R* denotes radius of earth and *g* denotes acceleration due to gravity on surface of earth).

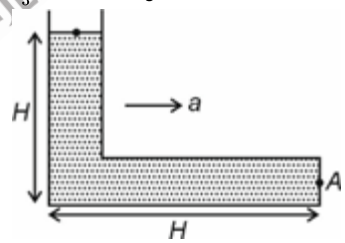
(1) $\frac{9\lambda gR}{50}$

(2) $\frac{9\lambda gR}{500}$

(3) $\frac{5\lambda gR}{90}$

(4) $\frac{5\lambda gR}{900}$

35. For an *L*-shaped vessel shown in figure, the value of acceleration *a* so that pressure at point *A* becomes equal to $\frac{P_0}{3}$ (where P_0 denotes atmospheric pressure)



(1) $\frac{2P_0}{3\rho H}+g$

(2) $\frac{3P_0}{2\rho H}-g$

(3) $\frac{2P_0}{3\rho H}-g$

(4) $\frac{3P_0}{2\rho H}+g$

36. If T is surface tension of soap solution, then the amount of work done in blowing a soap bubble from diameter D to diameter $2D$ is

(1) $2\pi D^2 T$

(2) $4\pi D^2 T$

(3) $6\pi D^2 T$

(4) $8\pi D^2 T$

37. A cylindrical rod has temperature T_1 and T_2 at its ends. The rate of flow of heat is β. If all the linear dimensions of same material rod are doubled keeping temperature of ends constant, then rate of flow of heat β′ will be

(1) 4β

(2) 2β

(3) $\frac{\beta}{4}$

(4) $\frac{\beta}{2}$

38. Consider the following statement
Statement A: The total mechanical energy of a planet revolving around the sun remains constant.
Statement B: If two soap bubbles of different radii are connected by a tube then air flows from smaller bubble to bigger bubble.
In the light of above statement choose the correct option.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

39. Consider the following statement
Statement A: A temperature change which increases the length of steel rod by 0.2% will increase its volume by nearly 0.6%.
Statement B: A liquid in equilibrium with vapour phase has the same pressure and temperature throughout the system.
Statement C: If scale gives correct reading at temperature T, then at temperature $T'(> T)$, the scale reading will be lesser than the true value.
In the light of above statement choose the correct option.

(1) Both statements A and B are correct

(2) Both statements B and C are incorrect

(3) Both statements A and C are incorrect

(4) All statements are correct

40. A rope 1 cm in diameter breaks, if tension in it exceeds 500 N. The maximum tension that may be given to same material rope of diameter 3 cm is

(1) 500 N

(2) 200 N

(3) 4500 N

(4) 300 N

41. Water rises in a vertical capillary tube upto a length of 5 cm. If the tube is inclined at 30° with vertical, the length of water column risen in the tube will be

(1) 10 cm

(2) $\frac{10}{\sqrt{3}}$ cm

(3) 20 cm

(4) $\frac{20}{\sqrt{3}}$ cm

42. The energy stored per unit volume in a copper wire having longitudinal strain of 0.1% is (Assume young's modulus of copper to be 1.1×10^{11} N m^{-2})

(1) 1.1×10^3 J m^{-3}

(2) 5.5×10^3 J m^{-3}

(3) 5.5×10^4 J m^{-3}

(4) 1.1×10^4 J m^{-3}

43. The bulk modulus for an incompressible liquid is

(1) Zero

(2) Unity

(3) Infinity

(4) 0.5

44. On centigrade scale, the temperature of a body increases by 30°. The increase in temperature on Fahrenheit scale is

(1) 50°

(2) 40°

(3) 30°

(4) 54°

45. What will be the ratio of temperatures of sun and moon if the wavelengths of their maximum emission radiations rates are 140 Å and 4200 Å respectively

(1) 1 : 30

(2) 30 : 1

(3) 42 : 14

(4) 14 : 42

CHEMISTRY

46. Consider the following statements

(a) The total number of possible isomers for a square-planar $[Pt(Br)(NO_2)(NO_3)(SCN)]^{2-}$ is twelve

(b) $[Mn_2(CO)_{10}]$ has one Mn–Mn bond and two bridged CO groups

(c) IUPAC name of $K_3[Cr(C_2O_4)_3]$ is potassium trioxalatochromate(III)

(d) Both $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$ are paramagnetic in nature

The correct statements are

(1) (a) and (b) only

(2) (a), (c) and (d) only

(3) (b) and (d) only

(4) (a), (b), (c) and (d)

47. Match the metal ions given in Column I with the spin only magnetic moments of the ions given in Column II and assign the correct code

Column I	Column II
a. Mn^{2+}	(i) 3.87
b. Cr^{3+}	(ii) 5.92
c. Fe^{2+}	(iii) 2.84
d. Ni^{2+}	(iv) 4.90

(1) a(ii), b(i), c(iii), d(iv)

(2) a(ii), b(i), c(iv), d(iii)

(3) a(iv), b(iii), c(ii), d(i)

(4) a(i), b(ii), c(iv), d(iii)

48. The correct decreasing order of second ionisation enthalpy of Fe, Co, Ni and Cu is

(1) Fe > Co > Ni > Cu

(2) Co > Ni > Fe > Cu

(3) Fe > Ni > Cu > Co

(4) Cu > Ni > Co > Fe

49. Given below are two statements

Statement-I: Polonium hardly shows –2 oxidation state.

Statement-II: Boiling point of polonium is higher than that of tellurium.

In the light of above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

50. The correct decreasing order of C – O bond length in the given metal carbonyl is

(1) $[Mn(CO)_6]^+ > [Cr(CO)_6] > [V(CO)_6]^- > [Ti(CO)_6]^{2-}$

(2) $[Mn(CO)_6]^+ > [V(CO)_6]^- > [Cr(CO)_6] > [Ti(CO)_6]^{2-}$

(3) $[Ti(CO)_6]^{2-} > [V(CO)_6]^- > [Cr(CO)_6] > [Mn(CO)_6]^+$

(4) $[V(CO)_6]^- > [Ti(CO)_6]^{2-} > [Mn(CO)_6]^+ > [Cr(CO)_6]$

51. Given below are two statements:

Statement I: The crystal field stabilization energy (CFSE) for $[MnCl_6]^{3-}$ is $-0.6\ \Delta_0$ (ignoring pairing energy).

Statement II: $[MnCl_6]^{3-}$ is paramagnetic with four unpaired electrons.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

52. The correct order of boiling point for the given elements is

(1) He > Ne > Xe > Ar > Kr

(2) Xe > Kr > Ar > Ne > He

(3) He > Ne > Ar > Kr > Xe

(4) Xe > Ar > Kr > Ne > He

53. How many mole(s) of AgCl will be precipitated if one mole of $[Cr(NH_3)_6]Cl_3$ is added to excess of $AgNO_3$ solution?

(1) 1

(2) 2

(3) 3

(4) 4

54. Given below are two statements: one is labelled as assertion (A) and other is labelled as reason (R)

Assertion (A): PH_3 has lower boiling point than NH_3.

