

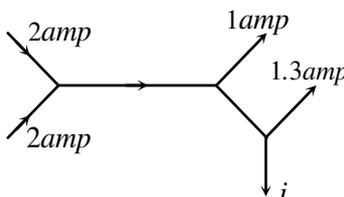
PHYSICS

1. Four plates of equal area A are separated by equal distances d and are arranged as shown in the figure. The equivalent capacity is

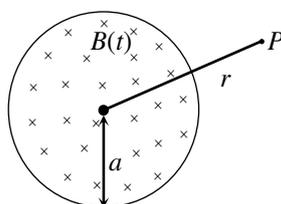


- (A) $\frac{\epsilon_0 A}{d}$ (B) $\frac{4\epsilon_0 A}{d}$ (C) $\frac{3\epsilon_0 A}{d}$ (D) $\frac{2\epsilon_0 A}{d}$

2. The figure below shows currents in a part of electric circuit. The current i is

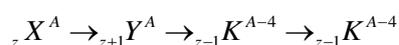


- (A) 1 amp (B) 1.3 amp (C) 3.7 amp (D) 1.7 amp
3. A uniform but time-varying magnetic field $B(t)$ exists in a circular region of radius a and is directed into the plane of the paper, as shown. The magnitude of the induced electric field at point P at a distance r from the centre of the circular region



- (A) Decreases as $\frac{1}{r^2}$ (B) Increases as r (C) Decreases as $\frac{1}{r}$ (D) Is zero

4. In the given reaction



Radioactive radiations are emitted in the sequence

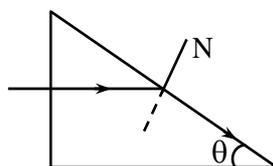
- (A) β, γ, α (B) γ, α, β (C) β, α, γ (D) α, β, γ
5. A diode having potential difference 0.5 V across its junction which does not depend on current, is connected in series with resistance of 20 Ω across source. If 0.1 A passes through resistance then what is the voltage of the source
- (A) 5 V V (B) 2.5 V (C) 2.0 (D) 1.5 V
6. A star emitting radiation at a wavelength of 5000 \AA is approaching earth with a velocity of $1.5 \times 10^6 \text{ m/s}$. The change in wavelength of the radiation as received on the earth, is
- (A) 2.5 \AA (B) 100 \AA (C) Zero (D) 25 \AA
7. The work function for metals A, B and C are respectively 1.92 eV, 2.0 eV and 5 eV. According to Einstein's equation, the metals which will emit photo electrons for a radiation of wavelength 4100 \AA is/are

- (A) None of these (B) A and B only (C) A only (D) All the three metals

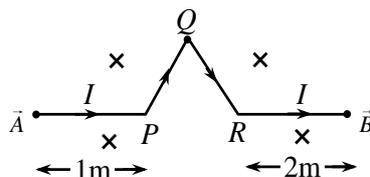
8. A balloon is released which rises vertically up with an acceleration 1.4 m/s^2 . A ball is released from the balloon, 20 sec. after the balloon has left the ground. The maximum height from the ground reached by the ball is, ($g = 9.8 \text{ m/s}^2$)
 (A) 260 m. (B) 320 m (C) 40 m (D) 280 m
9. A person attempts to remain in equilibrium, by pressing his palm and feet against the two parallel walls. Choose the incorrect statement:



- (A) For each wall, there is a minimum value of friction coefficient (depending on the person's mass) below which the above situation is not possible.
 (B) The friction coefficients corresponding to the man and the two walls may be different
 (C) The forces (horizontal) exerted on both the walls should be equal in magnitude
 (D) Both the walls should be rough
10. The refractive index of prism is 1.5, if light grazes the surfaces as shown in figure. The angle θ should be :



- (A) 45° (B) 90° (C) $\cos^{-1}(2/3)$ (D) $\sin^{-1}(2/3)$
11. A current carrying wire is placed in the magnetic field B (see the figure)



Given, $PQ = QR = 1\text{m}$, $\angle PQR = \angle QPR = \angle PRQ$

Then the force acting on the wire is :

- (A) $5IB$ (B) $3IB$ (C) $2IB$ (D) $4IB$
12. Which level of the doubly ionization lithium (Li^{++}) has the same energy as the ground state energy of hydrogen atom?
 (A) 4 (B) 1 (C) 2 (D) 3
13. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio
 (A) 1 : 2 (B) 2 : 1 (C) 1 : 4 (D) 4 : 1
14. A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg . The velocity of 8 kg mass is 6 m/sec . The kinetic energy of the other mass is
 (A) 288 J (B) 24 J (C) 32 J (D) 48 J

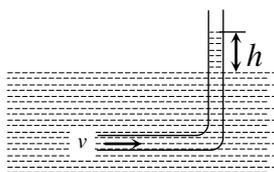
15. A uniform cube of side a and mass m rests on a rough horizontal table. A horizontal force 'F' is applied normal to one of the faces at a point that is directly above the centre of the face, at a height $\frac{3a}{4}$ above the base. The minimum value of 'F' for which the cube begins to tilt about the edges is (assume that the cube does not slide).

(A) $F_{\min} = \frac{5mg}{3}$ (B) $F_{\min} = \frac{2\sqrt{2}mg}{3}$ (C) $F_{\min} = \frac{2mg}{3}$ (D) $F_{\min} = \frac{4mg}{3}$

16. Two droplets merge with each other and forms a large droplet. In this process

- (A) Some mass is converted into energy
 (B) Neither liberated nor absorbed
 (C) Energy is absorbed
 (D) Energy is liberated

17. An L-shaped glass tube is just immersed in flowing water such that its opening is pointing against flowing water. If the speed of water current is v , then



- (A) The water in the tube does not rise at all (B) The water in the tube rises to height $\frac{g}{2v^2}$
 (C) The water in the tube rises to height $\frac{v^2}{2g}$ (D) None of these

18. Which of the following statements is correct for any thermodynamic system

- (A) The work done in an adiabatic process is always zero
 (B) The change in entropy can never be zero
 (C) Internal energy and entropy are state functions
 (D) The internal energy changes in all processes

