Physics

1. **Three identical charges are placed on three vertices of a square. If the force acting between q_1 and q_2 is F_{12} and between q_1 and q_3 is F_{13} then $\frac{F_{13}}{F_{12}} =$**

   (a) $\frac{1}{\sqrt{2}}$ (b) 2

   (c) $\frac{1}{2}$ (d) $\sqrt{2}$

2. **When a $10\mu C$ charge is enclosed by a closed surface, the flux passing through the surface is ϕ. Now another $10\mu C$ charge is placed inside the closed surface, then the flux passing through the surface is_____**

   (a) 2ϕ (b) ϕ

   (c) 4ϕ (d) Zero

3. **The electric force acting between two- point charges kept at a certain distance in vacuum is 16 N. If the same two charges are kept at the same distance in a medium of dielectric constant 8. The electric force acting between them is_____**

   (a) 16 (b) 128

   (c) 1024 (d) 2

4. **The unit of polarizabity of the molecule is _____**

   (a) $C^{-2}\ m^{1}\ N^{-1}$ (b) $C^{-2}\ m^{1}\ N^{1}$

   (c) $C^{2}\ m^{1}\ N^{-1}$ (d) $C^{2}\ m^{-1}\ N^{-1}$

5. **On the axis and on the equator of an electric dipole for all points____**

(a) On the axis $V = 0$ and on equator $V \neq 0$

(b) On both of them $V = 0$

(c) On both of them $V \neq 0$

(d) On the axis $V \neq 0$ and on equator $V = 0$

6. **When the temperature of a conductor increases the ratio of conductivity and resistivity____**

   (a) decrease (b) increase

   (c) remain constant (d) increase or decrease

7. **You are given 10 resistors each of resistance 2Ω. First, they are connected to obtain possible minimum resistance. Then they are connected to obtain possible maximum resistance. The ratio of maximum and minimum resistance is____**

   (a) 2.5 (b) 10

   (c) 100 (d) 25

8. **The dimensional formula of mobility is ____**

   (a) $M^{1}L^{-1}T^{-2}A^{-1}$ (b) $M^{1}L^{0}T^{-2}A^{-1}$

   (c) $M^{-1}L^{1}T^{2}A^{1}$ (d) $M^{-1}L^{0}T^{2}A^{1}$

9. **An electron having mass 9.1×10^{-31} kg, charge 1.6×10^{-19}C and moving with the velocity of 10^{6} m/ s enters a region where magnetic field exists. If it describes a circle of radius 0.2 m then intensity of magnetic field must be _____ $\times 10^{-5}$ T.**

   (a) 2.84 (b) 5.65

   (c) 14.4 (d) 1.32

10. **A galvanometer of resistance 50Ω giving full scale deflection for a current of 10 milliampere is to be changed into a voltmeter of range 100 V.**

A resistance of ____ Ω has to be connected in series with the galvanometer.

(a) 10000 (b) 10025

(c) 9950 (d) 9975

11. **Two parallel very long straight wires carrying current of 5A each are kept at a separation of 1 m. If the currents are in the same direction, the force per unit length between them is ___ N/m. $(\mu_0 = 4\pi \times 10^{-7}SI)$**

   (a) 5×10^{-5}, repulsive

   (b) 5×10^{-6}, attractive

(c) 5×10^{-5}, attractive
(d) 5×10^{-6}, repulsive

12. A very long straight wire of radius r carries current I. Intensity of magnetic field B at a point, lying at a perpendicular distance ' a ' from the axis is $\propto$ ___ (where $a < r$)
(a) $1/a$ (b) $1/a^2$
(c) a^2 (d) a

13. A substance is placed in a non- uniform magnetic field. It experiences weak force towards the strong field. The substance is____ type.
(a) Ferromagnetic (b) Diamagnetic
(c) Paramagnetic (d) None of these

14. The relation between B_v, B_h and B is____
(a) $B = \frac{B_v}{B_h}$ (b) $B = B_h \cdot B_v$
(c) $B = \sqrt{B_h^2 + B_v^2}$ (d) $B = \frac{B_h}{B_v}$