Reason (R): PH_3 molecules are not associated through hydrogen bonding in liquid state but NH_3 molecules are associated through hydrogen bonding.

In the light of above statements, choose the correct answer from the options given below.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

55. Number of geometrical isomers of $[Cr(NH_3)_3Cl_3]$ is

(1) 4

(2) 2

(3) 5

(4) 6

56. The coordination compound that can show linkage isomerism is

(1) $[Co(NH_3)_5(NO_2)]Cl_2$

(2) $[Co(Cl)(NH_3)_3(H_2O)_2]Cl_2$

(3) $[Pt(py)_4][PtCl_4]$

(4) $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

57. Match the Column I with Column II and choose the correct option

	Column I		**Column II**
a.	$[Ni(CN)_4]^{2-}$	(i)	sp^3, diamagnetic
b.	$[Cr(NH_3)_6]^{3+}$	(ii)	dsp^2, diamagnetic
c.	$[Co(H_2O)_6]^{3+}$	(iii)	d^2sp^3, paramagnetic
d.	$[Ni(CO)_4]$	(iv)	d^2sp^3, diamagnetic

(1) a(ii), b(iv), c(iii), d(i)

(2) a(i), b(iii), c(iv), d(ii)

(3) a(ii), b(iii), c(iv), d(i)

(4) a(ii), b(iv), c(i), d(iii)

58. The correct electronic configuration of Gadolinium (Gd) and Lutetium (Lu) respectively are

(1) $[Xe]4f^8, 6s^2$ and $[Xe]4f^{14}, 5d^1, 6s^2$

(2) $[Xe]4f^8, 6s^2$ and $[Xe]4f^{14}, 6s^2$

(3) $[Xe]4f^7, 5d^1, 6s^2$ and $[Xe]4f^{14}, 6s^2$

(4) $[Xe]4f^7, 5d^1, 6s^2$ and $[Xe]4f^{14}, 5d^1, 6s^2$

59. The inner orbital complex among the following is

(1) $[MnCl_6]^{3-}$

(2) $[CoF_6]^{3-}$

(3) $[Co(NH_3)_6]^{3+}$

(4) $[MnF_6]^{3-}$

60. Consider the following statements
(a) $[Fe(H_2O)_5NO]SO_4$ is paramagnetic with three unpaired electrons
(b) $[Ti(H_2O)_6]^{3+}$ is violet in colour due to d–d transition.
(c) EDTA is used in the treatment of lead poisoning
(d) Hardness of water is estimated by simple titration with Na_2EDTA.
The correct statements are

(1) (a), (b), (c) and (d)

(2) (a), (b) and (c) only

(3) (b), (c) and (d) only

(4) (b) and (d) only

61. Pair of ambidentate ligands among the following is

(1) NO_2^- and SCN^-

(2) $C_2O_4^{2-}$ and $H_2NCH_2CH_2NH_2$

(3) $EDTA^{4-}$ and CN^-

(4) CO and $C_2O_4^{2-}$

62. Which one of the following orders is **correct** for the bond dissociation enthalpy of halogen molecules?

(1) $Cl_2 > Br_2 > F_2 > I_2$

(2) $Br_2 > I_2 > F_2 > Cl_2$

(3) $F_2 > Cl_2 > Br_2 > I_2$

(4) $I_2 > Br_2 > Cl_2 > F_2$

63. Consider the following two statements.
Statement I: XeF_4 has square planar shape.
Statement II: On hydrolysis, XeF_4 with water gives XeO_3 and HF only.
In the light of above statements, choose the correct option.

(1) Statement I is correct but statement II is incorrect

(2) Statement I is incorrect but statement II is correct

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

64. Select the incorrect statement regarding XeO_3.

(1) It is colourless compound

(2) Explosive in nature

(3) Physical state is solid

(4) Formed by the partial hydrolysis of XeF_6

65. Cl_2 on reaction with cold dil. NaOH forms

(1) NaOCl

(2) $NaClO_2$

(3) $NaClO_3$

(4) $NaClO_4$

66. IF_7 on complete hydrolysis gives

(1) HOF and HIO_3

(2) HF and HIO_3

(3) HOF and HIO_4

(4) HF and HIO_4

67. Given below are two statements:
Statement I: Zr and Hf have almost identical radii due to lanthanoid contraction.
Statement II: From La^{3+} to Lu^{3+} ion, ionic size decreases due to lanthanoid contraction.
In the light of the above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

68. The correct electronic configuration of Curium (atomic number = 96) is

(1) $[Rn]5f^96s^1$

(2) $[Rn]5f^66d^27s^2$

(3) $[Rn]5f^76d^17s^2$

(4) $[Rn]5f^86s^2$

69. Consider the following statements
(a) TiO is used in pigment industry
(b) MnO_2 is used in dry battery cells
(c) V_2O_5 catalyses the oxidation of SO_2 in the manufacture of H_2SO_4
The correct statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a) and (c) only

(4) (a), (b) and (c)

70. Approximate percentage of lanthanoids in mischmetall is

(1) 5%

(2) 75%

(3) 25%

(4) 95%

71. Given below are two statements
Statement-I: The single N–N bond is weaker than the single P–P bond
Statement-II: Phosphorus and nitrogen can form dπ-dπ bond with transition metals.
In the light of above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

72. The increasing order of the value Δ_0 for the following species is

I. $[Co(NH_3)_6]^{3+}$

II. $[Rh(NH_3)_6]^{3+}$

III. $[Ir(NH_3)_6]^{3+}$

(1) III < II < I

(2) I < II < III

(3) II < I < III

(4) I < III < II

73. Consider the following statements.
a. Zinc reacts with concentrated nitric acid to give $NO_2(g)$.
b. Red phosphorus is much less reactive than white phosphorus.
c. Bond angle in PH_4^+ is higher than that in PH_3.
d. Liquid NH_3 is used as a refrigerant.
e. Dinitrogen pentaoxide (N_2O_5) is prepared by reaction of HNO_3 with P_4O_{10}.
The correct statements are

(1) a, b, c, d and e

(2) a, b and e only

(3) b, d and e only

(4) c and d only

74. What is the correct electronic configuration of the central atom in $[NiCl_4]^{2-}$ based on crystal field theory?

(1) $e^4t_2^6$

(2) $e^2t_2^6$

(3) $e^3t_2^5$

(4) $e^4t_2^4$

75. Match list-I with list-II

List-I	List-II
a. Haber process	(i) $PdCl_2$ catalyst
b. Deacon's process	(ii) $TiCl_4$ with $Al(CH_3)_3$
c. Ziegler catalyst	(iii) $CuCl_2$ catalyst
d. Wacker process	(iv) Fe catalyst

The correct match is

(1) a(ii), b(iii), c(i), d(iv)

(2) a(iv), b(iii), c(ii), d(i)

(3) a(i), b(ii), c(iv), d(iii)

(4) a(iii), b(i), c(ii), d(iv)

76. The colour of chromate and dichromate ions respectively are

(1) Orange and yellow

(2) Green and purple

(3) Yellow and orange

(4) Purple and green

77. Consider the following statements.

a. Conversion of oxygen gas to ozone is an endothermic process.

b. Ozone acts as an oxidising agent in the manufacture of $KMnO_4$.

c. Rhombic sulphur is insoluble in water as well as in CS_2.

d. SO_2 reacts with chlorine in the presence of charcoal to give sulphuryl chloride.

