



# Aakash

Medical|IIT-JEE|Foundations

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MM : 720

Fortnightly Test for NEET-2026\_RM(P1)\_FT-02A

Time : 180 Min

**Topics Covered:****Physics:** Motion in a Plane, Laws of Motion**Chemistry:** Structure of Atom, Classification of Elements and Periodicity in Properties**Botany:** Cell Cycle & Cell Division, The Living World**Zoology:** Biomolecules-II: (Proteins, types & functions, Lipids, Nucleic acids, Enzymes, Cofactors), Breathing & Exchange of Gases-I: (Upto mechanism of breathing)**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. A particle has an initial velocity  $(4\hat{i} + 2\hat{j}) \text{ m s}^{-1}$  and it moves under acceleration of  $(0.4\hat{i} + 0.4\hat{j}) \text{ m s}^{-2}$ . Its speed after 10 s will be

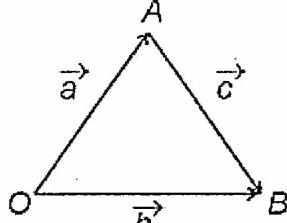
(1)  $7 \text{ m s}^{-1}$ (2)  $10 \text{ m s}^{-1}$ (3)  $8 \text{ m s}^{-1}$ (4)  $6 \text{ m s}^{-1}$ 

2. The coordinates of a body moving in a plane at any instant of time  $t$  are given by  $x = \alpha t$  and  $y = \beta t$ . The magnitude of acceleration of body will be (here  $\alpha$  and  $\beta$  are constant)

(1)  $2\sqrt{\alpha^2 + \beta^2}$ (2)  $\sqrt{\alpha^2 + \beta^2}$ (3)  $\alpha + \beta$ 

(4) Zero

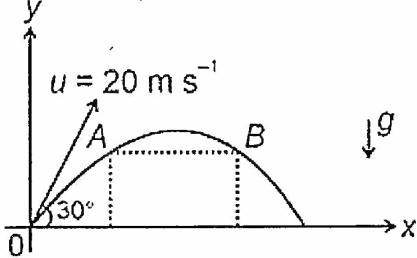
3. Figure given below shows three vectors  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$ .



Then correct relation is

(1)  $\vec{a} + \vec{b} = \vec{c}$ (2)  $\vec{b} + \vec{c} = \vec{a}$ (3)  $\vec{a} + \vec{b} + \vec{c} = 0$ (4)  $\vec{a} + \vec{c} = \vec{b}$

4. A particle is thrown with a velocity of  $20 \text{ m s}^{-1}$  from ground. It passes *A* and *B* as shown in figure at time  $t_1$  and  $t_2$  respectively. The sum of  $t_1$  and  $t_2$  is equal to ( $g = 10 \text{ m s}^{-2}$ )



- (1) 1 s
- (2) 2 s
- (3) 4 s
- (4) 0.5 s

5. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

**Assertion (A):** The change in velocity of a particle which is undergoing uniform circular motion with speed  $v$  when it covers half of circular path, is zero.

**Reason (R):** The change in magnitude of velocity of the particle which is undergoing uniform circular motion with speed  $v$  when it covers half of circular path, is zero.

In the light of the 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 and R is not the correct explanation of A
- (3) A is true but R is false
- (4) A is false but R is true

6. If an object follows a curved path, then (where symbols have their usual meaning)

- A.  $|\vec{v}|$  may remain constant
- B.  $\vec{v}$  may remain constant
- C.  $\vec{a}$  may remain constant
- D.  $|\vec{a}|$  may remain constant

Choose the set of correct statements from the options given below:

- (1) A, B and D only
- (2) A, C and D only
- (3) A and B only
- (4) A, B and C only

7. A lady standing on a bridge holds her umbrella vertically to keep the hailstorm away. If she starts running without umbrella with a speed of 24 km/hr, the hailstorm hits her head at  $30^\circ$  with the vertical. The speed of hailstorm with respect to the moving lady is

- (1) 12 km/hr
- (2) 24 km/hr
- (3) 36 km/hr
- (4) 48 km/hr

8. The position vector of a particle is given by  $\vec{r} = (3\hat{i} + 4\hat{j} + 5t^2\hat{k}) \text{ m}$ . The magnitude of velocity of particle at  $t = 1 \text{ s}$  is

- (1) 20 m/s
- (2) 10 m/s
- (3) 30 m/s
- (4) 5 m/s

9. A particle moving in a circle of radius  $R$  with a uniform speed takes a time  $T$  to complete one revolution. If this particle were projected with same speed at angle ' $\theta$ ' with the horizontal, then the time taken by particle to reach maximum height will be (All symbols have their usual meaning)

- (1)  $\frac{2\pi R \cos \theta}{gT}$
- (2)  $\frac{2\pi R}{gT}$
- (3)  $\frac{2\pi R \sin \theta}{gT}$
- (4)  $\frac{2\pi R \tan \theta}{gT}$

10. A projectile is projected with a speed of 10 m/s at an angle  $\theta$  with the horizontal from ground. If the horizontal range is 10 m, then  $\theta$  is ( $g = 10 \text{ m/s}^2$ )

- (1)  $30^\circ$
- (2)  $60^\circ$
- (3)  $90^\circ$
- (4)  $45^\circ$

13. A particle is moving in a circle with constant speed of 7 m/s, then the centripetal acceleration of particle is (If particle covers 44 meter to complete one circular round)

- (1)  $2 \text{ m/s}^2$
- (2)  $7 \text{ m/s}^2$
- (3)  $3 \text{ m/s}^2$
- (4)  $5 \text{ m/s}^2$

12. A body is projected with a velocity of  $(3\hat{i} + 4\hat{j})$  m/s. The maximum height attained by projectile is ( $g = 10 \text{ ms}^{-2}$ )
- 0.8 m
  - 8 m
  - 4 m
  - 0.4 m
13. A river 200 m wide is flowing at a rate of 4 m/s. A boat crosses the river in minimum time. If velocity of the boat in still water is 8 m/s, then how far from the point directly opposite to the starting point does the boat reach?
- 50 m
  - 100 m
  - 75 m
  - 25 m
14. Equation of trajectory of a projectile is  $y = \sqrt{3}x - 5x^2$ . Then angle of projection with vertical is (Assume x-axis as horizontal and y-axis as vertical)
- $45^\circ$
  - $30^\circ$
  - $60^\circ$
  - $53^\circ$
15. Three persons P, Q, R are standing at the vertices of an equilateral triangle ABC having side  $l$ . If they start moving simultaneously with same speed such that P always faces towards Q, Q always faces towards R and R always faces towards P, then the position where they all meet will be
- At the mid-point of side AB
  - At vertex B
  - At the centroid of triangle
  - They will never meet
16. Two balls are projected from two points A and B,  $x$  metre apart as shown in figure. The time after which the horizontal distance between them becomes zero is
- 
- (1)  $\frac{x}{10} \text{ s}$
- (2)  $\frac{x}{20} \text{ s}$
- (3)  $\frac{x}{45} \text{ s}$
- (4)  $\frac{x}{15} \text{ s}$
17. A particle is moving in x-y plane with constant acceleration of  $(3\hat{i} + 4\hat{j}) \text{ m/s}^2$ . The position of particle after 4 s if particle started from rest and origin, is
- $(\hat{i} + \hat{j}) \text{ m}$
  - $(24\hat{i} + 32\hat{j}) \text{ m}$
  - $(12\hat{i} + 16\hat{j}) \text{ m}$
  - $(3\hat{i} + 4\hat{j}) \text{ m}$
18. Car A is moving with velocity  $\vec{v}_A = (3\hat{i} - 4\hat{j}) \text{ m/s}$ , and car B is moving with velocity  $\vec{v}_B = (\hat{i} - \hat{j}) \text{ m/s}$ . Relative velocity of car A with respect to car B is
- $(2\hat{i} - 3\hat{j}) \text{ m/s}$
  - $(4\hat{i} - 5\hat{j}) \text{ m/s}$
  - $(2\hat{i} + 3\hat{j}) \text{ m/s}$
  - $(4\hat{i} + 5\hat{j}) \text{ m/s}$
19. The equation of a projectile is  $y = ax - \frac{bx^2}{2}$ , its horizontal range is (where x is horizontal and y is vertical displacement)
- $\frac{2a}{b}$
  - $\frac{a}{b}$
  - $\frac{a}{2b}$
  - $\frac{b}{a}$
20. A : Magnitude of force on a projectile while going up is equal to the magnitude of force while coming down.  
R : Direction of force while going up is upwards whereas while coming down is downwards.
- Both Assertion & Reason are true and the reason is the correct explanation of the assertion
  - Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
  - Assertion is true statement but Reason is false
  - Both Assertion and Reason are false statements