19. In an LCR series ac circuit, the voltage across each of the components, L , C and R is $50V$. the voltage across the LC combination will be

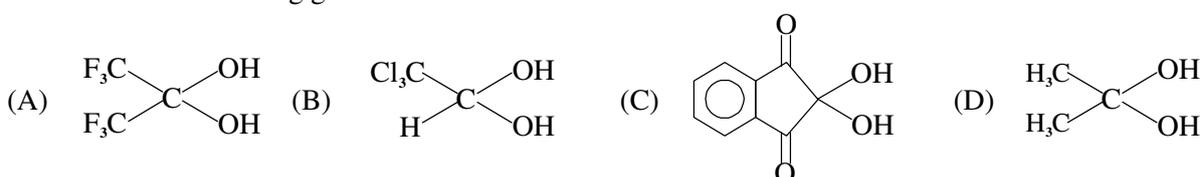
- (A) $0V$ (zero) (B) $100V$ (C) $50\sqrt{2}V$ (D) $50V$

20. If σ is the charge per unit area on the surface of a conductor, then the electric field intensity at a point on the surface is

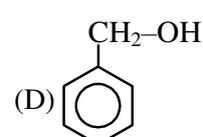
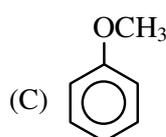
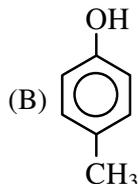
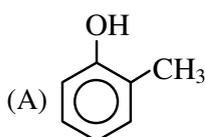
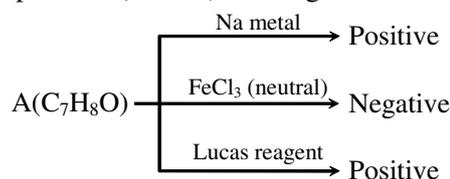
- (A) $\left(\frac{\sigma}{2\epsilon_0}\right)$ tangential to surface (B) $\left(\frac{\sigma}{\epsilon_0}\right)$ tangential to surface
 (C) $\left(\frac{\sigma}{2\epsilon_0}\right)$ normal to surface (D) $\left(\frac{\sigma}{\epsilon_0}\right)$ normal to surface

CHEMISTRY

21. In the silver plating of copper, $K[Ag(CN)_2]$ is used instead of $AgNO_3$. The reason is
- (A) Less availability of Ag^+ ions from $K[Ag(CN)_2]$, as Cu cannot displace Ag from $K[Ag(CN)_2]$, this ensure slow and uniform deposition of silver on copper.
- (B) Ag^+ ions are completely removed from solution if $K[Ag(CN)_2]$ is used and this ensure less consumption of raw material.
- (C) more availability of Ag^+ ions from $K[Ag(CN)_2]$, as complex breaks easily in aqueous solution $K[Ag(CN)_2]$, hence less voltage is required for electrolysis.
- (D) more availability of Ag^+ ions from $K[Ag(CN)_2]$, as complex breaks easily in aqueous solution $K[Ag(CN)_2]$, this results in faster electroplating.
22. Kjeldahl's method cannot be used for the estimation of nitrogen in
- (A) Pyridine (B) Azo compounds (C) Nitro compounds (D) All the these
23. Which of the following compounds will not undergo azo coupling reaction with benzene diazonium chloride?
- (A) Nitrobenzene (B) Anisole (C) Phenol (D) Aniline
24. The ejection of the photoelectron from the silver metal in the photoelectric effect experiment can be stopped by applying the voltage of 0.35V when the radiation 256.7 nm is used. Report the work function for silver metal in eV rounded upto one decimal place.
- (A) 4.5 (B) 3.5 (C) 2.5 (D) 1.5
25. Which of the following is incorrect statement about Arrhenius equation?
- $$k = Zpe^{-E_a/RT} = Ae^{-E_a/RT}$$
- (A) $e^{-E_a/RT}$ represents the fraction of fraction of colliding molecules having energy more than or equal to threshold energy.
- (B) $e^{-E_a/RT}$ represents the fraction of colliding molecules having energy less than threshold energy
- (C) 'Z' represents the collision frequency.
- (D) 'A' represents the number of collisions having proper orientation.
26. In the following sequence of reaction, Toluene $\xrightarrow{KMnO_4}$ A $\xrightarrow{SOCl_2}$ B $\xrightarrow[\text{BaSO}_4]{H_2/Pd}$ C. The product C is
- (A) C_6H_5CHO (B) $C_6H_5CH_2OH$ (C) $C_6H_5CH_3$ (D) C_6H_5COOH
27. Which of the following geminal diols is the least stable?



28. When an ideal gas undergoes unrestricted expansion,
 (A) Cooling does not occur as these do work which is equal to loss in kinetic energy
 (B) Cooling occurs as molecules collide with each other with loss of energy
 (C) No cooling occurs as no attractive interactions exist among molecules.
 (D) Cooling occurs because the molecules lie above inversion temperature.
29. Which one of the following molecules will have highest extent of inter molecular hydrogen bond?
 (A) NH_3 (B) HF (C) H_2O (D) HCl
30. In the reaction : $\text{S} + \frac{3}{2}\text{O}_2 \rightarrow \text{SO}_3 + 2x \text{ kcal}$ and $\text{SO}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{SO}_3 + y \text{ kcal}$, heat of formation of SO_2 is
 (A) $(y-2x)$ (B) $(2x+y)$ (C) $(x-y)$ (D) $(x+y)$
31. The decomposition of a substance follows first order kinetics. If its concentration is reduced to $1/8^{\text{th}}$ of its initial value in 24 minutes, the rate constant of decomposition process is $\frac{2.303}{y} \log(2) \text{ min}^{-1}$, then 'y' is
 (A) 8 (B) 6 (C) 4 (D) 2
32. Which of the following crystals do not exhibit Frenkel defect?
 (A) ZnS (B) KBr (C) AgCl (D) AgBr
33. Identify an aromatic compound $\text{A}(\text{C}_7\text{H}_8\text{O})$ which gives following tests with the given reagents.