The correct statement(s) is/are

(1) b only

(2) c and d only

(3) a, b and d only

(4) b and d only

78. Given below are two statements

Statement-I: SO_2 is used as an anti-chlor, disinfectant and preservative.

Statement-II: Sulphurous acid has one S = O bond and two S – OH bonds

In the light of above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

79. Identify the correct orders against the property mentioned (M = V, Cr and Fe).

a. V > Fe > Cr – Enthalpy of atomisation

b. $Cr^{2+} > Fe^{2+} > V^{2+}$ – spin only magnetic moment

c. Fe > Cr > V – Negative value of $\Delta_{hyd}H^{\ominus}(M^{2+})$

Choose the correct answer from the options given below.

(1) a and c only

(2) b and c only

(3) a, b and c

(4) a and b only

80. Choose the incorrect statement

(1) Brass is an alloy of copper and zinc

(2) Zn^{2+} and Sc^{3+} are colourless in aqueous medium

(3) Basic character increases from V_2O_3 to V_2O_4 to V_2O_5

(4) $Cr_2O_7^{2-}$ has lower oxidising power than MnO_4^-

81. Choose the incorrect statement.

(1) $Tb(OH)_3$ is more basic than $Tm(OH)_3$

(2) La^{3+} and Lu^{3+} ions are diamagnetic in nature

(3) Thorium (Th) exhibits both +3 and +4 oxidation states

(4) Np and Pu are transuranium elements

82. Which of the following lanthanoids exhibit +4 oxidation state?

(1) Ce

(2) Eu

(3) Sm

(4) Yb

83. Primary and secondary valency of Fe in $K_4[Fe(CN)_6]$ respectively are

(1) 4, 4

(2) 4, 6

(3) 2, 6

(4) 6, 4

84. Four successive members of the first series of the transition metals are listed below. For which one of them the standard potential $\left(E^{\circ}_{M^{2+}/M}\right)$ value has a positive sign?

(1) Zn

(2) Co

(3) Ni

(4) Cu

85. The number of mole of $KMnO_4$ is required for complete oxidation of 2 moles of iodide ion (I^-) in an acidic medium is

(1) $\frac{3}{5}$

(2) $\frac{4}{5}$

(3) $\frac{2}{5}$

(4) $\frac{1}{5}$

86. Which of the following statements is incorrect?

(1) CrO is basic but Cr_2O_3 is amphoteric

(2) All the transition metals except scandium form MO oxides which are ionic in nature

(3) Cr^{2+} is a weaker reducing agent than Fe^{2+} in water

(4) Scandium does not exhibit variable oxidation states

87. Which of the following statements is incorrect about 3*d* series elements?

(1) Scandium has highest density

(2) Zinc has lowest enthalpy of atomisation

(3) Zinc has highest first ionization enthalpy

(4) Both Mn and Fe can form mixed oxides

88. Identify the incorrect order against the property mentioned.

(1) $H_2O > H_2Te > H_2Se > H_2S$ – Melting point

(2) $H_2O > H_2S > H_2Se > H_2Te$ – HEH bond angle (E = O, S, Se, Te)

(3) $H_2O > H_2S > H_2Se > H_2Te$ – $\Delta_{diss}H^{\ominus}$ (H – E) [E = O, S, Se, Te]

(4) $H_2Te > H_2O > H_2Se > H_2S$ – Boiling point

89. Hybridisation of Pt in $[PtCl_4]^{2-}$ and shape of the species $[PtCl_4]^{2-}$ respectively are

(1) sp^3 and tetrahedral

(2) dsp^2 and tetrahedral

(3) dsp^2 and square planar

(4) sp^3 and square planar

90. According to spectrochemical series, the correct increasing order of field strength of following ligands is

(1) $HO^- < F^- < H_2O < C_2O_4^{2-}$

(2) $F^- < OH^- < C_2O_4^{2-} < H_2O$

(3) $OH^- < F^- < C_2O_4^{2-} < H_2O$

(4) $F^- < OH^- < H_2O < C_2O_4^{2-}$

BOTANY

91. What will be the number of molecules of sugar, phosphate, and nucleosomes, respectively in the nucleus of a diploid eukaryotic cell which possesses 2.4×10^6 bp?

(1) 2.4×10^6, 4.8×10^6 and 1.2×10^6

(2) 4.8×10^6, 2.4×10^6 and 12×10^3

(3) 4.8×10^6, 4.8×10^6 and 12×10^3

(4) 2.4×10^6, 2.4×10^6 and 12×10^3

92. It is observed that in eukaryotes a particular mRNA is shorter in length than its gene from which it has transcribed. What is the possible reason for this?

(1) mRNA has 5′ cap

(2) mRNA has 3′ tail

(3) mRNA has introns only

(4) mRNA has exons only

93. snRNAs are

(1) Transcribed by RNA polymerase I

(2) Small sized thymine rich RNAs which occur outside the nucleus

(3) Small sized RNAs confined to the nucleus

(4) Present in the nucleus and help in processing of polypeptides only

94. Choose the **wrong** statement.

(1) Prokaryotes unlike eukaryotes have single origin of replication

(2) DNA dependent DNA polymerases catalyse polymerisation only in one direction *i.e.* 5′ → 3′

(3) DNA ligase is not required for continuous but required for discontinuous DNA replication

(4) In prokaryotes, DNA gyrase has topoisomerase activity

95. Select the **incorrect** statement w.r.t. UTRs

(1) Are some additional sequences found in an mRNA

(2) Are translated frequently

(3) Are present at both 5'- end before start codon and 3'- end after stop codon

(4) Are required for efficient translation process

96. Same length of four DNA segments A, B, C and D respectively have 6%, 26%, 20% and 32% thymine base. Which segment requires more amount of energy than the others to separate their two strands completely?

(1) B

(2) D

(3) A

(4) C

97. In *lac* operon, if there occurs a mutation in *lac y* gene that makes it non-functional, which of the following effects will most likely to be observed?

(1) *Lac* operon will shut down

(2) Breakdown of lactose will be enhanced

(3) Formation of transacetylase will be stimulated

(4) Entry of lactose inside the cell will increase

98. VNTRs are
a. Small DNA sequences arranged tandemly in many copy number.
b. Surrounded by conserved restriction sites.
c. Microsatellites
d. Present in same copy number in different chromosomes of an individual.
The **correct** ones are

(1) a and b

(2) b and c

(3) c and d

(4) a and d

99. During initiation of transcription, which of the given confers specificity on promoter site of DNA?

(1) Core enzyme

(2) Rho factor

(3) DNA polymerase

(4) Sigma factor

100. Which of the following statements regarding transcription are **correct**?
a. Transcription is governed by principle of complementarity.
b. If both strands of DNA act as a template, they would code for RNA molecule with same sequences.
c. If double stranded RNA is formed after transcription then it will promotes RNA to get translated into protein.
d. Like the process of replication, the entire DNA of an organism gets transcribed at a time.