21. A particle moves in a circular path of radius  $R$  such that its speed  $v$  varies with distance  $x$  as  $v = \alpha\sqrt{x}$ , where  $\alpha$  is a positive constant. The acceleration of the particle after traversing a distance  $\sqrt{2}R$  is

- (1)  $\alpha^2$
- (2)  $\frac{3}{2}\alpha^2$
- (3)  $\frac{\alpha^2}{2}$
- (4)  $\frac{5}{2}\alpha^2$

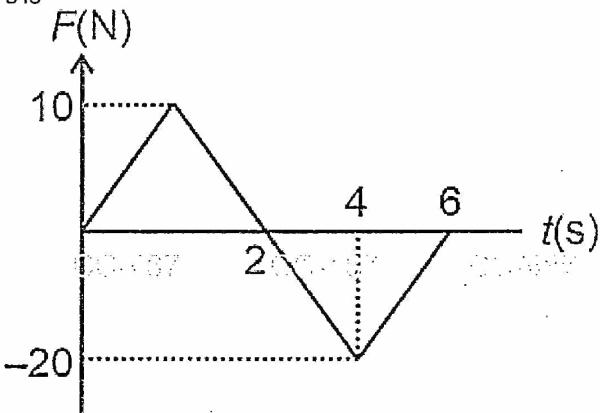
22. Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is  $0.25$  ( $g = 10 \text{ m s}^{-2}$ )

- (1)  $25 \text{ m s}^{-2}$
- (2)  $2.5 \text{ m s}^{-2}$
- (3)  $1.5 \text{ m s}^{-2}$
- (4)  $0.75 \text{ m s}^{-2}$

23. Shubham is moving eastward and suddenly turns southward with the same speed to avoid a pothole. The force that acts on the Shubham while turning is

- (1) Along northward
- (2) Along north-east
- (3) Along south-west
- (4) Along southward

24. The force  $F$  acting on a particle of mass  $m = 2 \text{ kg}$  is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval zero to 6 s is



- (1)  $10 \text{ N s}$
- (2)  $-40 \text{ N s}$
- (3)  $-30 \text{ N s}$
- (4) Zero

25. Consider the following statements

**Statement-A:** If a body is acted upon by a single external force, it cannot be in equilibrium.

**Statement-B:** If a body is in equilibrium under the action of only two external forces, the forces must be equal and opposite.

**Statement-C:** If a body is in equilibrium under the action of three forces, then they may not be coplanar.

Choose the correct option.

- (1) Only statement A is correct
- (2) All A, B and C are correct
- (3) Both A and C are correct
- (4) Both A and B are correct

26. A body is moving with uniform velocity of  $10 \text{ m/s}$  on a level rough surface. The frictional force acting on it is  $5 \text{ N}$ . If it moves with a constant velocity of  $5 \text{ m/s}$  on the same surface, then frictional force acting on it is

- (1) Zero
- (2)  $2.5 \text{ N}$
- (3)  $5 \text{ N}$
- (4)  $10 \text{ N}$

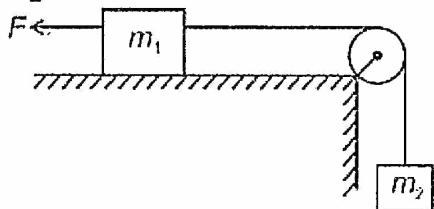
27. A large force  $f$  acts on a particle of mass  $m$  for a short time  $t$ . The impulse imparted to the particle is given by

- (1)  $ft^2$
- (2)  $\frac{f}{t}$
- (3)  $\frac{f}{t^2}$
- (4)  $ft$

28. A car is driven round a curved path of radius  $32 \text{ m}$  without the danger of skidding. The coefficient of friction between the tyres of the car and the surface of curved path is  $0.2$ . The maximum safe speed of the car will be

- (1)  $4 \text{ m/s}$
- (2)  $6 \text{ m/s}$
- (3)  $8 \text{ m/s}$
- (4)  $3 \text{ m/s}$

29. A constant force  $F = \frac{m_2}{2}g$  is applied on the block of mass  $m_1$  as shown in figure. The string and the pulley are light and the surface of the table is smooth. The acceleration of  $m_1$  is



- (1)  $\frac{m_1 g}{2(m_1 + m_2)}$
- (2)  $\frac{m_2 g}{2m_1}$
- (3)  $\frac{m_1 g}{2m_2}$
- (4)  $\frac{m_2 g}{2(m_1 + m_2)}$

30. A stationary body of mass 3 kg explodes into three equal pieces. Two of the pieces fly off in two mutually perpendicular directions, one with a velocity of  $3\hat{i}$  m/s and the other with a velocity of  $4\hat{j}$  m/s. If the explosion occurs in  $10^{-4}$  s, the average force acting on the third piece in newton is

- (1)  $-(3\hat{i} + 4\hat{j}) \times 10^{-4}$  N
- (2)  $-(3\hat{i} + 4\hat{j}) \times 10^4$  N
- (3)  $(4\hat{i} - 3\hat{j}) \times 10^{-4}$  N
- (4)  $-(4\hat{i} + 3\hat{j}) \times 10^4$  N

31. A car moves at an optimum speed of 20 m/s on a banked track while describing an arc of a circle of radius  $40\sqrt{3}$  m. The angle of banking is ( $g = 10$  m/s $^2$ )

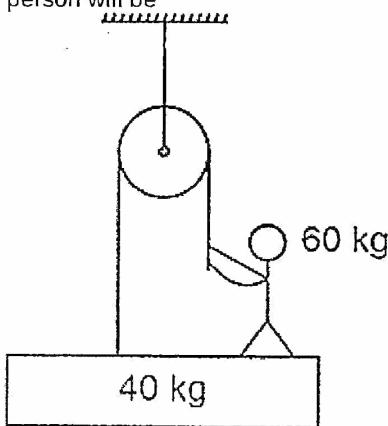
- (1)  $15^\circ$
- (2)  $30^\circ$
- (3)  $60^\circ$
- (4)  $75^\circ$

32. A block is placed on an inclined plane, and the angle of inclination is gradually increased. The block just starts to slide when the plane makes an angle of  $30^\circ$  with horizontal. If the same block is placed on another inclined plane with twice the coefficient of friction, at what angle  $\theta'$  will it start to slide?

- (1)  $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$
- (2)  $\tan^{-1}(\sqrt{3})$
- (3)  $\tan^{-1}(1)$
- (4)  $\tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

33. If a body under the action of force  $\vec{F} = (3\hat{i} + 4\hat{j} - 5\hat{k})$  N, acquires an acceleration of magnitude  $\sqrt{2}$  m/s $^2$ , then mass of body is
- (1) 5 kg
  - (2) 2 kg
  - (3) 10 kg
  - (4)  $5\sqrt{2}$  kg

34. A person of mass 60 kg is standing on a platform attached to rope and pulley as shown. If mass of platform is 40 kg and the system is at rest, then normal reaction on the feet of person will be



- (1)  $20g$
- (2)  $15g$
- (3)  $10g$
- (4)  $5g$

35. A monkey is descending from the branch of a tree with a constant acceleration. If the breaking strength of the branch is 75% of the weight of the monkey, then minimum acceleration with which the monkey can slide down without breaking the branch is

- (1)  $g$
- (2)  $\frac{3g}{4}$
- (3)  $\frac{g}{2}$
- (4)  $\frac{g}{4}$

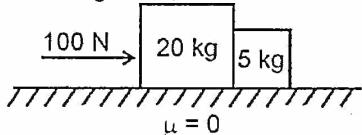
36. Which of the given forces is a pseudo-force?

