

ACE of PACE

Question Bank
for Medical Aspirants

(Currently in 10th Grade)



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ACE OF PACE
(Medical Study Material 2026-28)
Grade X moving XI

SECTION – 1 (PHYSIC)

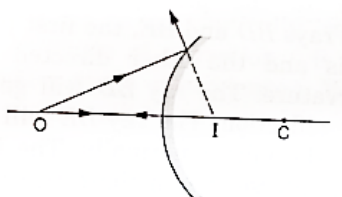
• WORK, POWER, ENERGY

1. A force $F = 3x^2$ N acts on a body along the x-axis. The work done by this force as the body moves from $x = 0$ to $x = 2$ m is :
(1) 8 J (2) 10 J (3) 12 J (4) 16 J
2. A boy pulls a box of mass 10 kg with a force of 50 N at an angle of 60° above the horizontal over a distance of 4 m. What is the work done by the boy?
(1) 100 J (2) 80 J (3) 60 J (4) 40 J
3. The kinetic energy of a body becomes 4 times its initial value. Its velocity must have become:
(1) 2 times (2) 4 times (3) 8 times (4) $\sqrt{2}$ times
4. A spring is compressed by 10 cm. If its spring constant is 400 N/m, the potential energy stored in it is:
(1) 1 J (2) 2 J (3) 0.5 J (4) 0.25 J
5. A machine does 1500 J of work in 2 minutes. Its power is:
(1) 750 W (2) 25 W (3) 12.5 W (4) 400 W
6. A man lifts a box of 20 kg to a height of 2 m in 5 seconds. What is his power output?
(Take $g = 10 \text{ m/s}^2$)
(1) 40 W (2) 80 W (3) 100 W (4) 200 W
7. A body of mass 2 kg is moving with velocity 3 m/s. How much additional work is required to double its speed?
(1) 18 J (2) 9 J (3) 27 J (4) 12 J
8. A particle of mass 2 kg is moving under a constant force of 10 N. What is the work done in 3 seconds, starting from rest?
(1) 45 J (2) 90 J (3) 135 J (4) 225 J
9. A block of mass 5 kg slides down a frictionless incline of height 4 m. What is its kinetic energy at the bottom?
(1) 100 J (2) 120 J (3) 200 J (4) 250 J
10. A bullet of mass 10 g moving at 400 m/s embeds into a block of 990 g. Find the loss in kinetic energy.
(1) 720 J (2) 792 J (3) 640 J (4) 560 J

11. The area under a Force vs Displacement graph represents:
 (1) Work done (2) Power (3) Acceleration (4) Energy per unit mass
12. A body of mass 1 kg falls freely for 2 s. The work done by gravity is:
 (1) 19.6 J (2) 120.2 J (3) 192.08 J (4) 300 J
13. A pump of power 1000 W lifts water to a height of 10 m in 20 s. How much water (in kg) is lifted? (Take $g = 10 \text{ m/s}^2$)
 (1) 100 kg (2) 150 kg (3) 200 kg (4) 250 kg
14. A particle's kinetic energy is given by $K = 3t^2$. What is the power delivered to the particle at $t = 2 \text{ s}$?
 (1) 6 W (2) 12 W (3) 24 W (4) 36 W
15. A body moves in a circle at constant speed. What is the work done by the centripetal force?
 (1) positive (2) Negative (3) Zero (4) Increasing

Light

16. The mirror used in automobiles to see the rear field to view is
 (1) concave (2) convex (3) plane (4) None
17. The image is always erect in:
 (1) Plane mirror (2) Concave mirror (3) Convex mirror (4) both (1a) and (c)
18. A ray of light is incident from air to water at an angle of incidence = 60° . Find the angle of refraction. (Given $\mu_{\text{water}} = 4/3$)
 (1) $\sin^{-1}(3\sqrt{3}/8)$ (2) $\sin^{-1}(2/\sqrt{3})$ (3) $\sin^{-1}\left(\frac{3\sqrt{3}}{2}\right)$ (4) $\sin^{-1}\left(\frac{4}{\sqrt{3}}\right)$
19. The ratio of refractive index of red light to that of blue light
 (1) Equal to 1 (2) Greater than 1 (3) Less than 1 (4) None
20. For an object placed at a distance 20 cm in front of a convex lens, the image is at distance of 10 cm behind the lens. The focal length of convex lens is :
 (1) $\frac{20}{3} \text{ cm}$ (2) 10 cm (3) 15 cm (4) 40 cm
21. The power of a lens having focal length 50 cm is
 (1) 1/2 D (2) 2 D (3) 3 D (4) 0.2 D
22. A convex mirror has its radius of curvature 20 cm. Find the position of the image of an object placed at a distance of 12 cm from the mirror.

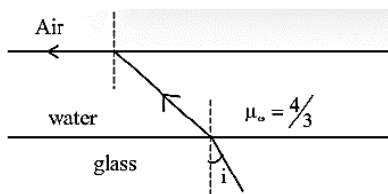


- (1) 60/11 cm (2) 18/11 cm (3) 11/60 cm (4) 11/18 cm

23. An object of length 2.0 cm is placed perpendicular to the principal axis of a convex lens of focal length 12 cm. Find the size of the image if the object is at a distance of 8.0 cm from the lens.