(1) b & c

(2) d only

(3) a only

(4) a & c

101. An mRNA which codes for a protein has 300 nucleotides. If the nucleotide at position 271 is deleted, how many codons of this mRNA will remain unaltered?

(1) 90

(2) 100

(3) 91

(4) 101

102. A couple has two sons. First son is normal but the second one is colourblind. Which of the following should be most appropriate conclusion that can be drawn from the given information?

(1) Both the maternal grandparents of the sons must be colourblind

(2) Paternal grandmother of the sons must be colourblind

(3) If the couple has daughters, all the daughters would be colourblind

(4) Probability of third son of this parent for being colourblind is 50%

103. If a pea plant heterozygous for seed shape and tallness is crossed with a dwarf pea plant having trait of wrinkled seed, then the resultant progenies will be in the ratio of

(1) Tall progenies with wrinkled seeds : Dwarf progenies with round seeds = 3 : 1

(2) Tall progenies with round seeds : Tall progenies with wrinkled seeds : Dwarf progenies with round seeds : Dwarf progenies with wrinkled seeds = 1 : 1 : 1 : 1

(3) Tall progenies with round seeds : Dwarf progenies with round seeds = 9 : 1

(4) Dwarf progenies with wrinkled seeds : Dwarf progenies with round seeds = 3 : 1

104. How many genotypically different types of gametes will be formed by PpQqRr genotype if only P and Q genes are completely linked?

(1) 8

(2) 4

(3) 2

(4) 16

105. When two varieties of a species of plant homozygous for a particular character controlled by a gene are crossed, the offspring showed the phenotype of only one of the parents. Which of the following statements could be true regarding the alleles responsible for the traits?

(1) The unmodified allele produces no enzyme at all

(2) Both modified and unmodified alleles produce less efficient enzyme

(3) The modified allele produces a non-functional enzyme

(4) The unmodified allele produces less amount of enzyme

106. A pea plant heterozygous for pod shape and flower colour was selfed and total 512 seeds were obtained. What will be the total number of seeds having the trait for inflated pod and white coloured flowers?

(1) 128

(2) 96

(3) 210

(4) 250

107. Read the following statements and select the **correct** option.
Assertion (A): Propagation of piece of DNA during recombinant DNA procedures, requires a vector.
Reason (R): Vector provides the origin of replication.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

108. A plant with genotype AABBCC produces tomatoes of 80 gram in weight, while aabbcc produces tomatoes of 20 gram in weight. Which of the following combinations is **correct** if the character shows polygenic inheritance?

(1) AaBbCc - 50 g

(2) AaBBCc - 40 g

(3) aaBbCC - 30 g

(4) Aabbcc - 10 g

109. During an experiment, following recombination frequencies between various genes were observed.
a and c = 9%
b and c = 24%
b and d = 5%
a and b = 15%
c and d = 29%
a and d = 20%
What will be the sequence of these genes on a linear chromosome?

(1) a, d, b, c

(2) a, b, c, d

(3) c, a, b, d

(4) a, c, b, d

110. Cystic fibrosis is a/an

(1) X-linked recessive disorder

(2) Autosomal dominant disorder

(3) Autosomal recessive disorder

(4) X-linked dominant disorder

111. If we get 9 : 3 : 3 : 1 phenotypic ratio in a dihybrid cross it denotes

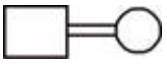
(1) Blending inheritance

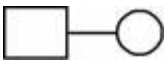
(2) Polygenic inheritance

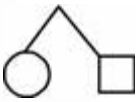
(3) Independent assortment of chromosomes

(4) Physical association

112. During pedigree analysis, consanguineous mating is represented by the symbol

(1) 

(2) 

(3) 

(4) 

113. Match column-I with column-II

	Column-I		**Column-II**
a.	The organism having 4.6×10^6 bp in its genetic material	(i)	No two different types of gametes in terms of sex chromosomes are produced
b.	Males of this organism are developed by means of parthenogenesis and it is considered as one of the dominating pollinating agent among animals	(ii)	Genes for wing size are present on X-chromosome
c.	The organism which belongs to Ascomycetes and there is no formation of fruiting body	(iii)	No role of snurps to form mRNA and also has *lac* operon
d.	The eukaryotic organisms used by Morgan to study genes that were sex linked	(iv)	Its genome has been sequenced and it has about 6000 genes

Choose the **correct** option.

(1) a(iv), b(iii), c(ii), d(i)

(2) a(iii), b(i), c(iv), d(ii)

(3) a(i), b(iv), c(ii), d(iii)

(4) a(iv), b(i), c(ii), d(iii)

114. Match column-I with column-II

	Column-I		Column-II
a.	The experimental organism of Mendel's hybridisation experiments	(i)	Presence of 5-methyl uracil in polynucleotide chain and has non-infectious protein coat
b.	The infectious agent used in the experiment by Hershey-Chase	(ii)	Location of traits responsible for seed shape and its colour are not on the same chromosome
c.	Dog flower	(iii)	The genetic material shows the presence of uridine
d.	QB bacteriophage	(iv)	In heterozygous condition, effect of one allele is more pronounced than the other, and mixing of both colours result in the intermediate flower colour

Choose the **correct** option.

(1) a(ii), b(iii), c(iv), d(i)

(2) a(iv), b(ii), c(iii), d(i)

(3) a(ii), b(i), c(iv), d(iii)

(4) a(i), b(iv), c(ii), d(iii)

115. Read the below given statements about the genetic material.

P. One DNA helix runs continuously from one end to the other in each chromatid, in a highly supercoiled form.

Q. Transcription and replication of DNA are energetically expensive processes

R. Loss or gain of a segment of DNA, results in alteration in chromosomes.

S. Different processes in central dogma of molecular biology are tightly regulated.

T. All the essential life processes were evolved around the first genetic material.

Based on the above statements pick the **correct** option.