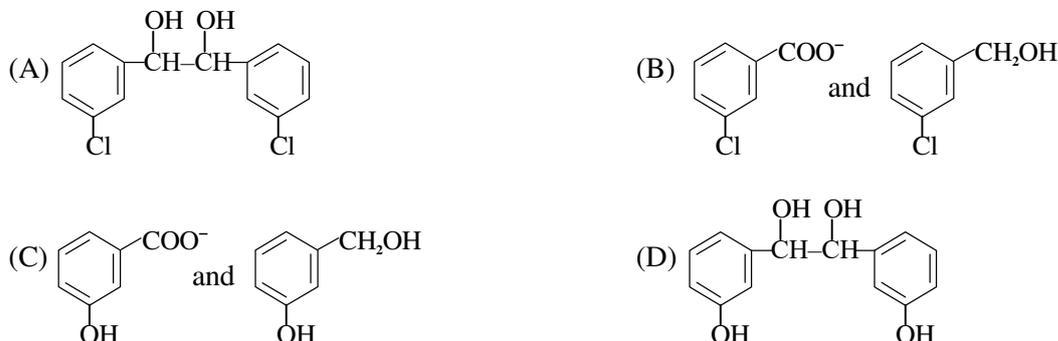
34. The decreasing order of the ionization potential of the following elements is
 (A) $\text{Ne} > \text{Cl} > \text{S} > \text{P} > \text{Al} > \text{Mg}$ (B) $\text{Ne} > \text{Cl} > \text{S} > \text{P} > \text{Mg} > \text{Al}$
 (C) $\text{Ne} > \text{Cl} > \text{P} > \text{S} > \text{Mg} > \text{Al}$ (D) $\text{Ne} > \text{Cl} > \text{P} > \text{S} > \text{Al} > \text{Mg}$
35. In the following sequence of reactions
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} \xrightarrow{\text{KOH}(\text{alc})} \text{(A)} \xrightarrow{\text{HBr}} \text{(B)} \xrightarrow{\text{KOH}(\text{aq})} \text{(C)}$
 In product (C) is
 (A) Propan-2-ol (B) Propan-1-ol
 (C) Propyne (D) Propene
36. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
 (A) Be forms beryllates and Al forms aluminates (B) $\text{Be}(\text{OH})_2$ like $\text{Al}(\text{OH})_3$ is strongly basic.
 (C) Be like Al is rendered passive by HNO_3 (D) Be_2C like Al_4C_3 yields methane on hydrolysis

37. Identify the compounds P, Q, and R in the following reactions.



- (A) $P=B(OH)_3$; $Q=B_2O_3$; $R=Na_2B_4O_7$ (B) $P=Na_2B_4O_7$; $Q=B(OH)_3$; $R=B_2O_3$
 (C) $P=Na_2B_4O_7$; $Q=B_2O_3$; $R=B(OH)_3$ (D) $P=B_2O_3$; $Q=Na_2B_4O_7$; $R=B(OH)_3$

38. When m-chlorobenzaldehyde is heated with 50% KOH solution, the product(s) obtained is(are)



39. Which of the following reactions occurs in the stratosphere?



40. Identify the complexes, which is expected to be coloured?

- (A) $K_3[VF_6]$ (B) $[Ni(CN)_4]^{2-}$
 (C) $[Cu(NCCH_3)_4]Cl$ (D) $[Ti(NO_3)_4]$

BIOLOGY

41. Tendons and ligaments are the examples of

- (A) dense irregular connective tissue. (B) dense regular connective tissue.
 (C) cartilage (D) bone

42. Enzymes of lysosome are

- (A) active at the basic pH. (B) active at very high pH.
 (C) active at the acidic pH. (D) active at the neutral pH.

43. Match Column-I with Column-II and choose the **correct** option.

Column-I		Column-II	
(a)	Metacentric chromosome	(I)	Middle centromere
(b)	Su(B)metacentric	(II)	Centromere slightly away from middle
(c)	Acrocentric	(III)	Centromere close to its end
(d)	Telocentric	(IV)	Terminal centromere

- (A) (a) – (IV); (b) – (III); (c) – (II); (d) – (I) (B) (a) – (I); (b) – (II); (c) – (IV); (d) – (III)
 (C) (a) – (II); (b) – (I); (c) – (III); (d) – (IV) (D) (a) – (I); (b) – (II); (c) – (III); (d) – (IV)

44. _____ is the basic pathway that results in the formation of the sugars and is common to the C_3 and C_4 plants.
- (A) Calvin cycle (B) HMP shunt (C) TCA cycle (D) Photorespiration
45. Recombination of genes occur at
- (A) metaphase II in meiosis. (B) prophase I in meiosis.
(C) anaphase I in meiosis. (D) prophase in mitosis.
46. The Z scheme refers to
- (A) an energy diagram for the transfer of electrons in the light reactions of photosynthesis.
(B) the carbon fixation process also known as the Calvin cycle.
(C) the pattern of grana within the chloroplasts of photosynthetic plants.
(D) the type of photosynthesis used in plants found in areas with minimal precipitation.
47. Match Column-I with Column-II and select the **correct** option.
- | Column-I | | Column-II | |
|----------|----------------------|-----------|----------------------|
| (a) | G ₁ phase | (I) | Gap I phase |
| (b) | Cytokinesis | (II) | Nuclear division |
| (c) | Karyokinesis | (III) | Cytoplasmic division |
| (d) | S phase | (IV) | Synthesis phase |
- (A) (a) – (I); (b) – (III); (c) – (IV); (d) – (II)
(B) (a) – (IV); (b) – (III); (c) – (II); (d) – (I)
(C) (a) – (I); (b) – (III); (c) – (II); (d) – (IV)
(D) (a) – (III); (b) – (I); (c) – (II); (d) – (IV)
48. The fastest method to obtain clones is through
- (A) vegetative reproduction (B) parthenogenesis
(C) parasexual hybridization (D) induced mutation.
49. If the nucellus cell of an angiosperm contains 24 chromosomes, then the number of chromosomes present in pollen grain. Endosperm and embryo will be respectively
- (A) 24, 12 and 12 (B) 12, 24 and 36
(C) 12, 36 and 24 (D) 24, 36 and 24
50. Which of the following hormone is released earliest by placenta during pregnancy?
- (A) Relaxin (B) hCG (C) Progesterone (D) hPL
51. Methyl guanosine triphosphate is associated with
- (A) Okazaki fragments. (B) capping
(C) tautomerism (D) point mutation