- (1) Normal force
- (2) Friction force
- (3) Gravitational force
- (4) Centrifugal force

37. A machine gun fires 10 bullets per second with speed 10 m/s. If mass of each bullet is 300 g, then the force required to keep the gun stationary is

- (1) 40 N
- (2) 10 N
- (3) 20 N
- (4) 30 N

38. Two blocks of mass 20 kg and 5 kg are kept on a smooth horizontal surface as shown. A 100 N force is applied on the 20 kg block, find contact force between blocks



- (1) 20 N
- (2) 40 N
- (3) 60 N
- (4) 50 N

39. Assertion (A): In equilibrium, net force on the body is zero.

Reason (R): A body in equilibrium must be at rest.

In the light of above 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 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

40. A balloon of mass 10 kg is rising up with an acceleration of  $20 \text{ ms}^{-2}$ . If a mass of 4 kg is removed from balloon, its acceleration becomes ( $g = 10 \text{ ms}^{-2}$ )

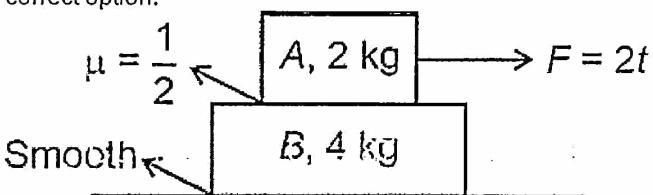
- (1)  $25 \text{ m s}^{-2}$  upwards
- (2)  $10 \text{ m s}^{-2}$  downwards
- (3)  $18 \text{ m s}^{-2}$  upwards
- (4)  $40 \text{ m s}^{-2}$  upwards

41. Choose the correct statement with regards to Newton's third law of motion.

- (1) To every action, there may not be an equal and opposite reaction.
- (2) Action and reaction forces have a cause-effect relationship.
- (3) Action-reaction forces have time lag between them.
- (4) Action and reaction act on different bodies.

42. This question has two columns (Column I and Column II). Column I has four entries (A), (B), (C) and (D), Column II has four entries (P), (Q), (R) and (S). Match the entries in Column I with the entries in Column II. Each entry in Column I may match with one or more entries in Column II. Four choices (1), (2), (3) and (4) are given for this question, out of which **ONLY ONE** is correct.

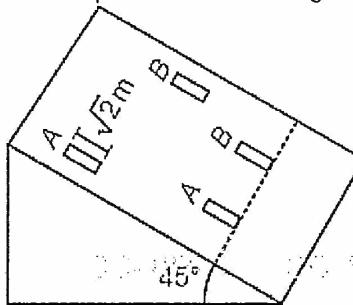
Two blocks A and B of masses 2 kg and 4 kg are placed one over the other as shown in figure. A time varying horizontal force  $F = 2t$  is applied on upper block. Match the entries of column I with entries of column II and choose the correct option.



| Column I                   | Column II                                            |
|----------------------------|------------------------------------------------------|
| (A) At $t = 6 \text{ s}$   | (P) Friction on block A act towards left             |
| (B) At $t = 7.5 \text{ s}$ | (Q) $a_A = 2.5 \text{ m/s}^2$                        |
| (C) At $t = 8 \text{ s}$   | (R) Both the blocks will move with same acceleration |
| (D) At $t = 2 \text{ s}$   | (S) $a_B = 2.5 \text{ m/s}^2$                        |

- (1) A(P, R); B(P, Q, R, S); C(P, S); D(P, R)
- (2) A(P, Q, S); B(P, R); C(P, S); D(Q, R)
- (3) A(P, R); B(Q, R, S); C(P, Q); D(Q, S)
- (4) A(P, R, S); B(Q, R, S); C(R, S); D(P, Q)

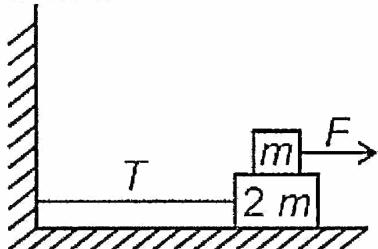
43. Two blocks A and B of equal masses are placed on a rough inclined plane as shown in figure.



Initially the block A is  $\sqrt{2} \text{ m}$  behind the block B. The coefficient of kinetic friction for the blocks A and B are 0.2 and 0.3 respectively. The time after which the two blocks come on the same line on the inclined plane, is

- (1) 2 s
- (2)  $\sqrt{2} \text{ s}$
- (3) 3 s
- (4)  $\sqrt{3} \text{ s}$

44. Two blocks of masses  $m$  and  $2m$  are placed one over the other as shown in figure. The coefficient of friction between  $m$  and  $2m$  is  $\mu$  and between  $2m$  and ground is  $\frac{\mu}{3}$ . If a horizontal force  $F$  is applied on upper block and tension  $T$  is developed in the string, then which of the following is incorrect?



- (1) If  $F = \frac{\mu mg}{2}$ ,  $T = 0$
- (2) If  $F = \frac{\mu}{3}mg$ ,  $T = 0$
- (3) If  $F = \mu mg$ ,  $T = 0$
- (4) If  $F = 2\mu mg$ ,  $T = \frac{\mu mg}{3}$

45. The position of a particle moving in x-y plane at any time 't' in second is given by  $y = (4t^2 - 8t)$  m and  $x = (2t^2 - 4t)$  m. Select the correct statement about the moving particle from the following.

- (1) The acceleration of the particle is zero at  $t = 0$  second
- (2) The velocity of the particle is zero at  $t = 0$  second
- (3) The velocity of the particle is zero at  $t = 1$  second
- (4) The velocity and acceleration of the particle can never be zero

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**CHEMISTRY**

46. For the transition of an electron from  $n = 3$  to  $n = 2$ , photon with the shortest wavelength will be emitted by

- (1) H atom
- (2)  $\text{Li}^{2+}$  ion
- (3)  $\text{He}^+$  ion
- (4)  $\text{Be}^{3+}$  ion

47. The angular momentum of electron in  $d$  orbital is equal to

- (1)  $\sqrt{2}\frac{\hbar}{2\pi}$
- (2)  $\sqrt{6}\frac{\hbar}{2\pi}$
- (3)  $2\sqrt{3}\frac{\hbar}{2\pi}$
- (4) Zero

48. Given below are two statements

**Statement I:** For  $1s$  orbital, the probability density of the electron is maximum at the nucleus.

**Statement II:** The region where the probability density function ( $\psi^2$ ) reduces to zero is called nodal surface or nodes.

In the light of 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

49. Match the ions given in list-I with the number of unpaired electrons given in list-II and choose the correct option.

|    | List-I    |       | List-II |
|----|-----------|-------|---------|
| a. | $Cr^{3+}$ | (i)   | 2       |
| b. | $Mn^{2+}$ | (ii)  | 3       |
| c. | $Fe^{2+}$ | (iii) | 5       |
| d. | $Ni^{2+}$ | (iv)  | 4       |

- (1) a(ii), b(iii), c(iv), d(i)
- (2) a(iii), b(ii), c(i), d(iv)
- (3) a(iv), b(iii), c(i), d(ii)
- (4) a(i), b(iii), c(iv), d(ii)

50. Select correct statement(s) from the following.

- a. The effect of Heisenberg uncertainty principle is significant only for the motion of microscopic objects and is negligible for that of macroscopic objects.
- b. According to de-Broglie, every object in motion has a wave character.
- c. According to Rutherford's nuclear model of atoms, the radius of nucleus is about  $10^{-10}$  m.

Choose the correct option.

- (1) a only
- (2) a and c only
- (3) a and b only
- (4) b and c only

51. Given below are two statements

**Statement I:** For H atom, energy of  $2s$  orbital is equal to the energy of  $2p$  orbital.

**Statement II:** For Zn atom, energy of  $4s$  orbital is more than the energy of  $3d$  orbital.

In the light of above statements, choose the correct option.