(1) -6 cm (2) -1.5 cm (3) 6 cm (4) 1.5 cm

24. A ray of light is incident at the glass water interface at an angle 'i'. It emerges finally parallel to the surface of water. The value of μ_g would be ____



(1) $\frac{4}{3} \sin i$ (2) $\frac{1}{\sin i}$ (3) $\frac{4}{3}$ (4) 1

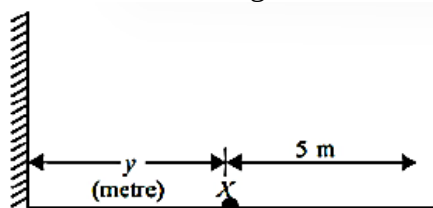
25. A thin lens is made with a material having refractive index $\mu = 1.5$. Both the sides are convex. It is dipped in water ($\mu = 1.33$). It will behave like ____

(1) a convergent lens (2) a divergent lens (3) a rectangular slab (4) a prism

26. ____ image is formed on the same side of the lens and ____ image is formed on the other side of the lens.

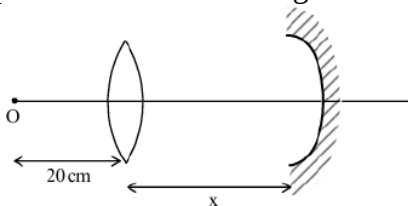
(1) real, real (2) Virtual, virtual (3) real, Virtual (4) virtual, real

27. A man is standing at a position X in front of a plane mirror, at a distance of y metre from the mirror as shown in the figure. When the man moves 5 m away from the mirror, the new distance between the man and his image becomes 20 metre. What is the value of y?



(1) 5 (2) 10 (3) 20 (4) 40

28. A point object O is placed at distance of 20 cm from a convex lens of focal length 10 cm as shown in the figure. At what distance 'x' from the lens should a concave mirror of focal length 10 cm, be placed so that final image coincided with the object?



(1) 10 cm (2) 20 cm (3) 40 cm (4) both (b) and (c)

29. A fish looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is $\frac{4}{3}$ and the fish is 12 cm below the surface, what is the radius of the circle?

(1) $12 \times 8 \times \sqrt{5}$ cm (2) $12 \times \sqrt{\frac{5}{3}}$ cm (3) $12 \times \sqrt{7}$ cm (4) $12 \times \frac{3}{\sqrt{7}}$ cm

30. A convex lens forms a real image of a point object placed on its principal axis. If the upper half of the lens is painted black,
- (1) the image will be shifted downwards (2) the image will be shifted upwards
(3) the intensity of the image will decrease (4) none of these

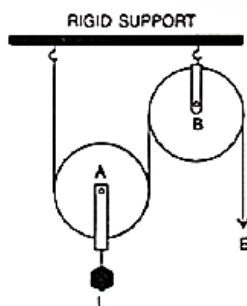
FORCE

31. Inertia depends upon :
- (1) acceleration of the body (2) velocity of the body
(3) shape of the body (4) mass of the body
32. The law which defines force is
- (1) Newton's third law (2) Newton's first law
(3) Newton's second law (4) none of these
33. When an object undergoes acceleration
- (1) Its speed always increases (2) Its velocity always increases
(3) It always falls towards the earth (4) A force always acts on it
34. Calculate the magnitude of resultant of two like parallel forces of 20 N separated by a distance of 20 cm
- (1) 40 N (2) 60 N (3) 20 N (4) 0 N
35. A 1 m long uniform beam of 2 kg mass is being lifted vertically up by a force F at the 100 cm. What is the minimum force required to do so?



- (1) 1 N (2) 2 N (3) 10 N (4) 20 N
36. The position of centre of gravity depends on
- (1) Shape (2) Weight (3) Volume (4) Both a and b
37. A slotted head screw is torqued to 4 Nm using a screw driver having a blade of 5 mm width. The couple force exerted by the blade edges on the screw slot is
- (1) 4 N (2) 800 N (3) 400 N (4) 20 N
38. A man sitting in a train in motion is facing the engine. He tosses a coin up, the coin falls behind him. The train is moving:
- (1) forward with uniform speed (2) backward with uniform speed
(3) forward with acceleration (4) forward with retardation
39. A force $\vec{f} = (10\hat{i} + 8\hat{j} - 5\hat{k})$ acts at a point $P(2, 5, 6)$. What will be the moment of the force about the point $Q(3, 1, 4)$?
- (1) $-36\hat{i} + 15\hat{j} - 48\hat{k}$ (2) $18\hat{i} + 19\hat{j} - 37\hat{k}$ (3) $32\hat{i} - 31\hat{j} - 4\hat{k}$ (4) zero

The diagram below shows a pulley arrangement. Q 40 – Q 43 based on the diagram



40. Name the pulleys A and B
 - (1) A = Fixed pulley ; B = Fixed pulley
 - (2) A = Fixed pulley ; B = Movable pulley
 - (3) A = Movable pulley ; B = Fixed pulley
 - (4) A = Movable pulley ; B = Movable pulley
41. If the tension is T, deduce the relation between T and E
 - (1) $T = 2E$
 - (2) $E = 2T$
 - (3) $E = T$
 - (4) $E = 3T$
42. What is the velocity ratio of the arrangement?
 - (1) 1
 - (2) 2
 - (3) 3
 - (4) 4
43. Assuming that the efficiency of the system is 100% what is the mechanical advantage?
 - (1) 1
 - (2) 2
 - (3) 3
 - (4) 4
44. The point at which entire weight of body is concentrated is
 - (1) centre of gravity
 - (2) end point
 - (3) centroid
 - (4) central point
45. The moment of force of 2N about a point is 7Nm. The distance of point of the force from point is
 - (1) 3m
 - (2) 0.35 m
 - (3) 5m
 - (4) 3.5 m

SECTION – 2 (CHEMISTRY)