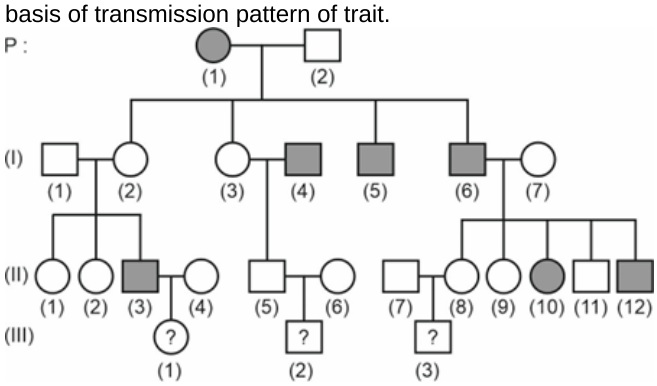
(1) T and R are true and R is the correct reason for T

(2) P, Q and S are true and S is the correct reason for Q

(3) All are true and P is the correct reason for T

(4) P and R are true and P is the correct reason for R

116. Observe the given pedigree analysis chart showing transmission of a trait and choose the correct option on the basis of transmission pattern of trait.



a. If the P(1) is affected with thalassemia, then the probability of the individual III(1) and III(2) of being affected with the trait can be 0.5.

b. The genotype of individual II(8) and III(3) can be XX and X^hY, respectively for the sex-linked recessive trait.

c. The individual I(4), I(5) and I(6) are not affected with Y-linked trait but instead showing Edward's syndrome.

d. The given pedigree is not showing the inheritance pattern of myotonic dystrophy.

How many of the above statements are **correct**?

(1) Two

(2) One

(3) Three

(4) Four

117. Read the given assertion (A) and reason (R) statements and choose the **correct** option.

Assertion (A): The individuals affected with sickle cell anemia, produce HbS peptide having valine and glutamic acid at the 6^{th} and 7^{th} position, respectively.

Reason (R): Due to transition mutation in the gene, the codon GAG is converted to GUG and thus, there is substitution of glutamic acid by valine resulting in sickle cell anaemia.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

118. Read the given statements (A to E) and state them as true (T) or false (F).
A. James Watson and Crick received their PhD degree in 1953 on a study of effect of hard x-rays on bacteriophage multiplication.
B. When Morgan crossed yellow-bodied and white-eyed female with brown-bodied, red-eyed male, then in the F_2 generation, he obtained 62.8% parental and 37.2% recombinants.
C. The first identification of "factors" and the "nuclein" by the different scientists occured in the same year.
D. In fruitflies, white eye mutation leads to depigmentation in many other parts of body, giving pleiotropic effect.
E. A gamete contains only one chromosome of a type and only one of the two alleles of a trait.
Choose the **correct** option.

	A	B	C	D	E
(1)	T	F	T	F	T
(2)	T	T	T	T	F
(3)	F	F	F	T	T
(4)	T	F	F	F	T

(1) (1)

(2) (2)

(3) (3)

(4) (4)

119. Observe the following crosses made between different parents with given blood group, to predict the blood groups of the progeny. Choose the most appropriate option regarding it.
Parents: ♂ ♀

(i) A × O
(ii) O × AB
(iii) A × B

(1) In case of both (i) and (ii), the probability of getting the children with blood group A can only be 50%

(2) In case of both (ii) and (iii), there can never be the chance of getting the F_1 progeny with 'O' blood group

(3) In case of (iii), there is always 100% probability of the children having blood group AB, regardless of the parental genotype

(4) If there is a non-sense mutation occuring in the allele I^A, then in case of both (i) and (ii), F_1 progeny can have blood group 'O'.

120. Read the given statements and choose the **correct** option.
a. From bacterial cell to human, UUU codes for tryptophan.
b. If there is an inhibitory mutation in the *i* gene and *y* gene of *lac* operon, then there will be constitutive expression of structural genes and this results in increased intake of lactose.
c. RNA can function as a messenger, an adaptor for picking up amino acids, structural and catalytic molecule.
d. Repetitive sequences are thought to have no direct coding functions, but they shed light on chromosome structure, dynamics and evolution.
e. In prokaryotes, the packaged structure of DNA is called genophore.
The **correct** ones are

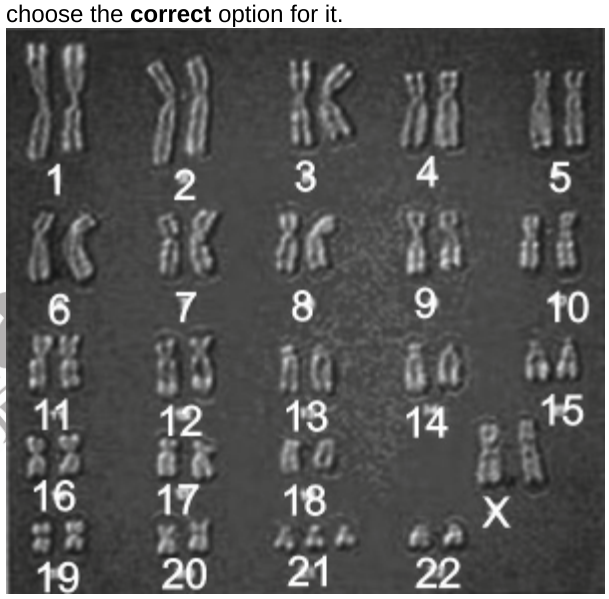
(1) b, c and e only

(2) a, b and d only

(3) All except a and b

(4) a, c and e only

121. Observe the below given karyotype. Identify the disorder and choose the **correct** option for it.



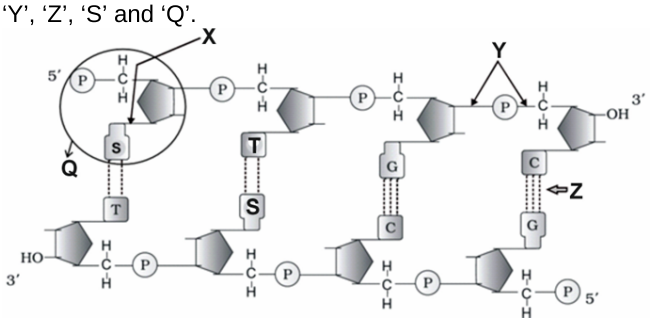
(1) The above condition arises due to non-disjunction of homologous chromosomes during anaphase-II

(2) The disorder depicted here was first described by Langdon in 1856 among humans.

(3) This is showing the presence of an additional copy of 'X body' resulting into 47 chromosomes.

(4) The affected individual of this disorder is characterised by broad flat face, flat back of head and congenital heart disease.

122. Observe the below given diagram of a polynucleotide chain and choose the **correct** option for the unknown labels 'X', 'Y', 'Z', 'S' and 'Q'.



a. 'S' represents a base having heterocyclic, 9-membered double ring structure.
b. 'X' is representing the 1'-9 glycosidic linkage in nucleotide.
c. Both 'Y' and 'Z' represents the bond which confer stability to the helical structure.
d. Two 'Q's are linked through 'Y' to form a dinucleotide.

(1) Only b and c are correct

(2) Only a is correct

(3) Only a and b are correct

(4) All are correct

123. A forensic team obtains DNA sample from a crime scene and they want to identify the criminal. The technique, they will use has following steps.
Arrange the given steps in a **correct** sequential order.
a. Transferring of DNA fragments to synthetic membranes.
b. Detection of hybridised DNA fragments by autoradiography.
c. Hybridization using labelled VNTR probe.
d. Digestion of DNA by restriction endonucleases.
e. Separation of DNA fragments by electrophoresis.
f. Isolation of DNA.
Choose the **correct** option.