- (1) Statement I is correct but statement II is incorrect
- (2) Both statement I and statement II are incorrect
- (3) Both statement I and statement II are correct
- (4) Statement I is incorrect but statement II is correct

52. The ratio of the wavelength of the second line of Balmer series to the third line of Balmer series of H-atom is

- (1) 21 : 25
- (2) 28 : 25
- (3) 25 : 28
- (4) 21 : 17

53. An electron is moving with a velocity  $2 \times 10^3$  ms $^{-1}$  with 0.01% of uncertainty. The uncertainty in the measurement of its position will approximately be ( $h = 6.6 \times 10^{-34}$  Js &  $m_e = 9 \times 10^{-31}$  kg)

- (1)  $9.1 \times 10^{-4}$  m
- (2)  $3.0 \times 10^{-6}$  m
- (3)  $3.0 \times 10^{-4}$  m
- (4)  $9.1 \times 10^{-6}$  m

54. The lowest value of  $n$  that allows  $h$  orbitals to exist is

- (1) 3
- (2) 4
- (3) 5
- (4) 6

55. Given below are two statements.

**Statement I:** Work function of sodium is greater than caesium.

**Statement II:** In photoelectric effect, there is no time lag between the striking of light beam and ejection of electrons from the metal surface.

In the light of above statements, select the **correct** option.

- (1) Statement I is correct and statement II is incorrect
- (2) Statement I is incorrect and statement II is correct
- (3) Both statement I and statement II are correct
- (4) Both statement I and statement II are incorrect

56. Select the correct statement(s) from the following.

- (a)  $Be^{2+}$  is isoelectronic with  $He^+$ .
- (b) Shape of an orbital is given by azimuthal quantum number.

(c) The number of orbitals in a shell ( $n$ ) =  $n^2$ .  
Choose the correct option.

- (1) (a) and (b) only
- (2) (b) only
- (3) (b) and (c) only
- (4) (a), (b) and (c)

57. Consider the following sets of quantum numbers

$n \mid m_s$

- (a) 2 0 0  $+\frac{1}{2}$
- (b) 4 1 2  $-\frac{1}{2}$
- (c) 3 2 2  $+\frac{1}{2}$
- (d) 1 1 0  $+\frac{1}{2}$

Which sets of quantum numbers are not possible?

- (1) (a), (b) and (c) only
- (2) (a), (c) and (d) only
- (3) (a) and (c) only
- (4) (b) and (d) only

58. The number of waves in the fourth orbit of H atom is

- (1) 2
- (2) 4
- (3) 6
- (4) 8

59. A radio station broadcasts on a frequency of 6000 kHz. The wave number of the electromagnetic radiation emitted by transmitter is,

- (1)  $2 \text{ m}^{-1}$
- (2)  $2 \times 10^{-5} \text{ m}^{-1}$
- (3)  $0.02 \text{ m}^{-1}$
- (4)  $0.2 \text{ m}^{-1}$

60. Maximum number of electrons present in magnesium atom having quantum numbers  $m_l = 0$  and  $s = +\frac{1}{2}$  is

- (1) 6
- (2) 3
- (3) 5
- (4) 4

61. The phenomenon which proves the particle nature of light is

- (1) Interference
- (2) Diffraction
- (3) Refraction
- (4) Photoelectric effect

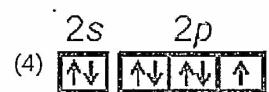
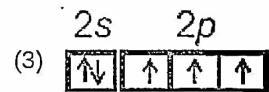
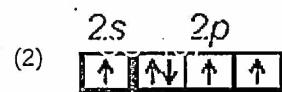
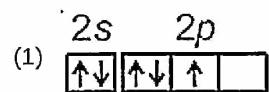
62. The number of protons, neutrons and electrons in  $^{31}_{15}P^3$ -respectively, are

- (1) 16, 15 and 15
- (2) 18, 16 and 15
- (3) 15, 16 and 12
- (4) 15, 16 and 18

63. All spectral lines of which series fall in the ultraviolet region?

- (1) Lyman
- (2) Brackett
- (3) Balmer
- (4) Paschen

64. The orbital diagram in which Aufbau principle is violated, is



65. The de-Broglie wavelength of a moving object having mass 5 g and velocity 200 m/s will be ( $\hbar = 6.63 \times 10^{-34} \text{ Js}$ )

- (1)  $6.63 \times 10^{-37} \text{ m}$
- (2)  $6.63 \times 10^{-32} \text{ m}$
- (3)  $6.63 \times 10^{-34} \text{ m}$
- (4)  $6.63 \times 10^{-36} \text{ m}$

66. Which among the following is a wrong statement?

- (1) Cathode rays start from cathode and move towards the anode
- (2) Canal rays are positively charged particles
- (3)  $(\frac{e}{m})$  value of electron is greater than  $(\frac{e}{m})$  value of  $\alpha$ -particle
- (4) Characteristics of cathode rays depend upon the material of cathode used in discharge tube

67. The number of lobes in  $d_{x^2-y^2}$  orbital is

- (1) 1
- (2) 4
- (3) 2
- (4) 6

68. The radius of ground state of hydrogen atom is 0.53 Å. The radius of similar state of  $\text{Be}^{3+}$  ion is

- (1) 0.26 Å
- (2) 0.53 Å
- (3) 0.13 Å
- (4) 0.17 Å

69.  $\text{Li}^+$  is isoelectronic with

- (1) H
- (2) He
- (3)  $\text{Be}^+$
- (4)  $\text{B}^{2+}$

70. Total number of atomic orbitals in fifth shell of an atom is

- (1) 16
- (2) 25
- (3) 9
- (4) 18

71. Given below are two statements

**Statement I:** Electron gain enthalpy of bromine is more negative than fluorine.

**Statement II:** Silicon is more electronegative than carbon as per Pauling scale.

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 incorrect
- (4) Both statement I and statement II are correct

72. Be shows diagonal relationship with

- (1) Li
- (2) Mg
- (3) Al
- (4) Si

73. The element with highest electronegativity will belong to

- (1) Period 2, group 17
- (2) Period 3, group 17
- (3) Period 2, group 18
- (4) Period 2, group 1

74. The first ionization potentials (eV) of N and O respectively are

- (1) 8.29, 8.29
- (2) 11.32, 11.32
- (3) 8.29, 11.32
- (4) 11.32, 8.21

75. Match the element in column I with that in column II.

|     | Column I | Column II             |
|-----|----------|-----------------------|
| (a) | Copper   | (i) Non-metal         |
| (b) | Fluorine | (ii) Transition Metal |
| (c) | Silicon  | (iii) Lanthanoid      |
| (d) | Cerium   | (iv) Metalloid        |

Identify the correct match

- (1) (a)-(i) (b)-(ii) (c)-(iii) (d)-(iv)
- (2) (a)-(ii) (b)-(iv) (c)-(i) (d)-(iii)
- (3) (a)-(ii) (b)-(i) (c)-(iv) (d)-(iii)
- (4) (a)-(iv) (b)-(iii) (c)-(i) (d)-(ii)

76. Match list-I with list-II.

|    | List-I<br>(IUPAC Name) | List-II<br>(IUPAC Official Name) |
|----|------------------------|----------------------------------|
| a. | Unnilquadium           | (i) Bohrium                      |
| b. | Unnilseptium           | (ii) Darmstadtium                |
| c. | Unnilennium            | (iii) Rutherfordium              |
| d. | Ununnilium             | (iv) Meitnerium                  |

The correct match is

- (1) a(i), b(ii), c(iv), d(iii)
- (2) a(iii), b(i), c(iv), d(ii)
- (3) a(ii), b(iii), c(iv), d(i)
- (4) a(iv), b(i), c(iii), d(i)

77. Given below are two statements:

**Statement I:**  $\text{As}_2\text{O}_3$  is amphoteric in nature.

**Statement II:**  $\text{NO}_2$  is a neutral oxide of nitrogen

In the light of the above statements, choose the most appropriate 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