PERIODIC CLASSIFICATION OF ELEMENT

- The elements of the group 16 are also called
(1) halogens (2) noble gases (3) chalcogens (4) alkaline earth metals
- In the periodic table from left to right in a period the atomic volume
(1) decreases (2) increases
(3) remains same (4) first decreases then increases
- Which of the following remains unchanged on descending a group in the periodic table?
(1) Valence electrons (2) Atomic size (3) Density (4) Metallic character
- The amount of energy released on the addition of an electron in outermost shell of an atom is called
(1) ionization energy (2) hydration energy
(3) electron affinity (4) electron negativity
- Electron affinity depend on
(1) Atomic size (2) Nuclear charge
(3) Atomic number (4) Both atomic size and nuclear charge
- The number of elements present in fifth period is
(1) 18 (2) 6 (3) 8 (4) 32
- Gradual addition of electronic shell in the noble gases causes a decrease in their
(1) Ionization energy (2) Atomic radius (3) Boiling point (4) Density
- The elements of group 1 are called alkali metals because
(1) the metals are corroded by alkali (2) their oxides are alkaline
(3) their hydrides are strongly alkaline (4) none of these
- Ionization potential is
(1) The tendency of an atom to lose an electron (2) The tendency of an anion to lose electron
(3) The tendency of cation to gain electron (4) The ratio of the cation to anion
- The most non-metallic element is
(1) Sodium (2) Helium (3) Chlorine (4) Fluorine
- The lightest metal in periodic table is
(1) Magnesium (2) Zinc (3) Lithium (4) Sodium
- Which of the following has highest electronegativity?
(1) Carbon (2) Magnesium (3) Oxygen (4) Sulphur
- The elements with atomic numbers 4, 12, 20, 38, 56, 88 belong to which of the given group?
(1) Alkali metals (2) Alkaline earth metals
(3) Inert gases (4) Halogens
- Halogens are placed in which group of elements in modern periodic table?
(1) 17 (2) 2 (3) 4 (4) 6
- The correct formula of the oxide of eka-aluminium element predicted by Mendeleev was _____
(1) EO_3 (2) E_3O_2 (3) E_2O_3 (4) (d) EO

16. Which of the following element would lose an electron easily?
 (1) Mg (2) Ca (3) Na (4) K
17. The modern periodic table was prepared by _____
 (1) Newlands (2) Dalton (3) Moseley (4) Mendeleev
18. _____ of the following triads does not follow Dobereiner's law of triads.
 (1) Li, Na, K (2) Ca, Sr, Ba (3) Cl, Br I (4) Cu, Ag, Au
19. According to Newlands octave, chlorine shows similarity with _____
 (1) Beryllium (2) Fluorine (3) lithium (4) Sodium
20. The number of electrons in the outermost shell of alkali metals is _____
 (1) 1 (2) 2 (3) 3 (4) 7

CHEMICAL REACTION

21. Which of the given chemical equations is balanced?
 (1) $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$ (2) $\text{NaNO}_3 \rightarrow \text{NaNO}_2 + \text{O}_2$
 (3) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (4) $\text{Al}_2\text{CO}_3 \rightarrow \text{Al}_2\text{O}_3 + \text{CO}_2$
22. Which of the following conditions is necessary for a chemical reaction?
 (1) It must be accompanied with change in temperature and pressure
 (2) At least one of the reactants must be in a fixed quantity
 (3) It must follow the law of conservation of mass
 (4) All of the above
23. In which reaction do two compounds exchange their ions to form two new compounds?
 (1) Displacement reaction (2) Double displacement reaction
 (3) Synthesis reaction (4) Decomposition reaction
24. Identify the substance which reduces a compound
 (1) A hydrating agent (2) A dehydrating agent
 (3) An oxidizing agent (4) A reducing agent
25. Identify the type of reaction: $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
 (1) Decomposition reaction (2) Combination reaction
 (3) Double displacement reaction (4) Displacement reaction
26. Which of the following is a redox reaction?
 (1) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (2) $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$
 (3) $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$ (4) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
27. Which of the following statements is correct about the given reaction? $\text{ZnO} + \text{CO} \rightarrow \text{Zn} + \text{CO}_2$
 (1) ZnO is being oxidized (2) CO is being reduced
 (3) CO is oxidizing agent (4) ZnO is being reduced
28. How is the decomposition of silver chloride carried out?
 (1) By electricity (2) By sunlight (3) By heat (4) By water
29. Which metal can prevent the corrosion of tin?
 (1) Zinc (2) Copper (3) Lead (4) Silver

30. Which gas is used in flush bags of chips to prevent oxidation?
(1) Helium (2) Neon (3) Nitrogen (4) Argon
31. Lime water turns milky when _____ gas is passed through it.
(1) H_2 (2) CO (3) CO_2 (4) SO_2
32. A white precipitate will be formed if we add common salt solution to _____ solution.
(1) KNO_3 (2) $AgNO_3$ (3) $CuSO_4$ (4) Na_2SO_4
33. The removal of oxygen from a reactant is called _____.
(1) oxidation (2) corrosion (3) rancidity (4) reduction
34. Chemical equations are balanced in accordance with the law of _____.
(1) conservation of momentum (2) conservation of mass
(3) conservation of velocity (4) conservation of speed
35. Which of the following is an exothermic reaction?
(1) electrolysis of water (2) cellular respiration
(3) process of photosynthesis (4) conversion of lime stone into quicklime
36. Dissolution of potassium nitrate in water is a _____.
(1) oxidation reaction (2) reduction reaction (3) exothermic process (4) endothermic process
37. The reaction of zinc dust with copper sulphate solution is an example of _____.
(1) combination reaction (2) decomposition reaction
(3) displacement reaction (4) double displacement reaction
38. $CaCO_3 \rightarrow CaO + CO_2$ is a _____ reaction
(1) combination (2) displacement
(3) double displacement (4) decomposition
39. Which of the following is not a balanced chemical equation?
(1) $2Mg + O_2 \rightarrow 2MgO$ (2) $NH_3 + HCl \rightarrow NH_4Cl$
(3) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$ (4) $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$
40. Copper on reaction with dilute nitric acid gives _____ gas
(1) nitrogen (2) nitrogen dioxide (3) hydrogen (4) nitric oxide