(1) f → a → d → e → b → c

(2) d → e → a → f → c → b

(3) f → d → e → a → c → b

(4) d → f → e → c → a → b

124. Identify the structure/organism on the basis of their description in below given table and choose the **correct** option.

(A) – A free-living non-pathogenic nematode
(B) – Have a size of 0.1 to 20 kb
(C) – A heritable feature that varies among individuals
(D) – An alternative version of a gene
(E) – Its presence is reminiscent of antiquity of RNA

(1) A → Roundworms, B → STRs, C → Trait, D → Allele, E → SNPs

(2) A → *Oryza*, B → SSRs, C → Gene, D → Allele, E → Exons

(3) A → *Caenorhabditis elegans*, B → VNTRs, C → Character, D → Allele, E → Introns

(4) A → *Ascaris*, B → Microsatellites, C → Trait, D → Factors, E → Ribozymes

125. Which of the following genes, binds to the product of regulator gene in an operon model proposed by Jacob and Monod?

(1) Structural gene

(2) Promoter gene

(3) Operator gene

(4) Inhibitor gene

126. Select the **mismatched** pair.

(1) ELSI – Ethical, Legal and Social Issues

(2) BAC – Bacteriophage Artificial Chromosome

(3) ESTs – Expressed Sequence Tags

(4) RFLP – Restriction Fragment Length Polymorphism

127. Read the given statements and choose the correct option for them.
Statement A: The development and differentiation of embryo into an adult organism are also a result of coordinated regulation of expression of several sets of genes.
Statement B: The ribosome consists of structural RNAs and about 80 different proteins.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Statement A is correct but B is incorrect

(4) Statement A is incorrect but B is correct

128. '__A__' cell-free system for protein synthesis finally helped the genetic code to be deciphered.
Choose the option to **correctly** fill in the above blank.

(1) Severo Ochoa's

(2) Marshall Nirenberg's

(3) George Gamow's

(4) Har Gobind Khorana's

129. Select the **odd** one out w.r.t. the properties of a genetic material.

(1) It should be chemically and structurally stable

(2) It should be able to generate its replica

(3) It should be able to express itself in the form of Mendelian characters.

(4) It should provide the scope for fast changes for evolution.

130. Select the **incorrect** representation w.r.t. the experiment conducted by Frederick Griffith.

(1) S strain → Inject into mice → Mice die

(2) R strain → Inject into mice → Mice live

(3) S strain (heat-killed) + R stain (live) → Inject into mice → Mice live

(4) S strain (heat-killed) → Inject into mice → Mice live

131. The characteristic feature(s) of an individual inflicted with Klinefelter's syndrome is/are
a. Short stature
b. Gynaecomastia
c. Reduction in hair and skin pigmentation
d. Palm crease
Choose the **correct** answer from the options given below:

(1) a and b only

(2) b only

(3) a, b and c only

(4) c and d only

132. Select the **odd** one w.r.t. the steps of Hershey and Chase experiment.

(1) Infection

(2) Blending

(3) Crystallography

(4) Centrifugation

133. In which of the following disorders, the affected individual lacks a liver enzyme that converts phenylalanine into tyrosine?

(1) Myotonic dystrophy

(2) Turner's syndrome

(3) Phenylketonuria

(4) β-Thalassemia

134. The scientist who coined the term recombination is

(1) Bateson

(2) de Vries

(3) Sutton

(4) Morgan

135. Polyploidy is often seen in

(1) Birds

(2) Plants

(3) Bees

(4) Mammals

ZOOLOGY

136. Prothrombin is present in

(1) Blood plasma

(2) Blood corpuscles

(3) Blood platelets

(4) Serum

137. FRC is represented by

(1) RV + ERV + TV + IRV

(2) ERV + RV

(3) ERV + TV + IRV

(4) VC + RV

138. The first sound of heart during a cardiac cycle is produced by

(1) Closure of aortic and pulmonary valves

(2) Back flow of blood in vena cava

(3) Rapid filling of ventricles

(4) Closure of mitral and tricuspid valves

139. **Correct** match in the given table is

	Respiratory gases	Atmospheric air	Alveoli	Oxygenated blood
(1)	pO_2	159 mm Hg	95 mm Hg	104 mm Hg
(2)	pCO_2	0.3 mm Hg	40 mm Hg	95 mm Hg
(3)	pCO_2	0.3 mm Hg	45 mm Hg	40 mm Hg
(4)	pO_2	159 mm Hg	104 mm Hg	95 mm Hg

(1) (1)

(2) (2)

(3) (3)

(4) (4)

140. Select the **mismatch** w.r.t. organisms and their corresponding respiratory structures.

(1) Aquatic arthropods – Tracheal tubes

(2) Birds – Lungs

(3) Earthworms – Moist cuticle

(4) Sponges – Body surface

141. In humans, the diffusion membrane in lungs is made up of how many cellular layer(s)?

(1) Two

(2) Three

(3) Four

(4) One

142. In the pulmonary vein of humans, the value of pCO_2 of blood passing through its lumen is

(1) Higher than the pCO_2 of blood present in lumen of vena cava

(2) Equal to the pO_2 of blood present in lumen of systemic veins

(3) Lower than the pCO_2 of atmospheric air

(4) Lower than the pO_2 of blood present in lumen of pulmonary artery

143. Trachea divides at the level of ___A___ to form right and left primary ___B___.

Choose the option that correctly fills the blanks A and B respectively.

(1) 5^{th} thoracic vertebra, bronchi

(2) 3^{rd} thoracic vertebra, bronchi

(3) 5^{th} thoracic vertebra, bronchioles

(4) 3^{rd} thoracic vertebra, bronchioles

144. Select the **incorrect** statement w.r.t. lymph.

(1) It is a colourless fluid containing lymphocytes.

(2) It is an important carrier for nutrients, hormones, *etc*.

(3) It has different mineral distribution as that present in plasma.

(4) Fats are absorbed through it in the lacteals present in the intestinal villi.

145. Read the following statements w.r.t. human heart

(i) Endodermally derived organ situated in the thoracic cavity.
(ii) In an adult, it is of the size of a clenched fist.
(iii) It is protected by a double walled membranous bag called the pericardium.
(iv) The small upper chambers of the heart are called atria and lower large chambers are called ventricles.

How many statements is/are **correct**?

(1) One

(2) Two

(3) Three

(4) Four

146. The average life span of RBCs in adult humans is _____ days, after which they are destroyed in the _____.

Choose the **correct** option which fills the blanks respectively.

(1) 180, Thymus

(2) 60, Spleen

(3) 120, Spleen

(4) 18, Thymus

147. Select the **incorrect** statement w.r.t. arteries.

(1) Arteries always carry oxygenated blood from heart to different organs of the body.

(2) The tunica media of arterial wall is comparatively thicker than that of corresponding vein.

(3) The wall of each artery consists of three layers.

(4) The outermost layer of arterial wall is made of fibrous connective tissue with collagen fibres.

148. Under normal physiological conditions, how many double circulations are normally completed by human heart in one minute?