78. Element with atomic number 44 belongs to

- (1) 6<sup>th</sup> period and 6<sup>th</sup> group
- (2) 5<sup>th</sup> period and 8<sup>th</sup> group
- (3) 5<sup>th</sup> period and 10<sup>th</sup> group
- (4) 6<sup>th</sup> period and 10<sup>th</sup> group

79. The incorrect statement among the following is

- (1) Atomic radius of silicon is larger than phosphorous.
- (2) The behaviour of lithium and beryllium is more similar with magnesium and aluminium respectively
- (3) Boron can show a maximum covalency of four
- (4) Ionisation enthalpy of potassium is higher than sodium

80. Out of C, N, O and Si, the lowest electronegativity is of

- (1) C
- (2) N
- (3) Si
- (4) O

81. If the successive ionization enthalpies of a metal (M) are  $x$ ,  $3x$ ,  $30x$   $\text{kJ mol}^{-1}$  respectively then the formula of metal halide will be

- (1) MX
- (2) MX<sub>3</sub>
- (3) MX<sub>4</sub>
- (4) MX<sub>2</sub>

82. Element having positive electron gain enthalpy is

- (1) O
- (2) F
- (3) Br
- (4) Ne

83. Which of the following is a representative element?

- (1) As
- (2) V
- (3) Gd
- (4) Ni

84. Select the ion of largest size in gas phase among the given species

- (1) Mg<sup>2+</sup>
- (2) O<sup>2-</sup>
- (3) Na<sup>+</sup>
- (4) N<sup>3-</sup>

85. Out of Na<sup>+</sup>, O, Na and N, the species having maximum and minimum ionisation energies respectively are

- (1) O, N
- (2) N, Na<sup>+</sup>
- (3) Na<sup>+</sup>, Na
- (4) N, Na

86. Given below are the two statements

**Statement I:** Electronegativity is a qualitative measure of the ability of an atom in a chemical compound to attract shared electrons to itself.

**Statement II:** Sulphur is the most electronegative element of the third period in periodic table.

In light of above statements, choose the correct answer.

- (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

87. Which of the following is an endothermic process?

- (1) F(g) + e<sup>-</sup> → F<sup>-</sup>(g)
- (2) S(g) + e<sup>-</sup> → S<sup>-</sup>(g)
- (3) O<sup>-</sup>(g) + e<sup>-</sup> → O<sup>2-</sup>(g)
- (4) O(g) + e<sup>-</sup> → O<sup>-</sup>(g)

88. **Statement I :** Ionic radius of F<sup>-</sup> is greater than O<sup>2-</sup>.

**Statement II :** F<sup>-</sup> and O<sup>2-</sup> are isoelectronic species.

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

- (1) Statement I is correct but statement II is incorrect
- (2) Both statement I and statement II are correct
- (3) Both statement I and statement II are incorrect
- (4) Statement I is incorrect but statement II is correct

89. An element (X) has equal number of neutrons as are in  $^{16}\text{S}^{32}$  and has 31 nucleons. The position of element (X) in periodic table is

- (1) 3<sup>rd</sup> period, 16<sup>th</sup> group
- (2) 4<sup>th</sup> period, 14<sup>th</sup> group
- (3) 3<sup>rd</sup> period, 15<sup>th</sup> group
- (4) 4<sup>th</sup> period, 15<sup>th</sup> group

90. Symbol of element of atomic number 103 is

- (1) Unn
- (2) Unt
- (3) Unb
- (4) Utu

BOTANY

91. Select the common feature between anaphase-I and mitotic anaphase.
- Separation of homologous chromosomes
  - Splitting of centromere and separation of chromatids
  - Movement of chromosomes towards opposite poles
  - Decondensation of chromosomes into chromatin
92. Identify the correctly matched pair.
- Zygotene – Recombination between homologous chromosomes is completed
  - Pachytene – Synapsis between homologous chromosome occurs
  - Diplotene – Chiasmata is clearly visible
  - Diakinesis – Congression of homologous chromosomes takes place
93. Select the correct sequence of stages of prophase I.
- Synapsis of homologous chromosomes.
  - Appearance of chiasmata.
  - Disintegration of nuclear envelope.
  - Beginning of chromatin compaction.
  - Exchange of genetic material between non-sister chromatids of homologous chromosomes.
- $d \rightarrow a \rightarrow e \rightarrow c \rightarrow b$
  - $d \rightarrow a \rightarrow e \rightarrow b \rightarrow c$
  - $d \rightarrow e \rightarrow a \rightarrow b \rightarrow c$
  - $a \rightarrow d \rightarrow b \rightarrow e \rightarrow c$
94. Spindle fibres begin to form during (i) and attach to specific site of chromosomes during (ii).  
Select the correct option to fill in the blanks (i) and (ii).
- | (i)           | (ii)      |
|---------------|-----------|
| (1) Prophase  | Metaphase |
| (2) Anaphase  | Telophase |
| (3) Metaphase | Anaphase  |
| (4) Prophase  | Anaphase  |
- (1) (1)
  - (2) (2)
  - (3) (3)
  - (4) (4)
95. Read the following statements and select the correct option.
- Statement A:** Intrameiotic interphase is a metabolic stage between telophase I and prophase II.
- Statement B:** There is no replication of DNA occur during interkinesis.
- Only statement A is correct
  - Only statement B is correct
  - Both the statements A and B are correct
  - Both the statements A and B are incorrect
96. Which of the following statements are true for the given diagram?
- 
- It shows telophase II.
  - All four cells are haploid.
  - All the cells are generally dissimilar to each other.
  - Each cell has univalents and dyads.
- All (a), (b), (c) & (d)
  - Only (a) & (b)
  - All except (d)
  - Only (a) & (c)
97. Prophase of mitosis can be characterised by
- Untangling of chromosomes
  - Condensation of chromosomal material
  - Congression
  - Spireme stage
  - Formation of interzonal fibres
- Select the correct ones
- a, b, c and e
  - a, b and d
  - b, c and e
  - c, d and e
98. Match the following columns and select the correct option.
- | <b>Column I</b> | <b>Column II</b>                               |
|-----------------|------------------------------------------------|
| a. Anaphase     | (i) Centrioles begin to move to opposite poles |
| b. Metaphase    | (ii) Splitting of centromere                   |
| c. Telophase    | (iii) Assembly of nuclear envelope             |
| d. Prophase     | (iv) Congression of chromosomes                |
- a(ii), b(iv), c(iii), d(i)
  - a(ii), b(i), c(iii), d(iv)
  - a(iv), b(ii), c(i), d(iii)
  - a(ii), b(iv), c(i), d(iii)

99. Which of the following is/are **not** the significance of mitosis?

- (a) It maintains the size of the cell.
- (b) It is a mechanism for replacing old dead and worn out cells.
- (c) It is the only process to produce gametes for sexual reproduction.
- (d) It brings out reproduction in unicellular organisms.

Choose the appropriate option.

- (1) (a), (b) & (c)
- (2) (c) only
- (3) (b), (c) & (d)
- (4) (b) & (d) only

100. The cell organelle that is responsible for aster formation in animal cell duplicates during

- (a) G<sub>0</sub> phase
- (b) G<sub>1</sub> phase
- (c) S phase
- (d) Interkinesis
- (e) G<sub>2</sub> Phase

The **correct** ones are

- (1) c and d only
- (2) a and b only
- (3) c and e only
- (4) b and d only

101. Quiescent stage of cell cycle is

- (a) G<sub>0</sub> phase
- (b) The phase where actual cell division occurs
- (c) Metabolically inactive

Choose the **correct** one(s)

- (1) (a) only
- (2) (b) and (c)
- (3) (a) and (c)
- (4) (c) only

102. A tetrad

- (a) Is a pair of two homologous chromosomes
- (b) Is clearly visible in zygote stage
- (c) Consists of four chromatids

The **correct** one(s) is/are

- (1) (a) only
- (2) (a) and (c) only
- (3) (b) only
- (4) (a) and (b) only

103. The last stage of meiosis II is characterised by

- (1) Formation of cell walls around the nuclei
- (2) Separation and movement of chromosomes
- (3) Disintegration of centrosomes
- (4) Enclosing of two groups of chromosomes by separate nuclear envelopes

104. Prophase I is similar to prophase II as

- (1) Both always occur in haploid cells
- (2) Both include five substages
- (3) Nuclear membrane disappears in both
- (4) Both are equally complex and prolonged stages

105. In interphase, one of the phases which is also known as synthesis phase occurs

- (1) Just after G<sub>2</sub> phase
- (2) Between G<sub>1</sub> and G<sub>2</sub> phase
- (3) Just before G<sub>1</sub> phase
- (4) Just after M phase

106. If a yeast cell divide into two daughter cells in 90 minutes, then \_\_\_\_\_ time is required to complete its M phase.  
Fill in the blank by choosing the **correct** option.