SECTION – 3 (BIOLOGY)

LIFE PROCESS

- Where does the light reaction takes place?
(1) Grana (2) Stroma
(3) Cytoplasm (4) Endoplasmic reticulum
- Which one of the following process occurs during photosynthesis?
(1) Reduction of carbohydrates into carbon dioxide.
(2) Conversion of light energy to chemical energy.
(3) Emission of light energy by chlorophyll.
(4) Conversion of hydrogen and oxygen into water.
- Where does the Calvin cycle take place?
(1) stroma of the chloroplast (2) thylakoid membrane
(3) cytoplasm surrounding the chloroplast (4) chlorophyll molecule
- During photosynthesis, carbon dioxide is taken in through tiny pores called:
(1) Stomata (2) Guard cells (3) Xylem vessels (4) Phloem fibers
- Sweet potato is an underground structure which stores food. Where is the food prepared in this plant?
(1) Leaves (2) Fruit (3) Stem (4) Root
- What do you mean by photo autotrophs?
(1) Oxidation of chemicals without sunlight
(2) Plants synthesize their food themselves
(3) Process of making food for plants and animals
(4) All of the given options are correct
- What are the products formed during photosynthesis?
(1) Glucose, Water and Oxygen (2) Glucose and Oxygen
(3) Starch and Oxygen (4) Starch, Water and Oxygen
- The chlorophyll in photosynthesis is used for
(1) Absorbing light (2) Breaking down water molecule
(3) No function (4) Reduction of CO₂
- Identify the element that helps to trap light energy that is essential for photosynthesis.
(1) Cristae (2) Amyloplasts (3) Carotenoid (4) Vacuoles
- Photosynthesis is a
(1) Catabolic process (2) Parabolic process (3) Amphibolic process (4) Photochemical process
- Which of the following equations is the summary of photosynthesis?
(1) $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
(2) $6\text{CO}_2 + \text{H}_2\text{O} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + 6\text{H}_2\text{O}$
(3) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
(4) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 + 6\text{H}_2\text{O}$
- Phytochrome pigment is present in _____.
(1) stems (2) leaves (3) fruits (4) flowers

13. Cut leaves remain green for longer time when dipped in cytokinins _____.
 (1) cytokinins (2) ethylene (3) gibberellin (4) auxins
14. Production of seedless fruits is referred to as _____.
 (1) parthenocarpy (2) parthenogenesis (3) endocarpy (4) exocarpy
15. Cell elongation in plants is caused by _____.
 (1) abscisic acid (2) gibberellins (3) florigens (4) ethylene.
16. Apical dominance in higher plants is due to _____.
 (1) balance between auxins and cytokinins (2) enzyme activity
 (3) supply of carbohydrates (4) photoperiodism
17. Respiration is the process in which _____.
 (1) energy is stored in the form of ADP
 (2) energy is released and stored in the form of ATP
 (3) energy is not released at all
 (4) energy is used up
18. Glucose gets converted into pyruvate in _____.
 (1) mitochondria (2) muscle cells (3) cytoplasm (4) yeast
19. How many molecules of ATP are gained during anaerobic respiration of one molecule of glucose?
 (1) 36 (2) 2 (3) 38 (4) 4
20. The process used in respiration is _____.
 (1) metabolic (2) electrical (3) mechanical (4) radiant
21. Arteries are best defined as the vessels which.
 (1) Carry blood from one visceral organ to another visceral organ.
 (2) Supply oxygenated blood to the different organs.
 (3) Carry blood away from the heart to different organs.
 (4) Break up into capillaries which reunite to form a vein.
22. Sino-atrial node (SAN) is a patch of nodal tissue present in
 (1) Right upper corner of right atrium (2) Left upper corner of right atrium
 (3) Right lower corner of left atrium (4) Left lower corner of left atrium
23. Role of pacemaker is to:
 (1) Initiate heartbeat (2) Increase heartbeat
 (3) Decrease heartbeat (4) No effect on heartbeat
24. The respiratory pigment in human beings is:
 (1) Carotene (2) Chlorophyll (3) Haemoglobin (4) Mitochondria
25. Which of the following statements are true-
 (a) Pulmonary artery carries blood from the heart, so it is called an artery and not a vein.
 (b) It carries carbon dioxide-rich blood to the lungs.
 (c) Pulmonary vein carries oxygen-rich blood from the lungs to the heart.
 (1) Statement (a) and (b) are true (2) Statement (b) and (c) are true
 (3) Statement (c) and (a) are true (4) All the statements are true
26. Which of the following cells get activated during bleeding?
 (1) RBC (2) WBC (3) Platelets (4) None of the above