(1) Eight

(2) Sixteen

(3) Thirty six

(4) Seventy two

149. The blood flows freely into the ventricles during all of the following events, **except**

(1) Atrial systole

(2) Ventricular systole

(3) Ventricular diastole

(4) Joint diastole

150. Match column I with column II.

	Column I		**Column II**
(a)	Fishes	(i)	Both pulmonary and systemic circulation are present
(b)	Amphibians	(ii)	Most of them contain 3-chambered heart
(c)	Reptiles	(iii)	Both oxygenated and deoxygenated blood get mixed up in a single ventricle
(d)	Birds	(iv)	Heart pumps out deoxygenated blood

Choose the **correct** option.

(1) a(iv), b(iii), c(i), d(ii)

(2) a(iv), b(ii), c(i), d(iii)

(3) a(iv), b(iii), c(ii), d(i)

(4) a(i), b(ii), c(iii), d(iv)

151. Read the following statements w.r.t. humans.
(a) Percentage of proteins in the plasma is same as that of the second most abundant agranulocytes among total WBCs.
(b) Both *Pheretima* and *Hyla* possess closed circulatory system.
(c) A thick fibrous wall called inter-atrial septum separates the right and left atria.
(d) Systemic circulation in *Struthio* starts from left ventricle and ends in right atrium.
Select the option representing **correct** statements only.

(1) (a) and (b) only

(2) (b) and (d) only

(3) (a), (b) and (c) only

(4) (a), (b) and (d) only

152. The correct pathway of impulse conduction through nodal tissues of heart is represented by

(1) AV bundle → Bundle of His → SA node → Purkinje fibres

(2) SA node → Purkinje fibres → AV node → Bundle of His

(3) Purkinje fibres → AV node → Bundle of His → SA node

(4) SA node → AV node → Bundle of His → Purkinje fibres

153. Read the following statements carefully w.r.t. humans.
Statement A: When the glottis is open and no air is flowing into or out of the lungs, pressure in all parts of the respiratory tree, all the way to the alveoli, is equal to the atmospheric pressure.
Statement B: On expiration, the air in the dead space (conducting airways) is expired along with alveolar air.
Select the **correct** option.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

154. A child was eating big candies with approximately 1 to 1.5 cm in diameter. During swallowing, he attempted to talk and accidently swallowed one candy down his airway, blocking his right bronchus. Which of the following describes the changes that will occur?

	Right lung alveolar pCO_2	Right lung alveolar pO_2	Systemic arterial pO_2
(1)	↑	↑	↑
(2)	↓	↓	↑
(3)	↑	↓	↓
(4)	↓	↑	↓

(1) (1)

(2) (2)

(3) (3)

(4) (4)

155. Select the **correct** statement.

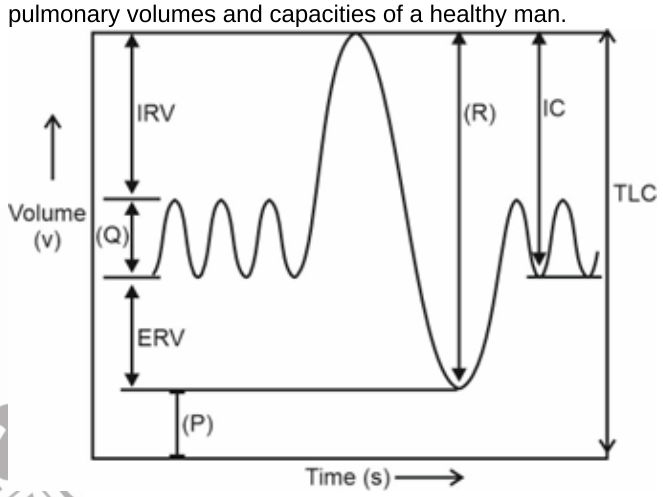
(1) During swallowing in humans, epiglottis is covered by a thin elastic cartilaginous flap called glottis to prevent the entry of food into the larynx.

(2) In humans, trachea is a straight tube lined by skeletal muscles which connects larynx to the alveolar ducts directly , allowing air to pass to and from the lungs

(3) In cockroaches, oxygen from the air dissolves in the moisture on their cuticle, then diffuses through it into the blood vessels while carbon dioxide is expelled in the same way.

(4) Diaphragm present at the bottom of the thoracic cage in humans, arches over the liver and moves downward like a piston when it contracts.

156. Observe the given below diagrammatic representation of pulmonary volumes and capacities of a healthy man.



Select the **correct** option w.r.t. above given graph.

(1) Average numerical value of [ERV + (P)] is equal to the value of [(R) + (P)]

(2) [IRV + (Q)] is equal to 1200 mL

(3) (P) prevents the lungs from collapsing by keeping the alveoli open and also allows continuous gas exchange between breaths

(4) (R) cannot be measured by a spirometer.

157. At the end of inhalation in a man, intra-pleural pressure is

(1) Greater than the atmospheric pressure

(2) Equal to the atmospheric pressure

(3) Less than the atomspheric pressure

(4) Greater than the alveolar pressure

158. At a party, few friends placed a plastic bag over X ‘s face tightly. As ’X' continued to breathe into this bag, his rate of breathing continued to increase. Which of the following is responsible for this increased ventilation?

(1) Increased alveolar pO_2

(2) Increased arterial pCO_2

(3) Decreased alveolar pCO_2

(4) Increased pH

159. Which of the following is **correct**?

(1) Hypoxia occurs due to decreased oxygen supply to tissues

(2) Asthma is caused due to damage to alveolar walls

(3) Emphysema is characterized by increased respiratory surface area

(4) Silicosis occurs due to proliferation of muscular tissue in lungs

160. Choose the **incorrect** statement.

(1) The rate of diffusion through the membrane is inversely proportional to the thickness of the membrane.

(2) We can directly alter the pulmonary volume.

(3) The difference between the partial pressure of the gas in alveoli and the partial pressure of the gas in the pulmonary capillary's blood is a measure of the net tendency for the gas molecules to move through the membrane.

(4) The diffusion capability of each gas through the respiratory membrane depends on its solubility.

161. A diver who holds his breath for an extended period, despite falling oxygen levels, does not feel an urge to breathe until a certain point.
Which of the following factors forces him to finally breathe?

(1) Fall in blood O_2 directly stimulates the pneumotaxic centre present in the chemosensitive area of brain stem.

(2) Increased H^+ in CSF stimulates the chemosensitive area present near the respiratory rhythm centre

(3) Increased parasympathetic stimulation of the diaphragm

(4) Triggering of chemoreceptors present in the lungs due to increased pH

162. A girl complains of episodes of breathlessness, chest tightness and wheezing after entering a dusty room. When her condition worsened, she was administered adrenaline due to history of similar symptoms.
Which of the following statements is **incorrect** regarding her condition?

(1) The affected site is bronchioles and bronchi due to their inflammation

(2) Her condition is characterised by reversible obstruction of airflow

(3) Vital capacity significantly increases during this attack

(4) Hypersecretion of mucus contributes to the narrowing of the airway lumen

163. Calculate alveolar ventilation (mL/min), volume of fresh air entering/reaching the alveoli per minute of a healthy human, when tidal volume is 500 mL with respiratory rate of 12 breaths/min and anatomical dead space (air present in conducting airways) is of 150 mL.