52. The gas produced as end product during growth and metabolism of microbes depends on
 (A) oxygen levels in the digester tank. (B) nature of microbe only
 (C) nature of digester tank and microbe (D) nature of microbe and substrate
53. A suitable method of transformation with recombinant DNA for plants in which cells are bombarded with high-velocity micro-particles of gold or tungsten coated with DNA is
 (A) biolistics (B) gene gun (C) microinjection (D) Both (A) and (B)
54. The association between clown fish and sea anemone is the same as between
 (A) cuscuta and hedge plant (B) fig and wasp
 (C) cuckoo and crow (D) egret bird and grazing cattle
55. Gametes of threatened species can be preserved in viable and fertile condition for long periods using
 (A) *in situ* conservation. (B) cryopreservation technique
 (C) CTAB (D) PCR technique
56. With respect to fungal sexual cycle, choose the **correct** sequence of events.
 (A) Meiosis, Karyogamy, Plasmogamy (B) Plasmogamy, Karyogamy, Meiosis
 (C) Meiosis, Plasmogamy, Karyogamy (D) Karyogamy, Plasmogamy, Meiosis
57. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is
 (A) gymnosperms (B) pteridophytes (C) dicots (D) monocots
58. Symptoms like constipation, abdominal pain, cramps, stools with excess of mucous and blood clots are of
 (A) filariasis (B) ascariasis (C) malaria (D) amoebiasis
59. Match Column-I with Column-II and select the **correct** option.

Column-I		Column-II	
(a)	<i>Pila</i>	(I)	Tusk shell
(b)	<i>Chiton</i>	(II)	Apple snail
(c)	<i>Dentalium</i>	(III)	Cuttlefish
(d)	<i>Sepia</i>	(IV)	Chaetopleura

- (A) (a) – (IV); (b) – (III); (c) – (II); (d) – (I) (B) (a) – (IV); (b) – (II); (c) – (III); (d) – (I)
 (C) (a) – (II); (b) – (IV); (c) – (I); (d) – (III) (D) (a) – (II); (b) – (I); (c) – (IV); (d) – (III)

60. Scutellum is a
(A) protective covering of plumule in grasses. (B) shield shaped and large cotyledon of grasses.
(C) remnant of nucellus. (D) food storing haploid structure in grass embryo.
61. In dicot roots, cells of which region show casparian strips?
(A) Hypodermis (B) Pericycle (C) Endodermis (D) Cambium
62. Which of the following is an example of active transport performed by the cell membrane ?
(A) Diffusion (B) Osmosis (C) Na^+ / K^+ pump (D) Both (D) and (B)
63. You are given 13 meiotic divisions. From these divisions how many seeds you can form and how many pollen grains will be wasted ?
(A) No. of seed – 52; No. of wasted pollen grain – 52
(B) No. of seed – 2; No. of wasted pollen grain – 10
(C) No. of seed – 10; No. of wasted pollen grain – 2
(D) No. of seed – 13; No. of wasted pollen grain – Zero
64. Accessory pigments
(A) allow plants to harvest visible light of wider range wavelength.
(B) transfer e^- to NADP.
(C) release e^- and get oxidised.
(D) play no role in photosynthesis.
65. Which of the following relations shows substrate level phosphorylation ?
(A) Succinyl CoA \rightarrow Succinic acid (B) α -Ketoglutaric acid \rightarrow Succinic CoA
(C) Malic acid \rightarrow Oxalo-acetic acid (D) Citric acid \rightarrow α -Ketoglutaric acid
66. Which part of the human ear plays no role in hearing as such but otherwise is very much important?
(A) Vestibular apparatus (B) Organ of Corti
(C) Tympanum (D) Ear ossicles
67. Blood flowing in umbilical cord of mammalian embryo is
(A) 75% foetal and 25% maternal. (B) 100% foetal.
(C) 50% maternal and 50% foetal. (D) 100% maternal.
68. Each cell of microspore tetrad is
(A) $3n$. (B) some n and some $2n$. (C) n . (D) $2n$

69. In F_1 generation, a phenotypic ratio of 1 : 1 : 1 : 1 exhibits
- (A) dihybrid test cross. (B) lethality.
(C) monohybrid test cross (D) back cross.
70. 'The transforming principle' in Griffith's experiment was detected,
- (A) when mixture of heat killed S-strain and live R-strain of *S. pneumoniae* were injected into mice.
(B) when heat killed R-strain of *S. pneumoniae* were injected into mice.
(C) when live R-strain of *S. pneumoniae* were injected into mice.
(D) when live S-strain of *S. pneumoniae* were injected into mice.
71. If cardiac output is 7 L, what would be the approximate number of heartbeats per minute?
- (A) 120 (B) 100 (C) 80 (D) 72
72. The given table gives the classification of a wheat plant.
- | | |
|-----------|-----------------|
| Kingdom | Plantae |
| Division | Angiospermae |
| __ (a) __ | Monocotyledonae |
| __ (b) __ | Poales |
| Family | __ (c) __ |
- Fill in the blanks using the **correct** option.
- (A) (a) – Class; (b) – Order; (c) – Solanaceae (B) (a) – Genus; (b) – Class; (c) – Solanaceae
(C) (a) – Class; (b) – Order; (c) – Poaceae (D) (a) – Genus; (b) – Class; (c) – Poaceae
73. Infoldings of plasma membrane in bacteria are called
- (A) mesosomes. (B) pili (C) plasmid (D) episomes
74. Which of the following characters belong to slime moulds?
- (1) Saprophytes
(2) Forms plasmodium under favourable condition
(3) Spores possess true walls
(4) Spores are dispersed by water
(5) Body moves along decaying twigs and leaves engulfing organic matter.
- (A) All except (2) (B) All except (3) and (5)
(C) All except (4) (D) All except (5)