27. Pulmonary circulation is _____.
 (1) The blood flow from heart to the body cells and back to the heart.
 (2) The blood flow from heart to the lungs and back to the heart.
 (3) The blood flow from lungs to the heart and then to the body cells.
 (4) The blood flow from the body cells to the lungs and back to the heart.
28. Name a circulatory fluid in the human body other than blood.
 (1) Platelets (2) RBC (3) Lymph (4) Plasma
29. The major excretory product in human beings is:
 (1) Urea (2) Ammonia (3) Uric acid (4) Ammonium chloride
30. In human beings excretory products are removed by the _____ in the kidneys.
 (1) Pancreas (2) Palate (3) Nephrons (4) Neurons
31. _____ forms a common passage for both urine and sperms in human males.
 (1) Oviduct (2) Ureter (3) Urethra (4) Vas deferens
32. Which one of the following shows the correct sequence of the path of urine in the human excretory system?
 (1) Kidney → Urinary bladder → Ureter → Urethra
 (2) Kidney → Urinary bladder → Urethra → Ureter
 (3) Kidney → Urethra → Urinary bladder → Ureter
 (4) Kidney → Ureter → Urinary bladder → Urethra
33. The reason why the right kidney is slightly lower than the left is
 (1) the left kidney is bigger than right
 (2) considerable space occupied by the heart
 (3) considerable space occupied by the liver on the right side
 (4) the right kidney is bigger than the left
34. Glycosuria is the term used for
 (1) Loss of glucose in the urine (2) Loss of blood in the urine
 (3) Loss of salts in the urine (4) None of these
35. In which part of the excretory system of the human body urine is it stored before passing urine?
 (1) Urinary bladder (2) Ureter (3) Bowman's Capsule (4) Urethra
36. Oxygen (O_2) is utilized by an organism to
 (1) directly breakdown the nutrient molecules (2) indirectly breakdown the nutrient molecules
 (3) obtain nourishment from the food (4) burn the organic compounds indirectly
37. Among vertebrates,...A... use gills whereas reptiles, birds and mammals respire through the ...B... Amphibians like frogs can respire through...C... also. Mammals have a well adapted respiratory system. Select appropriate choice for the blanks A, B and C to complete the given statement.
 (1) A-fishes, B-lungs, C-gills A-mammals, B-gills, C-moist skin
 (2) A-fishes, B-lungs, C-dry skin
 (3) A-fishes, B-lungs, C-moist skin
 (4) A-mammals, B-gills, C-moist skin
38. In Earthworms, the process of respiration is through _____.
 (1) Skin (2) Head
 (3) Lungs (4) Pores on its anterior end

39. Which of the following is the function of the trachea?
 (1) Gaseous Exchange (2) Filters the air we breathe
 (3) Exhales the air from the body (4) All of the above
40. Which of the following functions by filtering and keeping the mucus and dirt away from our lungs?
 (1) Cilia (2) Bronchioles (3) Hairs in the lungs (4) All of the above
41. In which part of the respiratory system, gaseous exchange takes place?
 (1) Alveoli (2) Pharynx (3) Larynx (4) Trachea
42. In humans, the alternative pathway of respiration where pyruvate is converted into a three-carbon compound called lactic acid is found in:
 (1) Muscle cells (2) Nerve cells (3) Alveoli of lungs (4) Intestinal villi
43. Which of the following statements is/are correct:
Statement I: Breathing is the process of exchanging gases between the blood and body cells.
Statement II: Respiration involves breaking down glucose with oxygen to release energy.
Statement III: The lungs are used for both respiration and digestion.
Statement IV: The diaphragm moves downward during inhalation to allow more air into the lungs.
 (1) Statement I and II are correct (2) Statement II and IV are correct
 (3) Only Statement IV is correct (4) All statements are correct

Heredity & Evolution

44. Two pink-coloured flowers on crossing resulted in 1 red, 2 pink and 1 white-flower progeny. The nature of the cross will be:
 (1) single fertilization (2) self-pollination (3) cross-fertilization (4) no fertilization
45. A zygote which has an X chromosome inherited from the father will develop into a:
 (1) boy
 (2) girl
 (3) X chromosome does not determine the sex of a child
 (4) either boy or girl
46. In pea plants, yellow seeds are dominant to green seeds. If a heterozygous yellow-seeded plant is crossed with a green-seeded plant, what ratio of yellow and green-seeded plants would you expect in the F₁ generation?
 (1) 9:1 (2) 3:1 (3) 1:3 (4) 50:50
47. The two versions of a trait (character) which are brought in by the male and female gametes are situated on:
 (1) Copies of the same (homologous) chromosomes
 (2) Two different chromosomes
 (3) Sex chromosomes
 (4) Any Chromosomes
48. Exchange of genetic material takes place in:
 (1) Vegetative reproduction (2) Asexual reproduction
 (3) Sexual reproduction (4) Budding