- (1) 50-60 minutes
- (2) > 45 minutes
- (3) 120 minutes
- (4) < 4.5 minutes

107. Match List-I with List-II and select the correct option.

**List-I**

- a. Synaptonemal complex (i)
- b. Anaphase promoting complex (ii)
- c. Diakinesis (iii)
- d. Crossing over (iv)

**List-II**

- Formation of recombination nodule
- Structure formed during synapsis
- Separation of sister chromatids
- Terminalisation of chiasmata

- (1) a(ii), b(iii), c(i), d(iv)
- (2) a(ii), b(iii), c(iv), d(i)
- (3) a(iii), b(ii), c(iv), d(i)
- (4) a(iv), b(ii), c(ii), d(i)

108. The cell cycle is divided into how many basic phases?

- (1) Three
- (2) Four
- (3) Two
- (4) Five

109. After mitosis, each resultant daughter cells have

- (1) Four times the amount of DNA in comparison to parent cells.
- (2) Same amount of DNA as in the parent cell in G<sub>2</sub> phase
- (3) Twice the number of chromosome in comparison to the parent cell
- (4) Same amount of DNA as in the parent cell

**110.** Match the following columns and choose the correct option.

|    | Column I   |       | Column II                                                                          |
|----|------------|-------|------------------------------------------------------------------------------------|
| A. | Diakinesis | (i)   | It can last for months or years in oocytes of some vertebrates                     |
| B. | Pachytene  | (ii)  | The nucleolus disappear and the nuclear envelope also breaks down                  |
| C. | Diplotene  | (iii) | Formation of synaptonemal complex occurs                                           |
| D. | Zygotene   | (iv)  | Recombination between homologous chromosomes is completed by the end of this phase |

- (1) A(ii), B(i), C(iv), D(iii)
- (2) A(ii), B(iv), C(i), D(iii)
- (3) A(ii), B(iv), C(iii), D(i)
- (4) A(iii), B(iv), C(i), D(ii)

**111.** Given below are two statements, one is assertion (A) and the other is reason (R).

**Assertion (A):** In the second phase of karyokinesis of M phase, the chromosome are spread through the cytoplasm of the cell.

**Reason (R) :** The complete disintegration of the nuclear envelope marks the start of the second phase of mitosis. In the light of above statements, select the most appropriate option.

- (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) Only (A) is true
- (4) Both (A) and (R) are false

**112.** With the help of following statements, identify the phase of cell division.

(a) Movement of chromosomes towards the poles.  
 (b) It leads to the reduction in the number of chromosomes in the daughter cells.  
 (c) Division at centromere does not occur.

- (1) Anaphase II
- (2) Metaphase I
- (3) Anaphase I
- (4) Telophase I

**113.** Which of the following events are common between diakinesis and prophase-II of meiosis?  
 a. Terminalisation of chiasmata  
 b. Alignment of the chromosomes on equator  
 c. Disappearance of nuclear envelope  
 d. Establishment of meiotic spindle  
 Choose the correct option.

(1) a and c only

(2) b, c and d only

(3) c and d only

(4) All a, b, c and d

**114.** If a cell does not want to divide it will enter into a phase

- (a) Called quiescent stage
- (b) In which it can easily proliferate
- (c) Where cells remain metabolically active
- (1) Only (a) is true
- (2) Only (a) and (c) are true
- (3) Only (b) and (c) are true
- (4) All (a), (b) and (c) are true

**115.** In which of the following options, taxa do not belong to the same taxonomic category?

- (1) Anacardiaceae, Hominidae
- (2) Primata, Insecta
- (3) Poales, Polymoniales
- (4) Mammalia, Dicotyledonae

**116.** When karyokinesis is not followed by cytokinesis, it results in the

- (1) Entrance of the cell into G<sub>0</sub> phase
- (2) Formation of cell plate
- (3) Haploid stage of the cell
- (4) Formation of syncytium

**117.** A tetrad formed during meiosis is composed of

- (1) 4 pairs of homologous chromosomes with 4 chromatids
- (2) 2 pairs of homologous chromosomes with 2 chromatids
- (3) A pair of homologous chromosomes with 4 chromatids
- (4) 2 pairs of non-homologous chromosomes

**118.** The most dramatic period of the cell cycle involves

- (1) Duplication of centrioles in the cytoplasm of the animal cells
- (2) Increase in the amount of DNA
- (3) A major reorganisation of virtually all components of the cell
- (4) The stage in which cells remain metabolically active but no longer proliferate unless called on to do so.

119. How many of the above features are associated with G<sub>1</sub> and G<sub>2</sub> phases respectively?

Duplication of chloroplast, Replication of DNA, Nucleotides synthesis, Tubulin protein synthesis, Duplication of membranous organelles

- (1) 2 and 2
- (2) 3 and 2
- (3) 1 and 2
- (4) 2 and 3

120. Observe the events given below.

- (a) ATP synthesis
- (b) DNA duplication
- (c) Histone synthesis
- (d) Organelle duplication
- (e) Karyokinesis

Select the events that occurs only during resting phase of cell cycle.

- (1) b and e only
- (2) b, c and d only
- (3) a, c and e only
- (4) d and e only

121. Which of the following events does not take place in prophase stage of mitosis?

- (1) Initiation of condensation of chromosomal material
- (2) Each centrosome radiates out microtubules called asters
- (3) Congression of chromosomes at the equator of spindle
- (4) Untangling of DNA strand to form compact mitotic chromosome

122. Choose the incorrect match.

- (1) Family – A group of related genera
- (2) Order – A group of related families
- (3) Class – A group of related orders
- (4) Division – A group of related phyla

123. Choose the incorrect statement.

- (1) Consciousness is the most obvious and technically complicated feature of all living organisms.
- (2) Plants respond to external factors like light, water, temperature etc.
- (3) Prokaryotes cannot sense and respond to the environmental cues.
- (4) Photoperiod affects reproduction in seasonal breeders.

124. Read the following statements.

**Statement A:** During interphase, each centrosome radiates out microtubules called asters.

**Statement B:** During cell division, the replicated chromosomes are then distributed to daughter nuclei by a complex series of events.

In the light of the above statements, mark the correct option.

- (1) Both the statements A and B are correct
- (2) Both the statements A and B are incorrect
- (3) Only statement A is correct
- (4) Only statement B is correct

125. Liquid endosperm in coconut exemplifies

- (1) Syncytium
- (2) Haploid tissue
- (3) Tissue composed of uninucleate cell

Tissue in which the cell shows cytokinesis by furrow formation

126. Which of the following does not qualify as the universal rule of binomial nomenclature?

- (1) Biological names are generally in Latin.
- (2) First letter of the second word of biological name is capital.
- (3) First word in a biological name represents the genus.
- (4) Both the words in a biological name, when handwritten, are separately underlined.