75. Which of the following statements are **incorrect** with respect to lichens?
- (1) Algae protects fungus and fungus is parasite on algae.
 (2) Algae and fungi are in symbiotic association.
 (3) Lichens are pollution indicator.
 (4) Lichen represents the climax of plant succession.
- (A) (3) and (4) (B) (2) and (3)
 (C) (1) and (4) (D) (1) and (2)
76. How many of the following algae belong to the category of red algae?
- Polysiphonia, Gelidium, Laminaria, Spirogyra, Porphyra, Fucus, Chlamydomonas
- (A) Five (B) Four (C) Three (D) Two
77. If the haploid number of chromosomes in gymnosperms (*Pinus*) is 12, what will be the number of chromosomes in its root and endosperm?
- (A) 24 and 36 (B) 24 and 12 (C) 12 and 24 (D) 12 and 12
78. Which of the following is **not** a characteristic of the cnidarians?
- (A) Coelom is absent.
 (B) Shows cellular level of body organisation.
 (C) Mostly marine, sessile or free swimming, radially symmetrical.
 (D) A central gastrovascular cavity with a single opening, hypostome.
79. Following features belongs to which phylum?
- (1) Exclusively marine
 (2) Radial symmetry
 (3) Diploblastic
 (4) Tissue level organisation
- (A) Platyhelminthes (B) Ctenophora (C) Porifera (D) Coelentrata
80. Choose the **incorrect** match.
- (A) Superior ovary/hypogynous flower – Mustard, China rose and brinjal
 (B) Inferior ovary – Pea
 (C) Asymmetric (irregular flower) – *Canna*
 (D) Zygomorphic flowers (Bilateral symmetry) – Pea, gulmohur, bean, *Cassia*

* * * * *

CLASS 12th BIO MOVING TO TARGET NEET

ANSWER KEY

SET - B

PHYSICS

1. (D)
2. (D)
3. (C)
4. (C)
5. (B)
6. (D)
7. (B)
8. (B)
9. (A)
10. (C)
11. (D)
12. (D)
13. (B)
14. (A)
15. (C)
16. (D)
17. (C)
18. (C)
19. (A)
20. (D)

CHEMISTRY

21. (A)
22. (D)
23. (A)

24. (A)
25. (B)
26. (A)
27. (D)
28. (C)
29. (C)
30. (A)
31. (A)
32. (B)
33. (D)
34. (C)
35. (A)
36. (B)
37. (B)
38. (B)
39. (D)
40. (A)

BIOLOGY

41. (B)
42. (C)

43. (D)
44. (A)
45. (B)
46. (A)
47. (C)
48. (B)
49. (C)
50. (B)
51. (B)
52. (D)
53. (D)
54. (D)
55. (B)
56. (B)
57. (A)
58. (D)
59. (C)
60. (B)
61. (C)
62. (C)

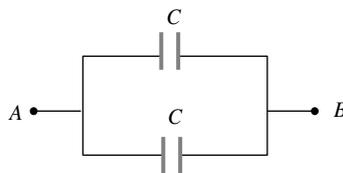
63. (C)
64. (A)
65. (A)
66. (A)
67. (B)
68. (C)
69. (A)
70. (A)
71. (B)
72. (C)
73. (A)
74. (C)
75. (C)
76. (C)
77. (B)
78. (B)
79. (B)
80. (B)

SOLUTION

PHYSICS

1. (D)

The given circuit is equivalent to a parallel combination two identical capacitors
Hence equivalent capacitance between A and B is



$$C = \frac{\epsilon_0 A}{d} + \frac{\epsilon_0 A}{d}$$

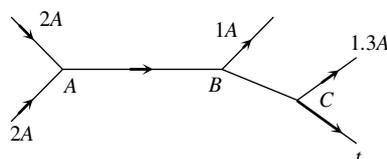
$$= \frac{2\epsilon_0 A}{d}$$

2. (D)

According to Kirchhoff's first law

$$\text{At junction A, } i_{AB} = 2 + 2 = 4A$$

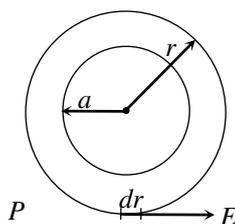
$$\text{At junction B, } i_{AB} = i_{BC} - 1 = 3A$$



$$\text{At junction C, } i = i_{BC} - 1.3 = 3 - 1.3 = 1.7 \text{ amp}$$

3. (C)

Construct a concentric circle of radius r . The induced electric field (E) at any point on the circle is equal to that at P . For this circle

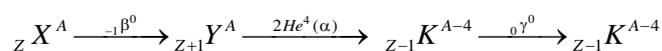


$$\oint \vec{E} \cdot d\vec{l} = \left| \frac{d\phi}{dt} \right| = A \left| \frac{dB}{dt} \right|$$

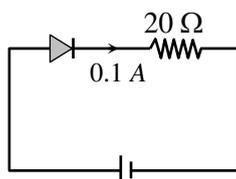
$$\text{or } E \times (2\pi r) = \pi a^2 \cdot \left| \frac{dB}{dt} \right|$$

$$\Rightarrow E = \frac{a^2}{2r} \left| \frac{dB}{dt} \right| \Rightarrow E \propto \frac{1}{r}$$

4. (C)



5. (B)



$$V' = V + IR$$

$$= 0.5 + 0.1 \times 20$$

$$= 2.5 \text{ V}$$

6. (D)

$$\Delta\lambda = \lambda \cdot \frac{v}{c} = \frac{1.5 \times 10^6}{3 \times 10^8} \times 5000 = 25 \text{ \AA}$$

7. (B)

$$\text{Energy of incident radiations (in eV)} = \frac{12375}{4100} = 3.01 \text{ eV}$$

Work function of metal A and B are less than 3.01 eV, so A and B will emit photo electrons.