49. A cross between a tall plant (TT) and short plant (tt) resulted in progeny that were all tall plants as:
 (1) Tallness is the dominant trait
 (2) Shortness is the dominant trait
 (3) Tallness is the recessive trait
 (4) Height of plant is not governed by gene T or t
50. Who is known as the “Father of Genetics”?
 (1) Mendel (2) Morgan (3) Bateson (4) Watson
51. A cross between two individuals results in a ratio of 9:3: 3:1 for four possible phenotypes of progeny. This is an example of a
 (1) Monohybrid cross (2) Dihybrid cross (3) Test cross (4) F1 generation
52. What according to Mendel, was responsible for the inheritance of specific traits?
 (1) Genes (2) Factors (3) Chromosomes (4) DNA
53. Humans have two different sex chromosomes, X and Y. Based on Mendel's laws, a male offspring will inherit which combination of chromosomes?
 (1) Both the X chromosomes from one of its parents
 (2) Both the Y chromosomes from one of its parents
 (3) A combination of X chromosomes from either of its parents
 (4) A combination of X and Y chromosomes from either of its parents
54. Darwin’s natural selection is based on:
 (1) Variations (2) Survival of the fittest
 (3) Law of use and disuse of organs (4) Law of inheritance of acquired characters
55. Natural selection works on
 (1) Genotype (2) Phenotype (3) Environment (4) All of these
56. ‘Gene pool’ is the sum total of genes present in
 (1) the single member of species (2) the interbreeding population of a species
 (3) the community of organisms (4) the parents of a member
57. Match the Column I with Column II:
- | | Column I | | Column II |
|-----|----------|-------|-----------------------------------|
| I. | Darwin | (i) | Inheritance of acquired character |
| II. | De Vries | (ii) | Swan-Necked |
| III | Pasteur | (iii) | Natural Selection |
| I | Lamarck | (iv) | Mutational theory |
- (1) I (iii), II (iv), III (ii), IV (i) (2) I (ii), II (i), III (iv), IV (iii)
 (3) I (iv), II (i), III (ii), IV (iii) (4) I (iv), II (i), III (iii), IV (ii)
58. The most significant character of a man from the evolution point of view is
 (1) foramen magnum shifted forward (2) larger cranial capacity
 (3) face is orthognathous (4) binocular vision
59. The CORRECT sequence of stages in evolution of Modern man/*Homo sapiens sapiens* is
 (1) *Australopithecus* → Neanderthal man → *Homo erectus* → Cro-magnon man → Modern man
 (2) *Australopithecus* → *Homo erectus* → Neanderthal man → Cro-magnon → Modern man
 (3) Neanderthal man → *Australopithecus* → Cro-magnon man, *Homo erectus* → Modern man
 (4) *Homo erectus* → *Australopithecus* → Neanderthal man → Cro-magnon man → Modern man

60. The main weakness of Darwin's theory of Natural Selection was that it could not explain
 (1) Basis of variation (2) Reason for natural selection
 (3) Struggle for existence (4) Prodigality of population
61. Similarities in proteins and genes performing a given function among diverse organism gives clues about common ancestry. This is
 (1) Palaeontological evidences of evolution (2) Evidences from comparative anatomy
 (3) Biochemical evidence (4) Phylogenetic evidence
62. The homologous organs from the following are
 (1) Eyes of octopus and mammals (2) Flippers of penguin and fin of fish
 (3) Potato and sweet potato (4) Heart or brain of vertebrates
63. What is the most important requirement of evolution?
 (1) adaptation of acquired characters (2) genetic variation
 (3) natural selection (4) development anomaly

Reproduction

64. Identify the following organism



- (1) *Rhizobium* (2) *Rhizopus* (3) *rhizoid* (4) mushroom.
65. Unisexual flowers contain _____.
 (1) both stamen and carpel (2) only stamen
 (3) only carpel (4) either stamen or carpel
66. Asexual reproduction produces offspring that are _____.
 (1) genetically identical to their parents (2) genetically identical to their siblings
 (3) none of the above (4) both (1) and (2)
67. Which of the following is not a vegetative propagule ?
 (1) root (2) stem (3) leaf (4) seed
68. Which among the following statements are true for sexual reproduction in flowering plants?
 (i) It requires two types of gametes.
 (ii) Fertilization is a compulsory event.
 (iii) It always results in formation of zygote.
 (iv) Offspring formed are clones.
 (1) (i) and (iv) (2) (i), (ii) and (iv) (3) (i), (ii) and (iii) (4) (i), (iii) and (iv).
69. Out of two daughter cells produced as a result of binary fission in *Amoeba* _____.
 (1) one is large and the other is small
 (2) one is uninucleate and the other is without nucleus
 (3) one is spherical and the other is irregular
 (4) The two are nearly equal sized and identical

70. Testes in human male are located in scrotal sac outside body because_____ for sperm maturation
 (1) it will be nearer to penis (2) it requires lower temperature
 (3) it requires higher temperature (4) to accommodate the large intestine
71. The wall of the uterus has a layer of _____
 (1) Smooth muscles (2) Striated muscles
 (3) Cardiac muscles (4) None of the above
72. The primary sex organs in female, apart from production of female gametes have the responsibility of production of _____
 (1) Oestrogen & Progesteron (2) Ovarian fluid
 (3) Hormone oxytocin (4) Hormone prolactin
73. If the two structurally identical individuals are taking part in sexual reproduction then they will probably be _____ organisms
 (1) Asexual (2) Bisexual (3) Hermaphrodite (4) None of the above
74. Immediately after implantation of fertilized egg (or embryonic stage) in the uterus of the mother a disc shaped special tissue called placenta develops from
 (1) The embryonic tissue (2) The uterine tissue
 (3) Both embryo & uterine tissue combined (4) None of the above
75. If the vasa deferentia of a man are surgically cut or blocked
 (1) sperms in the semen become nonmotile (2) spermatogenesis will not take place
 (3) testosterone will disappear from blood (4) semen will be without sperms
76. Accessory sexual character in female is promoted by
 (1) androgen (2) progesterone (3) oestrogen (4) testosterone.
77. In the male human being, sperms contain autosomes and _____.
 (1) only one Y-chromosome (2) only one X-chromosome
 (3) both X and Y-chromosome (4) either X or Y-chromosome
78. The onset of menstruation at puberty in females is called
 (1) Menopause (2) Menarche (3) Parturition (4) Ovulation
79. Correct sequence of embryo development is
 (1) Gamete → Zygote → Morula → Blastula (2) Zygote → Gamete → Morula → Blastula
 (3) Gamete → Zygote → Blastula → Morula (4) Zygote → Gamete → Blastula → Morula
80. Shortest phase in the menstruation cycly of women is
 (1) menses (2) luteal phase (3) ovulatory phase (4) follicular phase