15. Two thin lenses of focal length f_1 and f_2 are in contact and coaxial. The power of the combination is ____
(a) $\frac{f_1 f_2}{f_1 + f_2}$ (b) $\frac{f_1 + f_2}{2}$
(c) $\frac{1}{\sqrt{f_1 f_2}}$ (d) $\frac{f_1 + f_2}{f_1 f_2}$

16. On decreasing the wavelength of incident light from 8000Å to 4000Å. the intensity of the scattered light in Rayleih scattering will become _____ times the initial scattered intensity.
(a) 16 (b) 4
(c) 2 (d) 8

17. A small angled prism of refractive index 1.6 gives a deviation of $3.6°$. The angle of prism is___
(a) 5° (b) 6°
(c) 7° (d) 8°

18. A plano convex lens is made of material having refractive index 1.5. The radius of curvature of curved surface is 60 cm. The focal length of the lens is ____ cm
(a) 60 (b) 120
(c) -60 (d) -120

19. If the uncertainty in the position of an electron is 10^{-10} m, then the value of uncertainty in its momentum will be _____ $kgms^{-1}$. $(h = 6.62 \times 10^{-34}\ J^{-s})$
(a) 1.06×10^{-24} (b) 1.03×10^{-24}
(c) 1.05×10^{-24} (d) 1.08×10^{-24}

20. If the energy of photons corresponding to wavelength of 6000Å is 3.2×10^{-19} J. The photon energy for wavelength of 4000Å will be ____
(a) 1.11×10^{-19} J (b) 2.22×10^{-19} J
(c) 4.44×10^{-19} J (d) 4.80×10^{-19} J

21. Two inductors each of inductance L are connected in parallel. One more inductor of value 5 mH is connected in series of this configuration then the effective inductance is 15 mH . The value of L is_____ mH.
(a) 2.5 (b) 5.0
(c) 10 (d) 20

22. A lamp consumes only 50% of maximum power in an A.C. circuit. What is the phase difference between the applied voltage and the circuit current?
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$

23. A capacitor ' C ' is connected across a D.C. source, the reactance of capacitor will be____
(a) LOW (b) HIGH
(c) ZERO (d) INFINITE

24. The dimensional formula of $\mu_0 \in_0$ is ____
(a) $M^0 L^1 T^{-1}$ (b) $M^0 L^2 T^{-2}$
(c) $M^0 L^{-2} T^2$ (d) $M^0 L^{-1} T^1$

25. Match Column I and Column II

Column I		Column II
(i) Interference	(P)	Coherent sources
(ii) Brewster's Law	(Q)	$\mu = \frac{1}{\sin C}$
(iii) Malus Law	(R)	$\mu = \tan\theta_p$
(iv) Total Internal reflection	(S)	$I = I_0\cos^2\theta$

(a) i → Q, ii → S, iii → R, iv → P
(b) i → P, ii → R, iii → S, iv → Q
(c) i → P, ii → S, iii → R, iv → Q
(d) i → R, ii → Q, iii → S, iv → P

26. Frequencies of various radiations are given as

f_v → Visible light

f_r → Radio waves

f_{UV} → Ultra Violet waves

Then which of following is true?
(a) $f_V < f_r < f_{UV}$ (b) $f_r < f_V < f_{UV}$
(c) $f_{UV} < f_V < f_r$ (d) $f_{UV} < f_r < f_V$

27. Wavelength of characteristic X-ray depends on which property of target?
(a) A (b) Z
(c) Melting point (d) All of these

28. The energy of the fast neutrons emitted in a nuclear fission reactor is approximately____
(a) 10 MeV (b) 2 KeV
(c) 2 MeV (d) 20 MeV

29. In radioactive reaction $^{A}_{Z}X \rightarrow {}^{A}_{Z+1}X_1 \rightarrow {}^{A}_{Z+2}X_2 \rightarrow {}^{A-4}_{Z}X_3 \rightarrow {}^{A-4}_{Z+1}X_4$
(a) $\beta^-, \beta^-, \alpha, \alpha$ (b) $\beta^-, \beta^-, \beta^+, \alpha$
(c) $\beta^-, \beta^-, \beta^-, \alpha$ (d) $\beta^-, \beta^-, \alpha, \beta^-$

30. In CE transistor amplifier, the collector junction has ___ bias and emitter junction has ___ bias.
(a) reverse, forward (b) forward, forward
(c) reverse, reverse (d) forward, reverse