(1) 4200 mL/min

(2) 3500 mL/min

(3) 8000 mL/min

(4) 7000 mL/min

164. During strenuous exercise, when heart rate increases, all of the following will be correct, **except**

(1) Duration of each cardiac cycle decreases

(2) Duration of action potential increases

(3) Duration of inspiration decreases

(4) Rate of production of ATP increases

165. Read the following statements carefully.
Statement A: Osmotic pressure caused by the plasma proteins tends to cause fluid movement by osmosis from the interstitial spaces into the blood.
Statement B: The coronary arteries branch from the ascending aorta and encircle the heart to supply the oxygenated blood to myocardium.
Select the **correct** option.

(1) Both the statements A and B are correct

(2) Both the statements A and B are incorrect

(3) Only the statement A is correct

(4) Only the statement B is correct

166. Which of the following events occurs after ventricular ejection?

(1) AV valves close

(2) Aortic valve opens

(3) Semilunar valves close

(4) Tricuspid valve closes

167. Arrange the following formed elements in the increasing order of their abundance in blood in a healthy adult human.
a. Erythrocytes
b. Basophils
c. Thrombocytes
d. Monocytes
e. Neutrophils
Select the most **appropriate** answer.

(1) a < b < c < d < e

(2) b < d < e < a < c

(3) b < d < e < c < a

(4) d < b < e < a < c

168. Select the **incorrect** statement w.r.t. humans.

(1) Certain hormones influence the heart rate.

(2) An increase in the sympathetic stimulation typically stimulates the smooth muscles of peripheral blood vessels to contract, narrowing the lumen.

(3) Recoil of elastic arteries keeps blood pushing it forward into the peripheral circulation during ventricular diastole.

(4) After a meal, hepatic artery is rich in nutrients after receiving nutrients from the digestive system.

169. Read the following statements.
a. It secretes histamine which acts as a vasodilator and increases vascular permeability.
b. It secretes heparin which acts as an anti-coagulant.
c. A type of white blood cell characterised by large granules that stain blue-purple with basic dyes.
d. It is associated with allergic and inflammatory reactions.
How many of the above given statements is/are true for basophil?

(1) Two

(2) Three

(3) One

(4) Four

170. A laboratory technician places a drop of blood from a volunteer onto three separate petri dishes labelled as P, Q and R.
Each dish contains anti-serum as follows:
• Petri dish P : Anti-A serum
• Petri dish Q : Anti-B serum
• Petri dish R : Anti-Rh serum
After mixing, the following observations are recorded:
a. Strong coagulation appears only in dishes P and R.
b. No coagulation in dish Q.
The correct blood group of the volunteer is

(1) A^{-ve}

(2) A^{+ve}

(3) AB^{+ve}

(4) O^{+ve}

171. **Assertion (A):** During treatment of coronavirus infection, convalescent plasma therapy (plasma collected from individuals who recovered from COVID-19) was most accepted, where AB^{+ve} individuals were considered as the universal plasma donors.

Reason (R): People with AB^{+ve} blood type do not have anti-A, anti-B and anti-Rh antibodies in their plasma and thus they can donate without causing adverse immune reactions.
In the light of above given statements, choose the **correct** option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are false

(3) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(4) (A) is true but (R) is false

172. **Assertion (A):** A patient with sudden rupture of chordae tendinae in left ventricle may show regurgitation of blood into the left atrium during ventricular systole.
Reason (R): Chordae tendinae normally keep the atrio-ventricular valves taut and prevent backflow of blood during ventricular systole and their rupture leads to valve prolapse.
In the light of above given statements, choose the **correct** option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are false

(3) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(4) (A) is true but (R) is false

173. An individual's blood pressure repeatedly measures 140/90 mmHg. This is clinically significant because

(1) The increased systolic pressure indicates that the ventricles are contracting with excessive force, which can chronically damage arterial walls.

(2) The elevated diastolic pressure shows that the heart is relaxing more powerfully than normal, leading to faster blood flow.

(3) Both systolic and diastolic pressures are above normal, meaning the heart pumps more efficiently and supplies tissues with less O_2, leading to hypoxia.

(4) Only the diastolic pressure determines hypertension; therefore, systolic elevation has no clinical importance.

174. Simple organisms like sponges and coelenterates rely on the movement of external water through their body cavities, while complex organisms evolved specialized transport fluids such as blood. Which of the following best explains this evolutionary shift?

(1) Diffusion becomes insufficient as body size and internal tissue depth increase, requiring an internal fluid to maintain efficient transport and homeostasis.

(2) Water circulation is more energy-efficient, so larger organisms avoid it.

(3) Complex organisms intentionally retain primitive mechanisms to reduce metabolic demand.

(4) Complex organisms evolved blood only for temperature regulation.

175. A patient arrives with severe breathlessness, swollen ankles, and fatigue. Clinical tests show that the heart is still beating but is pumping out only 55% of the normal cardiac output, causing blood to pool in the pulmonary circulation. However, ECG shows no cessation of heartbeat, and biomarkers indicate no acute myocardial infarction. This patient might be suffering from

(1) Cardiac arrest, because reduced cardiac output indicates the heart has stopped functioning.

(2) Heart attack, because reduced blood flow to heart muscle always produces immediate necrosis.

(3) Congestive heart failure, because ineffective pumping causes pulmonary congestion.

(4) Normal physiological variation, because cardiac output always fluctuates without clinical significance.

176. During intense exercise, cardiac output can increase initially but may eventually fail to rise further at very high heart rates because

(1) Systole shortens excessively, reducing the force of contraction.

(2) Diastole becomes too short to allow adequate ventricular filling, limiting the increase in stroke volume.

(3) Heart rate and stroke volume are independent and do not influence each other.

(4) The cardiac cycle stops alternating between systole and diastole at high heart rates.

177. The human lungs are situated in an air-tight chamber whose mid ventral part is demarcated by

(1) Dome-shaped diaphragm

(2) Thoracic vertebrae

(3) Flat sternum

(4) Ribs

178. In humans, the contraction of which of the following muscles causes an increase in the volume of thoracic chamber in the dorso-ventral axis during normal breathing?

(1) Abdominal muscles

(2) Internal inter-costal muscles

(3) External inter-costal muscles

(4) Diaphragm

179. Skin of man cannot act as a respiratory organ because
(a) It is dry
(b) It is not thin
(c) It is not permeable to O_2 and CO_2
Select the option with correct set.

(1) Only (a)

(2) Only (b) and (c)

(3) Only (c)

(4) (a), (b) and (c)

180. In humans, there is a specialised centre called respiratory rhythm centre which is primarily responsible for the regulation of respiration. This respiratory rhythm centre is present in

(1) Medulla oblongata

(2) Aortic arch

(3) Cerebellum

(4) Pons