Answer Key

Physic

1. (1)	2. (1)	3. (1)	4. (2)	5. (3)
6. (2)	7. (3)	8. (4)	9. (3)	10. (2)
11. (1)	12. (3)	13. (3)	14. (2)	15. (3)
16. (2)	17. (4)	18. (1)	19. (3)	20. (1)
21. (2)	22. (1)	23. (3)	24. (2)	25. (1)
26. (4)	27. (1)	28. (3)	29. (4)	30. (3)
31. (4)	32. (3)	33. (4)	34. (1)	35. (3)
36. (1)	37. (2)	38. (3)	39. (1)	40. (3)
41. (3)	42. (2)	43. (2)	44. (1)	45. (4)

Chemistry

1. (3)	2. (4)	3. (1)	4. (3)	5. (4)
6. (1)	7. (1)	8. (2)	9. (1)	10. (4)
11. (3)	12. (3)	13. (2)	14. (1)	15. (3)
16. (4)	17. (3)	18. (4)	19. (2)	20. (1)
21. (3)	22. (3)	23. (2)	24. (4)	25. (2)
26. (2)	27. (4)	28. (2)	29. (1)	30. (3)
31. (3)	32. (2)	33. (4)	34. (2)	35. (2)
36. (4)	37. (3)	38. (4)	39. (3)	40. (4)

Biology

1. (1)	2. (2)	3. (1)	4. (1)	5. (1)
6. (2)	7. (1)	8. (1)	9. (3)	10. (4)
11. (3)	12. (2)	13. (1)	14. (1)	15. (2)
16. (1)	17. (2)	18. (3)	19. (2)	20. (1)
21. (3)	22. (1)	23. (1)	24. (3)	25. (4)
26. (3)	27. (2)	28. (3)	29. (1)	30. (3)
31. (3)	32. (4)	33. (3)	34. (1)	35. (1)
36. (1)	37. (3)	38. (1)	39. (2)	40. (1)
41. (1)	42. (1)	43. (2)	44. (3)	45. (2)
46. (4)	47. (1)	48. (3)	49. (1)	50. (1)
51. (2)	52. (2)	53. (4)	54. (2)	55. (2)
56. (2)	57. (1)	58. (2)	59. (2)	60. (1)
61. (3)	62. (4)	63. (2)	64. (2)	65. (4)
66. (4)	67. (4)	68. (3)	69. (4)	70. (2)
71. (1)	72. (1)	73. (3)	74. (3)	75. (4)
76. (3)	77. (4)	78. (2)	79. (1)	80. (3)

PACE-IIT & MEDICAL

Solution

SECTION – 1 (PHYSIC)

• WORK, POWER, ENERGY

1. Soln.: (1)

$$W = \int_0^2 F dx = \int_0^2 3x^2 dx = 3 \cdot \left[\frac{x^3}{3} \right]_0^2 = 8J$$

2. Soln.: (1)

$$W = F \cdot d \cdot \cos \theta = 50 \cdot 4 \cdot \cos 60^\circ = 200 \cdot 0.5 = 100 J$$

3. Soln.: (1)

$$KE \propto v^2 \Rightarrow \frac{KE_2}{KE_1} = \left(\frac{v_2}{v_1} \right)^2 = 4 \Rightarrow v_2 = 2v_1$$

4. Soln.: (2)

$$PE = \frac{1}{2} kx^2 = \frac{1}{2} \cdot 400 \cdot (0.1)^2 = 2J$$

5. Soln.: (3)

$$P = \frac{W}{t} = \frac{1500}{120} = 12.5W$$

6. Soln.: (2)

$$W = mgh = 20 \cdot 10 \cdot 2 = 400 J, p = \frac{400}{5} = 80W$$

7. Soln.: (3)

$$KE_1 = \frac{1}{2} \cdot 2 \cdot 3^2 = 9J, KE_2 = \frac{1}{2} \cdot 6^2 = 36J \Rightarrow \Delta KE = 27J$$

8. Soln.: (4)

$$a = \frac{F}{m} = 5, m/s^2, s = \frac{1}{2} at^2 = \frac{1}{2} \cdot 5 \cdot 9 = 22.5m \Rightarrow W = F \cdot s = 10 \cdot 22.5 = 225J$$

9. Soln.: (3)

$$PE = mgh = 5 \cdot 10 \cdot 4 = 200 J \Rightarrow \text{At bottom, } KE = 200 J$$

10. Soln.: (2)

$$KE_i = \frac{1}{2} \cdot 0.01 \cdot 400^2 = 800J, v = \frac{0.01 \cdot 400}{1} = 4m/s \Rightarrow KE_f = \frac{1}{2} \cdot 1 \cdot 4^2 = 8J, \text{ Loss} = 792J$$

11. Soln.: (1)

$$\text{Work done} = \int F dx = \text{Area under } F - x \text{ graph}$$

12. Soln.: (3)
 $s = \frac{1}{2}gt^2 = \frac{1}{2} \cdot 9.8 \cdot 4 = 19.6\text{m}, \quad W = mgs = 1 \cdot 9.8 \cdot 19.6 = 192.08\text{J}$
13. Soln.: (3)
 $W = P \cdot t = 1000 \cdot 20 = 20000\text{J}, \quad m = \frac{W}{gh} = \frac{20000}{10 \cdot 10} = 200\text{kg}$
14. Soln.: (2)
 $P = \frac{dK}{dt} = \frac{d}{dt}(3t^2) = 6t = 6 \cdot 2 = 12\text{W}$
15. Soln.: (3)
 Centripetal force is perpendicular to displacement, so work done is zero.