127. Identify the correctly printed scientific name

- (1) *Mangifera indica Linnaeus*
- (2) *Mangifera Indica Linnaeus*
- (3) *Mangifera indica Linn.*
- (4) *Mangifera Indica Linn*

128. Select the incorrect match w.r.t. taxonomic categories of wheat

- (1) Family – Solanaceae
- (2) Class – Monocotyledonae
- (3) Division – Angiospermae
- (4) Genus – *Triticum*

129. Which of the following represents 'Class'?

- (1) Hominidae
- (2) Primata
- (3) Insecta
- (4) Angiospermae

130. Reproduction cannot be considered as defining property of living organisms because

- (1) Organisms can reproduce by two modes, that are asexual and sexual
- (2) Few organisms do not reproduce at all
- (3) In unicellular organisms, reproduction is synonymous with growth
- (4) Some organisms can reproduce by fragmentation

131. Read the following statements of assertion (A) and reason (R) and choose the correct option.

**Assertion (A)** : Lower the taxa, lesser are the characteristics that the members within the taxon share.

**Reason (R)** : As we go higher from species to kingdom, the number of common characteristics goes on increasing.

- (1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
- (2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
- (3) Assertion is true statement but Reason is false
- (4) Both Assertion and Reason are false statements

132. **Statement-A** : Both the words "Taxonomy" and "Systematics" have been derived from Latin words.

**Statement-B** : Systematics is the science which deals with diversity of organisms and evolutionary relationships among them.

- (1) Only statement A is correct
- (2) Only statement B is correct
- (3) Both the statements are correct
- (4) Both the statements are incorrect

133. Which of the following characteristics of living beings is not said to be true for worker bees?

- (1) Anabolism
- (2) Reproduction
- (3) Consciousness
- (4) Growth

134. Choose the correct option for A, B and C in the following table:

| Plant name | Order  | Class         |
|------------|--------|---------------|
| Mango      | A      | Dicotyledonae |
| Wheat      | Poales | B             |
| Bringal    | C      | Dicotyledonae |

- (1) A-Solanaceae, B-Dicotyledonae, C-Poales
- (2) A-Poaceae, B-Sapindales, C-Dicotyledonae
- (3) A-Anacardiaceae, B-Dicotyledonae, C-Polygoniales
- (4) A-Sapindales, B-Monocotyledonae, C-Polygoniales

135. \_\_\_\_\_ is the basic and lowest unit of taxonomic hierarchy.

- (1) Sub-species
- (2) Species
- (3) Genus
- (4) Division

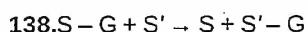
## ZOOLOGY

136. If we completely hydrolyse cytidylic acid, then all of the following will be produced, except

- (1) A hexose sugar
- (2) A pyrimidine derivative
- (3) Phosphoric acid
- (4) Ribose

137. Triglyceride molecule contains

- (1) Three glycerol molecules joined to three fatty acids by ester bonds
- (2) Three fatty acid molecules joined to one glycerol molecule by ester bonds
- (3) Three glycerol molecules linked to three fatty acid molecules by glycosidic bonds
- (4) One fatty acid molecule joined to three glycerol molecules by ether bonds



The enzymes of which of the following categories will catalyse the reaction given above?

- (1) Lyases
- (2) Isomerases
- (3) Transferases
- (4) Ligases

139. Which of the following is a phospholipid commonly found in cell membranes?

- (1) Glycerol
- (2) Palmitic acid
- (3) Lecithin
- (4) Arachidonic acid

140. Choose the incorrect statement w.r.t. nature of enzyme action

- (1) Each enzyme has a substrate binding site
- (2) Enzyme-substrate complex (ES) always dissociates into enzyme and substrate
- (3) Binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate
- (4) Enzyme remain intact after conversion of substrate into product

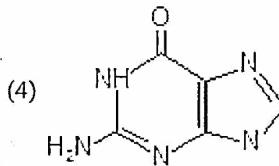
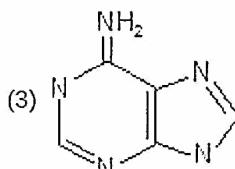
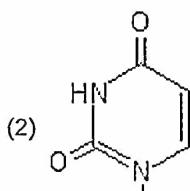
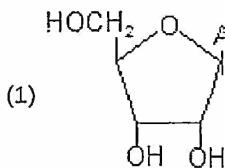
141. A non-proteinaceous enzyme among the following is

- (1) Lyases
- (2) Ribozymes
- (3) RuBisCO
- (4) Succinic dehydrogenase

142. Which one is an incorrect description of apoenzyme?

- (1) It is an organic compound.
- (2) It is proteinaceous in nature.
- (3) It is a part of holoenzyme.
- (4) It is a complete enzyme.

143. Which of the following given structure correctly represents uracil?



144. How many compounds given in the box below possess heterocyclic rings?

Adenine, Guanine, Thymine, Uracil, Cytosine, Lecithin, Cholesterol

- (1) 6
- (2) 7
- (3) 5
- (4) 4

145. Assertion (A): When the substrate concentration increases, the velocity of enzymatic reaction increases, then reaches the maximum and does not exceed any further.

Reason (R): The free enzyme molecules have no substrate molecules to bind with, hence, reaches a saturation.

In the light of above given statements, choose the appropriate option.

- (1) Both (A) and (R) are true; (R) correctly explains (A)
- (2) Both (A) and (R) are true; but (R) does not explain (A)
- (3) (A) is true; (R) is false
- (4) Both (A) and (R) are false

CC-137

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146. The total number of hydroxyl groups in a glycerol molecule is equal to the total number of

- (1) Hydroxyl group attached to the heterocyclic ring in adenine
- (2) Hydroxyl group attached to the glucose
- (3) Nitrogen atoms present in the adenine
- (4) Fatty acids present in a triglyceride

147. How many among the following statements are incorrect?

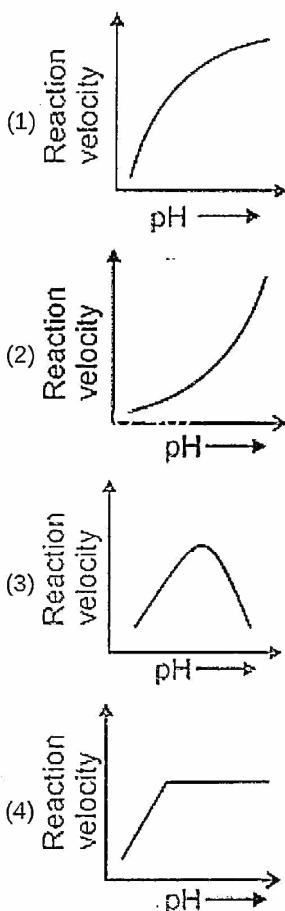
- a. Inhibition of succinic dehydrogenase by malonate is an example of competitive inhibition.
- b. Catalytic activity is lost when the cofactor is removed from enzyme.
- c. Alteration in pH alters the charge on specific amino acid residues.
- d. Enzymes lower the activation energy by enhancing the energy level of product.

- (1) Two
- (2) Three
- (3) Four
- (4) One

148. Which of the following is incorrect for an exothermic reaction in presence of biological catalyst?

- (1) Enzyme decreases activation energy of reaction
- (2) Potential energy of product is less than that of substrate
- (3) Enzyme increases velocity of reaction
- (4) Enzyme substrate complex does not pass through transition state and product is formed immediately

149. Which of the following graphs shows the effect of change in pH on enzyme activity?



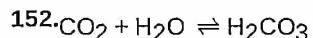
150. Transition state structure in an enzyme catalysed reaction has/is

- (a) Low stability
  - (b) Low potential energy
  - (c) High potential energy
  - (d) High stability
  - (e) An intermediate structural state
- Select the option with correct set.

- (1) Only (a) and (c)
- (2) Only (b), (d) and (e)
- (3) (a), (b) and (c)
- (4) (a), (c) and (e)

151. Select the correct option to complete the analogy.  
Peroxidase : Haem :: Carboxypeptidase : \_\_\_\_\_

- (1) NAD
- (2) Zinc
- (3) Niacin
- (4) Haem



In the absence of an enzyme, the above reaction is

- (1) Very slow, about 2000 molecules of  $\text{H}_2\text{CO}_3$  being formed in a minute
- (2) Very slow, about 200 molecules of  $\text{H}_2\text{CO}_3$  being formed in an hour
- (3) Very fast, 6,00,000 molecules of  $\text{H}_2\text{CO}_3$  being formed in a second
- (4) Very fast, such that 10 million molecules of  $\text{H}_2\text{CO}_3$  are being formed in a minute

153. The most abundant protein present in the animal world is

- (1) Also found in blood
- (2) Arranged in an irregular pattern in tissues that are present beneath the skin
- (3) A receptor present on cell surface
- (4) A storage homopolymer

154. Protein thread folded in the form of a helix represents \_\_\_\_\_ structure of a protein.

Select the correct option to fill in the blank.