8. (B)

The height risen by the balloon after 20 s will be

$$h = \frac{1}{2} \times 1.4 \times 20^2 \quad \text{using } s = ut + \frac{1}{2}at^2$$

$$= 280 \text{ m.}$$

Velocity attained by the balloon (as also by the ball) at the end of 20 s of its release is $v = 1.4 \times 20$

∴ if 'h' be the further height risen by the ball after its release then $0^2 = 28^2 - 2gh'$

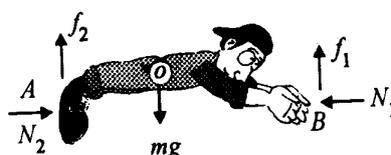
$$\text{or } h' = \frac{28^2}{2g} = 40 \text{ m}$$

∴ maximum height risen by the ball = $h + h'$

$$= 280 + 40 = 320 \text{ m}$$

9. (A)

Figure given below shows the free body diagram of the person;



Conditions of equilibrium for a rigid body under the action of coplanar forces are :

$$\sum f_h = 0; \sum f_v = 0; \sum m = 0$$

∴ For $\sum M = 0$ and assuming N_1 and N_2 to be acting almost along the same line. So we have; taking moments about A, it is clear that f_1 should exist, to balance the clockwise moment due to the person's weight.

Similarly, taking moments about B, the existence of f_2 becomes a must, hence, (i) is correct.

For $\sum f_h = 0$; we have $N_1 - N_2 = 0$ or $N_1 = N_2$ hence (ii) is also correct

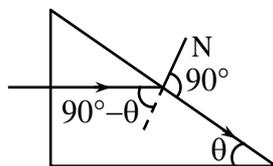
For $\sum f_v = 0$; we have $f_1 + f_2 = mg$

In other words; f_1 and f_2 should be together able to balance mg hence f_1 and f_2 may be separately unequal. Hence (iii) is also correct

$$\because (f_1)_{\max} = \mu_1 N_1 \quad \text{and} \quad (f_2)_{\max} = \mu_2 N_2$$

So, irrespective of the values of μ_1 and μ_2 the forces f_1 and f_2 can be made to satisfy the condition $f_1 + f_2 = mg$, by suitably manipulating N_1 or N_2 . Hence (iv) is wrong.

10. (C)



$$\frac{3}{2} \sin(90^\circ - \theta) = 1 \sin 90^\circ$$

$$\cos \theta = \frac{2}{3}$$

$$\theta = \cos^{-1}\left(\frac{2}{3}\right)$$

11. (D)

12. (D)

$$E = \frac{-13.6Z^2}{n^2}$$

∴ For same energy $E_1 = E_2$

$$\Rightarrow \frac{Z_1^2}{n_1^2} = \frac{Z_2^2}{n_2^2}$$

$$Z_1 = 1, n_1 = 1, Z_2 = 3$$

$$1 = \frac{3^2}{n_2^2}$$

$$n_2 = 3$$

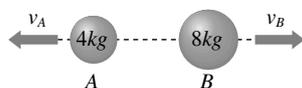
13. (B)

$$U = \frac{F^2}{2k} \Rightarrow \frac{U_1}{U_2} = \frac{k_2}{k_1} \quad (\text{if forces are same})$$

$$\therefore \frac{U_1}{U_2} = \frac{3000}{1500} = \frac{2}{1}$$

14. (A)

As the initial momentum of bomb was zero, therefore after explosion two parts should possess numerically equal momentum

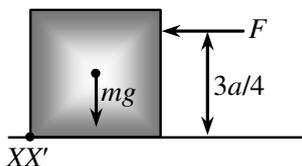


$$i.e. m_A v_A = m_B v_B \Rightarrow 4 \times v_A = 8 \times 6 \Rightarrow v_A = 12 \text{ m/s}$$

$$\therefore \text{Kinetic energy of other mass A,} = \frac{1}{2} m_A v_A^2$$

$$= \frac{1}{2} \times 4 \times (12)^2 = 288 \text{ J.}$$

15. (C)



For toppling about edge XX'

$$F_{\min} \frac{3a}{4} = mg \frac{a}{2}$$

$$F_{\min} = \frac{2mg}{3}$$

16. (D)

When two droplets merge with each other, their surface energy decreases.

$W = T(\Delta A) = (\text{negative})$ i.e. energy is released.

17. (C)

$$\frac{1}{2} \rho v^2 = \rho gh \Rightarrow h = \frac{v^2}{2g}$$

18. (C)

The internal energy and entropy depend only on the initial and final states of the system and not on the path followed to attain that state.

19. (A)

Net voltage across LC combination = $V_L - V_C = 0$ V

20. (D)

CHEMISTRY

21. (A)

option (d) correctly explains the reason.

22. (D)

Kjeldahl's method for estimation of nitrogen fails for compounds containing nitrogen in the ring (pyridine) and compounds containing nitrogen directly linked to oxygen atom (pyridine) and compounds containing nitrogen directly linked to oxygen atom (nitro compounds) or another nitrogen atom (azo compounds).

23. (A)

Diazonium cation is a weak electrophile and hence reacts with electron rich compounds containing electron donating groups such as $-\text{OH}$, $-\text{NH}_2$ and $-\text{OCH}_3$ groups and not with compounds containing electron withdrawing groups such as $-\text{NO}_2$, etc.

24. (A)

Energy of incident radiation (E)

$$= \frac{hc}{\lambda} = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{256.7 \times 10^{-9}} = 0.0774 \times 10^{-17} \text{ J}$$

$$= 7.74 \times 10^{-19} \text{ J} = 4.83 \text{ eV} \quad [\because 1.602 \times 10^{-19} \text{ J} = 1 \text{ eV}]$$

The potential applied gives the kinetic energy to the electron.

K.E. of photoelectron = eV_0

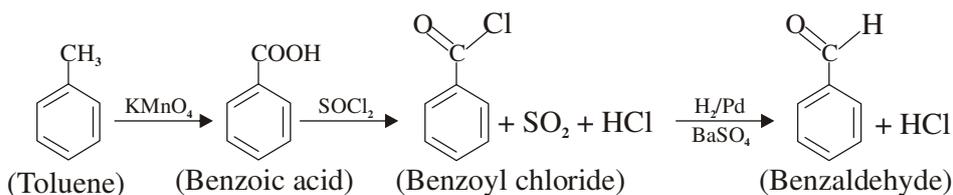
$$= 1.6 \times 10^{-19} \times 0.35 = 5.6 \times 10^{-20} \text{ J} = \frac{5.6 \times 10^{-20}}{1.602 \times 10^{-19}} = 0.349 = 0.35 \text{ eV}$$

$$\therefore \text{Work function} = (4.83 - 0.35) \text{ eV} = 4.48 \text{ eV} = 4.5 \text{ eV}$$

25. (B)

26. (A)

Toluene undergoes oxidation with KMnO_4 , forms benzoic acid. In this conversion, alkyl part of toluene converts into carboxylic group. Further, benzoic acid reacts with thionyl chloride (SOCl_2) to give benzoyl chloride which upon reduction with H_2/Pd or BaSO_4 forms benzaldehyde (Rosenmund reduction) The conversion look like.