31. When carrier wave of 2.5 MHz frequency is amplitude modulated, the resulting AM wave has maximum amplitude of 15 V and minimum amplitude of 10 V. The modulation index is ___
(a) 10% (b) 20%
(c) 30% (d) 40%

32. Which of the following is wrong for interference fringes?

(a) Distance between two consecutive fringes is constant

(b) All bright fringes are equally bright

(c) Fringes are due to limited portion of wave front

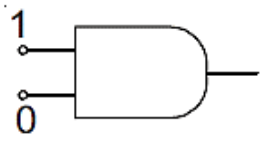
(d) Fringes are due to the use of coherent sources

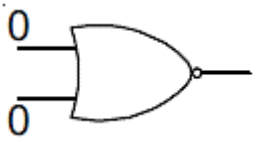
33. **A ray of light travelling in impure water is incident on a glass plate immersed in it. When the angle of incidence is 51°, the reflected ray is totally plane polarized. Given that refractive index of impure water is 1.4. The refractive index of glass should be _____ $(\tan 51^\circ = 1.235)$**
(a) 1.53 (b) 1.34
(c) 1.64 (d) 1.73

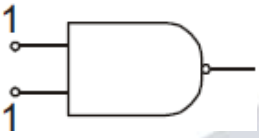
34. **A coil having 200 turns has a surface area of 0.15 m^2. A magnetic field of strength 0.2 T applied perpendicular to this -changes to 0.6 T in 0.4 s, then the induced emf in the coil is _____ V.**
(a) 15 (b) 30
(c) 45 (d) 60

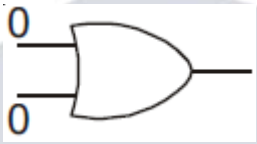
35. **A sinusoidal A.C. current flows through a resistor of resistance 10Ω. If the peak current is 2A flowing through the resistor then the power dissipated in _____ W.**
(a) 10 (b) 20
(c) 30 (d) 40

36. **Which of following gates produces output of 1?**

(a) 

(b) 

(c) 

(d) 

37. **The value of β of a transistor is 19. The value of α will be_____**
(a) 0.99 (b) 0.98
(c) 0.93 (d) 0.95

38. **If the half-life of a radioactive element is 10 hr , its average life = _____ hr.**
(a) 14.4 (b) 6.93
(c) 1.44 (d) 0.693

39. **is the wavelength of photon of energy 35 KeV. $h = 6.625 \times 10^{-34}\ J^{-2}, c = 3 \times 10^8\ m/s, 1eV = 1.6 \times 10^{-19}\ J$.**
(a) 3.5 mm (b) 35Å
(c) 35×10^{-12} mm (d) 3.5Å

40. **The band gaps of an insulator, conductor and semi -conductor are respectively E_{g1}, E_{g2} and E_{g3}. The relationship between them is given as ____**
(a) $E_{g1} < E_{g2} > E_{g3}$ (b) $E_{g1} > E_{g2} > E_{g3}$
(c) $E_{g1} > E_{g2} < E_{g3}$ (d) $E_{g1} < E_{g2} < E_{g3}$

Chemistry

41. **If the edge length of a body centred unit cell is 400pm, what will be the approximate radius of the atom present in it? (in pm)**
(a) 173 (b) 141
(c) 200 (d) 924

42. **Which of the following is Ferromagnetic?**
(a) MnO (b) CrO_2
(c) O_2 (d) Fe_3O_4

43. **What is the normality of aqueous solution of H_2SO_4 having pH = 1.**
(a) 0.1 N (b) 0.05 N
(c) 1 N (d) 0.5 N