- (1) Quaternary
- (2) Primary
- (3) Tertiary
- (4) Secondary

155. Read the following statements and choose the correct answer.

**Statement A :** All prosthetic groups are inorganic compounds that are tightly bound to the apoenzyme.

**Statement B :** Co-enzymes are organic compounds and their association with the apoenzyme is for longer period of time.

- (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

156. The sequence of amino acids i.e., the positional information in a protein is represented by its

- (1) Primary structure
- (2) Secondary structure
- (3) Tertiary structure
- (4) Quaternary structure

157. A protein is imagined as a line where

- (1) The left end is represented by the first amino acid and the right end is represented by the last amino acid
- (2) The left end is represented by the last amino acid and the right end is represented by the first amino acid
- (3) The left end is represented by the first amino acid and the right end is represented by the second last amino acid
- (4) Both the left and right ends are represented by the first amino acids

158. Glycerol is also known as

- (1) Monohydroxy propane
- (2) Dihydroxy propane
- (3) Trihydroxy propane
- (4) Tetrahydroxy propane

159. Match column I with column II.

|    | Column I |       | Column II                                |
|----|----------|-------|------------------------------------------|
| a. | Trypsin  | (i)   | Most abundant animal protein             |
| b. | Ribozyme | (ii)  | A protein digesting enzyme               |
| c. | GLUT-4   | (iii) | A nucleic acid which behaves like enzyme |
| d. | Collagen | (iv)  | A glucose transporter                    |

Choose the correct option.

- (1) a(ii), b(iii), c(iv), d(i)
- (2) a(iii), b(iv), c(ii), d(i)
- (3) a(iv), b(i), c(iii), d(ii)
- (4) a(i), b(ii), c(iii), d(iv)

160. Which among the following options represents correct set of aromatic amino acids?

- (1) Glutamic acid, Valine
- (2) Alanine, Lysine
- (3) Valine, Serine
- (4) Tryptophan, Phenylalanine

161. How many of the structures mentioned in the box below are formed/supported by cartilage in case of humans?

Larynx, epiglottis, initial bronchiole, trachea, alveoli, terminal bronchiole

Select the correct option.

- (1) Two
- (2) Three
- (3) Four
- (4) Five

162.Under normal physiological conditions, a person can inspire or expire 'Y' mL of air in a minute. This can be represented as

- (1) IRV + ERV
- (2) VC/TV
- (3) Tidal volume × Breathing rate
- (4) Vital capacity/Breathing rate

163.The volume of sum of TV, ERV and RV is almost

- (1) Equal to FRC
- (2) Half of the TLC
- (3) More than VC
- (4) Equal to EC

164.Read the following statements.

**Statement A:** The anatomical set up of lungs in thorax is such that any change in the volume of the thoracic cavity will be reflected in the pulmonary cavity.

**Statement B:** In humans, the outer pleural membrane of lungs is in close contact with the lung surface.

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

165.Fill in the respective blanks with correct option.

Lungs are situated in thoracic chamber, which is formed \_\_\_\_\_ by the vertebral column, \_\_\_\_\_ by the sternum, \_\_\_\_\_ by the ribs and on \_\_\_\_\_ side by diaphragm.

- (1) Ventrally, laterally, dorsally, upper
- (2) Ventrally, dorsally, laterally, lower
- (3) Laterally, ventrally, dorsally, lower
- (4) Dorsally, ventrally, laterally, lower

166.Match column I with column II w.r.t. respiratory volumes and capacities in humans.

|    | Column I |       | Column II    |
|----|----------|-------|--------------|
| a. | EC       | (i)   | 2500-3000 mL |
| b. | IRV      | (ii)  | 1000-1100 mL |
| c. | VC       | (iii) | 1500-1600 mL |
| d. | ERV      | (iv)  | 3000-3500 mL |

Select the correct option.

- (1) a(ii), b(iii), c(i), d(iv)
- (2) a(ii), b(i), c(iv), d(iii)
- (3) a(i), b(iv), c(iii), d(ii)
- (4) a(iii), b(i), c(iv), d(ii)

167.Which of the following additional muscles present in thoracic cage contract to help in increasing the strength of breathing during forceful expiration?

- (1) External intercostal muscles
- (2) Internal intercostal muscles
- (3) Abdominal muscles
- (4) Diaphragm

168.A portion of which of the following body parts is the common passage for food and air?

- (1) Nasal cavity
- (2) Trachea
- (3) Larynx
- (4) Pharynx

169.The rate of breathing in a healthy adult human is

- (1) 20-25 times/minute
- (2) 12-16 times/minute
- (3) 12-16 times/second
- (4) 40-45 times/hour

170.Contraction of diaphragm during inspiration leads to

- (1) Increase in the volume of thoracic chamber in the dorso-ventral axis
- (2) Increase in the volume of thoracic chamber as well as pulmonary cavity in the antero-posterior axis
- (3) Decrease in the volume of pulmonary cavity but increase in that of thoracic chamber
- (4) No change in the volume of thoracic chamber

171.Choose the incorrect statement w.r.t. human sound box.

- (1) It is a cartilaginous structure
- (2) It is also called larynx
- (3) It is common passage for food and air
- (4) Epiglottis covers the glottis to prevent entry of food into the larynx

172.Function not performed by the conducting part of human respiratory tract is

- (1) Humidification of inhaled air
- (2) Trapping of foreign particles
- (3) Diffusion of O<sub>2</sub> and CO<sub>2</sub> between blood and atmospheric air
- (4) Bringing the temperature of inhaled air to body temperature

173. Choose the option which represents the steps involved in human respiration in the correct order.

- a. Utilization of oxygen by cells for catabolic reactions.
- b. Transport of gases by the blood to tissues.
- c. Diffusion of O<sub>2</sub> and CO<sub>2</sub> between blood and tissues.
- d. Diffusion of O<sub>2</sub> and CO<sub>2</sub> across alveolar membrane.

- (1) a, b, c, d
- (2) d, b, c, a
- (3) b, c, a, d
- (4) d, a, b, c

174. Which of the following lung capacities **cannot** be measured by a simple spirometer?

- (1) FRC
- (2) VC
- (3) EC
- (4) IC

175. Trachea divides at the level of \_\_\_\_ vertebra into right and left bronchus

Choose the option that fills the blank correctly.

- (1) 5<sup>th</sup> cervical
- (2) 3<sup>rd</sup> thoracic
- (3) 5<sup>th</sup> thoracic
- (4) 7<sup>th</sup> thoracic

176. The volume of air that will remain in the lungs after a normal expiration is equivalent to

- (1) TLC
- (2) ERV + RV
- (3) TV + ERV
- (4) IC + ERV

177. The numerical value of which of the following pulmonary capacities is least in a healthy human at rest?

- (1) Expiratory capacity
- (2) Functional residual capacity
- (3) Inspiratory capacity
- (4) Vital capacity

178. A healthy, adult man is quietly respiring while reading a newspaper. Now, which of the following muscles are being involved in this?

- (1) Only external intercostal muscles
- (2) Only internal intercostal muscles
- (3) Diaphragm and external intercostal muscles
- (4) Diaphragm and abdominal muscles

179. During swallowing, glottis can be covered by a \_\_\_\_\_ flap called epiglottis.

Fill in the blank by selecting the correct option.

- (1) Thick muscular
- (2) Thin elastic cartilaginous
- (3) Thin muscular
- (4) Thick fibro-cartilaginous

180. Comprehend the given statements w.r.t. human lungs.

**Statement A:** Pleural fluid between the double layered pleura reduces friction on the lung surface.

**Statement B:** The parietal pleura and the visceral pleura respectively are in direct contact with the lung surface and thoracic lining.

Choose the correct option.

- (1) Both statements A and B are incorrect
- (2) Only statement B is correct
- (3) Only statement B is incorrect
- (4) Both statements A and B are correct