27. (D)

As $-\text{I}$ group on carbonyl carbon increases, stability of hydrate increases.

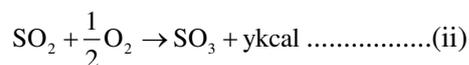
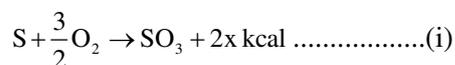
28. (C)

Ideal gases do not show Joule-Thomson effect.

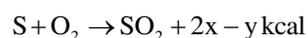
29. (C)

Each H_2O molecules form 4 hydrogen bond.

30. (A)



Now, subtract eq. (ii) from (i), we get



\therefore heat of formation of $\text{SO}_2 = -(2x - y) = y - 2x \text{ kcal}$.

31. (A)

$$k = \frac{2.303}{24} \log \frac{1}{1/8} = \left(\frac{2.303}{24} \log 8 \right) \text{ minutes}^{-1} = \left(\frac{2.303}{24} \log 2^3 \right) \text{ minutes}^{-1}$$

$$= \left(\frac{2.303 \times 3}{24} \log 2 \right) \text{ minutes}^{-1} = \left(\frac{2.303}{8} \log 2 \right) \text{ minutes}^{-1}$$

32. (B)

Frenkel defect is exhibited by compound having low coordination number and compound having large difference in size of cation and anion. This defect is not found in alkali metal halides because cations and anions have almost equal size and cations cannot be accommodated in interstitial sites.

33. (D)

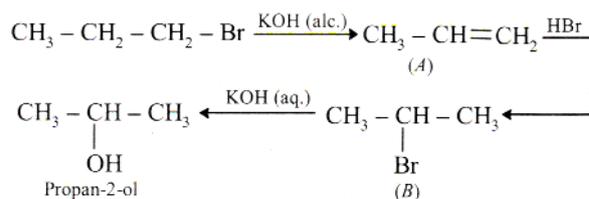
Compound 'A' give positive test with Na metal. That means it contains polar Hydrogen i.e., alcoholic group. It gives negative test with neutral FeCl_3 implies it does not contain of a phenolic group. It gives positive Lucas test means it is an alcohol.

34. (C)

Ionisation energy increases from left to right in a period, but-
ionization energy of group-2 > ionization energy of group-13 and

ionization energy of group-15 > ionization energy of group-16.

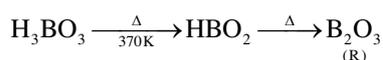
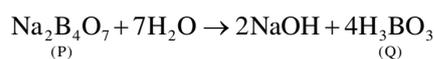
35. (A)



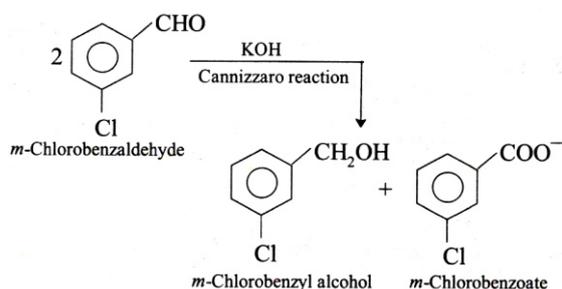
36. (B)

Both $\text{Be}(\text{OH})_2$ and $\text{Al}(\text{OH})_3$ are amphoteric in nature.

37. (B)



38. (B)



39. (D)

All of these reactions occurs in the stratosphere

40. (A)

$\text{V}^{3+} = 4s^0 3d^1 - 1$ unpaired electron, hence colored.

BIOLOGY

41. (B)

In the dense regular connective tissues, the collagen fibres are present in rows between many parallel bundles of fibres. Examples Tendons and ligaments.

42. (C)

Enzymes of lysosome are active at the acidic pH, hence they are also called acid hydrolases. They act upon the food components and helps in their digestion.

43. (D)

The metacentric chromosome has middle centromere forming two equal arms of the chromosome. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

44. (A)

Calvin cycle is the common pathway to synthesise carbohydrates in all photosynthetic plants. whether it may be C_3 plants or C_4 plants or CAM plants.

45. (B)
Recombination of genes occurs as a result of crossing over which takes place in pachytene stage in prophase I of meiotic division.
46. (A)
Non-cyclic Photo-phosphorylation is also called Z scheme.
47. (C)
 G_1 phase represent Gap 1 phase that corresponds to the interval between mitosis and initiation of DNA replication. S phase is synthesis phase during which DNA synthesis or replication takes place. Cytokinesis is division of cytoplasm. Karyokinesis represent phase of Nuclear division.
48. (B)
Parthenogenesis is a modification of sexual reproduction in which an egg develops into a complete offspring without fertilization. It is monoparental. This avoids the wastage of germplasm as sperms and ova. It is the fastest method to obtain clones.
49. (C)
The nucellus cell of an angiosperm is always diploid, pollen grain is haploid, endosperm is triploid and embryo is always diploid.
50. (B)
Placenta also acts as an endocrine gland as it secretes certain hormones like estrogens, progesterone and human chorionic gonadotrophin (hCG). hCG maintains the corpus luteum for the continued secretion of progesterone to maintain the pregnancy. Presence of hCG in the urine sample of a female confirms the pregnancy.
51. (B)
Methyl guanosine triphosphate is associated with 5' capping during the post transcriptional modifications (during the maturation of hn-RNA into mature mRNA)
52. (D)
The microbes produce different types of gaseous end products during growth and metabolism. The type of gas produced depends upon the microbes and the organic substrates they utilize.
53. (D)
Biolistics is also known as gene gun, It is a vector-less method of gene transfer and is a very fast process. Thus, it is the best suitable method for transformation of plants cells with high velocity micro-particles of gold or tungsten coated with DNA.
54. (D)
These both associations are examples of commensalism. Commensalism is an association between members of two species in which one is benefitted, while other is almost unaffected.
55. (B)
Gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques, eggs can be fertilised *in vitro* and plants can be propagated using tissue culture methods.