Light

16. Soln.: (2)
17. Soln.: (4)
18. Soln.: (1)
19. Soln.: (3)
20. Soln.: (1)
21. Soln.: (2)
22. Soln.: (1)
23. Soln.: (3)
24. Soln.: (2)
25. Soln.: (1)
26. Soln.: (4)
27. Soln.: (1)
28. Soln.: (3)
29. Soln.: (4)
30. Soln.: (3)

FORCE

31. Soln.: (4)

- 32. Soln.: (3)
- 33. Soln.: (4)
- 34. Soln.: (1)
- 35. Soln.: (3)
- 36. Soln.: (1)
- 37. Soln.: (2)
- 38. Soln.: (3)
- 39. Soln.: (1)
- 40. Soln.: (3)
- 41. Soln.: (3)
- 42. Soln.: (2)
- 43. Soln.: (2)
- 44. Soln.: (1)
- 45. Soln.: (4)

SECTION – 2 (CHEMISTRY)

PERIODIC CLASSIFICATION OF ELEMENT

- 1. Soln.: (3)
- 2. Soln.: (4)
- 3. Soln.: (1)
- 4. Soln.: (3)
- 5. Soln.: (4)
- 6. Soln.: (1)
- 7. Soln.: (1)
- 8. Soln.: (2)
- 9. Soln.: (1)
- 10. Soln.: (4)
- 11. Soln.: (3)

12. Soln.: (3)
13. Soln.: (2)
14. Soln.: (1)
15. Soln.: (3)
16. Soln.: (4)
17. Soln.: (3)
18. Soln.: (4)
19. Soln.: (2)
20. Soln.: (1)

CHEMICAL REACTION

21. Soln.: (3)
22. Soln.: (3)
23. Soln.: (2)
24. Soln.: (4)
25. Soln.: (2)
26. Soln.: (2)
27. Soln.: (4)
28. Soln.: (2)
29. Soln.: (1)
30. Soln.: (3)
31. Soln.: (3)
32. Soln.: (2)
33. Soln.: (4)
34. Soln.: (2)
35. Soln.: (2)
36. Soln.: (4)

37. Soln.: (3)
38. Soln.: (4)
39. Soln.: (3)
40. Soln.: (4)

SECTION – 3 (Biology)

1. Sol: (1)
2. Sol: (2)
Conversion of light energy to chemical energy.
3. Sol: (1)
4. Sol: (1)
Stomata
5. Sol: (1)
6. Sol: (2)
Plants synthesize their food themselves
7. Sol: (1)
Photosynthesis is the process through which plants utilize sunlight to make food and it takes place
8. Sol: (1)
Absorbing light
9. Sol: (3)
Carotenoid
10. Sol: (4)
Photochemical process
11. Sol: (3)
 $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
12. Sol: (2)
13. Sol: (1)
14. Sol: (1)
15. Sol: (2)
16. Sol: (1)
17. Sol: (2)
18. Sol: (3)

19. Sol: (2)
20. Sol: (1)
21. Sol: (3)
Arteries carry blood away from the heart.
22. Sol: (1)
A patch of nodal tissue is present in the right upper corner of the right atrium called the sino-atrial node (SAN).
23. Sol: (1)
Pacemakers are electronic devices that stimulate the heart with electrical impulses to maintain or restore a normal heartbeat.
24. Sol: (3)
25. Sol: (4)
26. Sol: (3)
27. Sol: (2)
28. Sol: (3)
29. Sol: (1)
30. Sol: (3)
31. Sol: (3)
32. Sol: (4)
33. Sol: (3)
34. Sol: (1)
Loss of glucose in the urine
35. Sol: (1)
Urinary bladder
36. Sol: (1)
37. Sol: (3)
38. Sol: (1)
Skin.
39. Sol: (2)
Filters the air we breathe.
40. Sol: (1)
Cilia.

41. Sol. (1)
Alveoli.
42. Sol. (1)
43. Sol. (2)
44. Sol: (3)
45. Sol: (2)
46. Sol: (4)
47. Sol: (1)
48. Sol: (3)
49. Sol: (1)
Tallness is the dominant trait
50. Sol: (1)
51. Sol: (2)
Dihybrid cross
52. Sol: (2)
53. Sol: (4)
54. Sol: (2)
55. Sol: (2)
Nature selects favourable variations i.e phenotypic characters in organisms.
56. Sol: (2)
XII NCERT pg 136
57. Sol: (1)
58. Sol: (2)
59. Sol: (2)
XII NCERT pg 140
60. Sol: (1)
61. Sol: (3)
XII NCERT pg 129
62. Sol: (4)
XII NCERT pg 130
63. Sol: (2)

- 64. Sol: (2)
- 65. Sol: (4)
- 66. Sol: (4)
- 67. Sol: (4)
- 68. Sol: (3)
- 69. Sol: (4)
- 70. Sol: (2)
- 71. Sol: (1)
- 72. Sol: (1)
- 73. Sol: (3)
- 74. Sol: (3)
- 75. Sol: (4)
- 76. Sol: (3)
- 77. Sol: (4)
- 78. Sol: (2)
- 79. Sol: (1)
- 80. Sol: (3)