56. (B)
Fungi go through haploid, dikaryotic and diploid phases in their life cycle:
Plasmogamy (union of two protoplast) → Karyogamy (union of two haploid nuclei) → Meiosis (diploid zygote undergoes meiosis to form haploid spores)
57. (A)
Gymnosperms include medium sized trees or tall trees and shrubs. Leaves of these plants are well adapted to withstand extremes of temperature, humidity and wind. Reproductive organs are usually in the form of cones or strobili, The male cone are made up of microsporophyll and female cones are made up of megasporophyll, The presence of sporophyll (micro and megasporophyll) shows the development of seed habit, but seeds develop from naked ovule and are not covered.
58. (D)
Many people don't even have the symptoms of infection by *Entamoeba histolytica*. These symptoms are quite mild and include loose stools, stomach pain and stomach cramping.
59. (C)
60. (B)
Scutellum is the name given to the only cotyledon found in monocot seeds (e.g. grasses). It is large and shield shaped. It has only a single layer of seed coat.
61. (C)
Young cells of endodermis are characterised by presence of casparian strips on their radial and transverse walls. The casparian strip is band like thickening of suberin that extends completely around the cell.
62. (C)
The process of transporting ions of sodium and potassium across the cell membrane is an active transport process. It involves hydrolysis of ATP to provide the required energy and an enzyme Na^+/K^+ ATPase. This process is accountable for upholding the excess of Na^+ outside the cell and K^+ ions inside.
63. (C)
3 meiotic divisions are required to produce 12 male gametes.
10 meiotic divisions are required to produce 10 female gametes.
10 pollens + 10 female gametes = 10 seeds.
Thus, two pollen grains will be wasted.
64. (A)
The pigments like chlorophyll *b*, xanthophylls and carotenoids are located in the quantasomes along with chlorophyll *a*. These are called accessory pigments. They absorb light and transfer the energy to chlorophyll *a*. They enable a wider range of wavelength of incoming light to be utilized for photosynthesis. They also protect chlorophyll *a* from photo-oxidation, hence are also called protective pigments.
65. (A)

Substrate-level phosphorylation is a type of reaction that results in the formation of ATP by direct transfer and donation of a phosphoryl (PO_3^-) group to ADP. During the conversion of succinyl CoA to succinic acid in Krebs cycle, substrate level phosphorylation takes place.

66. (A)
Vestibular apparatus of the human ear plays no role in hearing as such but otherwise is very much important. It help in balancing organ.
67. (B)
The embryo is suspended in the amniotic cavity by an umbilical cord. The latter is formed of the stalks of the yolk sac and allantois. The main blood vessel from the placenta reaches the foetus through the umbilical cord. Amniotic fluid is secreted by both embryo and amnion. Blood flowing in umbilical cord of mammalian embryo is completely foetal.
68. (C)
Each microspore mother cell divide meiotically to form four haploid microspores (pollen grains) and remains arranged in tetrads. The arrangement of pollen grains in a tetrad form is affected by cytokinesis during meiosis. Each cell of the tetrad is always haploid as they are formed as a result of meiotic division.
69. (A)
In F_1 generation, a phenotypic ratio of 1:1:1:1 exhibits dihybrid test cross (Ex. $\text{AaBb} \times \text{aabb}$).
70. (A)
Griffith (1928) injected the mice with virulent and smooth (S-type, smooth colony with mucilage) form of *Streptococcus pneumoniae*. The mice died due to pneumonia. No death occurred when the mice were injected with non-virulent or rough (R-type, irregular colony without mucilage) form or heat – killed virulent form. However, in a combination of heat killed S-type and live R-type bacteria, death occurred in some mice. Autopsy of dead mice showed that they possessed S-type living bacteria, which could have been produced only by transformation of R-type bacteria.
71. (B)
Rate of heartbeat = Cardiac output / Stroke
volume.
= 7 L / 70 mL
= 7000 mL / 70 mL
= 100 times per minute
72. (C)
Wheat plant belong to class- Monocotyledonae, order- Poales and family- Poaceae.
73. (A)
The infoldings of plasma membrane in bacterial cells are called mesosomes. They help the bacteria in respiration, protein synthesis and replication of chromosomal DNA.
74. (C)
Slime moulds are saprophytic protists. The body moves along decaying twigs and leaves engulfing organic material. Under suitable conditions, they form an aggregation called plasmodium which may grow and spread over several feet. During unfavourable conditions, the plasmodium differentiates and forms fruiting bodies bearing spores at their tips. The spores possess true walls. They are extremely

resistant and survive for many years, even under adverse conditions. The spores are dispersed by air currents.

75. (C)

The association of algae and fungi is symbiotic. Algae prepare food for fungi and fungi provide shelter and absorb mineral nutrients and water for its partner. Lichens represent the pioneer community in ecological succession. Lichens are very good pollution indicators – they do not grow in polluted areas.

76. (C)

Polysiphonia, *Gelidium* and *Porphyra* belong to red algae. *Laminaria* and *Fucus* belong to brown algae. *Spirogyra* and *Chlamydomonas* belong to green algae.

77. (B)

In gymnosperms, the root is diploid whereas the endosperm is haploid. The endosperm here is formed before fertilisation.

78. (B)

Cnidarians are radially symmetrical. They have tissue level of body organisation, in which some similar cells are associated into groups or aggregations called tissues, but true organs do not occur, e.g., *Hydra*, Jelly fish, corals etc.

79. (B)

Members of phylum ctenophora are called comb bearers or comb jellies. Their general characteristics are: biradially / radially symmetrical; with eight rows of ciliated combs; incomplete gut (mouth but no anus); no excretory, respiratory or circulatory systems.

80. (B)

Inferior ovary are found in flowers of guava and cucumber, and the ray- florets of sunflower.

* * * * *