44. **Which of the following mixture is non-ideal solution?**

(a) Chlorobenzene and bromobenzene

(b) Benzene and toluene

(c) Chloroform and acetone

(d) Bromoethane and chloroethane

45. Which solution is isotonic with 6%w/v aqueous solution of urea? [Mole mass of Urea $= 60\text{gm.mol}^{-1}$]

(a) 0.1 M NaCl (b) 0.5 M NaCl

(c) 0.25 M NaCl (d) 1 M NaCl

46. In which metal container, the aqueous solution of $CuSO_4$ can be stored?

$E^0_{Cu^{3+}/Cu} = 0.34V$

$E^0_{Fe/Fe^{2+}} = 0.44V, E^0_{Al/Al^{3+}} = 1.66V$

$E^0_{Ni/Ni^{2+}} = 0.25V, E^0_{Ag^{+}/Ag} = 0.80V$

(a) Fe (b) Ni

(c) Ag (d) Al

47. For how much time, 10 ampere electric current should be passed through a dilute aqueous $NiSO_4$ solution during electrolysis using inert electrode, in order to get 5.85 gm Nickel? [At. mass of Ni $= 58.5\text{gm}$]

(a) 1930 sec. (b) 3860 sec

(c) 965 sec. (d) 9650 sec

48. What will be the oxidation potential for the following hydrogen half- cell at 1 bar pressure and 25°C temperature?

$\underset{1\text{bar}}{Pt H_{2(g)}} \mid HCl_{(aq)} pH = 3$

(a) 0.177 V (b) 0.188 V

(c) 0.059 V (d) 0.000 V

49. Which ore does not contain carbonate?

(a) Malachite (b) Ciderite

(c) Calamine (d) Zincite

50. Which is the correct order of metallurgy for the extraction of copper metal?

(a) Concentration → roasting → smelting → bessimerisation

(b) Concentration → smelting → roasting → bessimerisation

(c) Concentration → smelting → bessimerisation → roasting

(d) Concentration → roasting → bessimerisation → smelting

51. How many grams of Cl_2 gas will be obtained by the complete reaction of 31.6 gm of potassium permanganate with hydrochloric acid?

[Mole mass of $KMnO_4 = 316\text{gm/mol}$]

(a) 35.5 (b) 17.75

(c) 71 (d) 142

52. What is the structure of $XeOF_4$?

(a) Pyramidal (b) Trigonal bipyramidal

(c) Square pyramidal (d) Square bipyramidal

53. Which one is not an allylic halide?

(a) 1 - Chloro but - 2 - ene

(b) 1 - Chloro but - 1 - ene

(c) 3 - Chloro cyclo hex - 1 - ene

(d) 3 - Chloro prop - 1 - ene.

54. Which is the main organic product obtained by the reaction of 2, 2, 2 trichloro ethanal with calcium hydroxide?

(a) Chloroform (b) Carbon tetrachloride

(c) Methylene chloride (d) Trichloro ethane

55. Which of the following compound is optically inactive?

(a) 2 - Hydroxy propanoic acid (b) 2, 3 - Dichloro butane

(c) 3 - Chloro but -1 – ene (d) 2, 2 - Dichloro pentane

56. Which of the organic products of the following reactions has the least boiling point?

(a) $CH_3 - CH_2 - CHO \xrightarrow[H_2O]{NaBH_4}$

(b) $CH_3 - \underset{\underset{O}{\|}}{C} - CH_3 \xrightarrow[H_2O]{NaBH_4}$

(c) $CH_3 - CH_2 - COOH \xrightarrow[H_2O]{LiAH_4}$

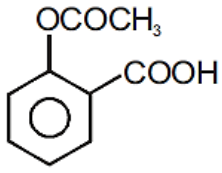
(d) $CH_3 - CH = CH_2 \xrightarrow[H_2O_2, OH^-]{(BH_3)_2}$

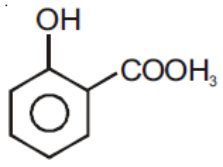
57. Which is the final product obtained by the reaction of a grignard reagent ethyl Magnesium bromide with propanone?

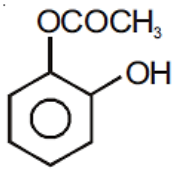
(a) Pentane - 2 – ol (b) 2 - Methyl - butane -2 - ol

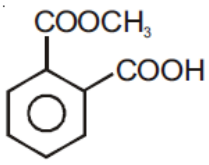
(c) Pentane -1 – ol (d) 3 - Methyl - butane -2 - ol

58. Which is the correct structural formula of Aspirin?

(a) 

(b) 

(c) 

(d) 

59. The units for the rate constant and the rate of reaction are same for a reaction. What will be the order of the reaction?

(a) First (b) Zero

(c) Second (d) Third

60. At 27° C temperature, time required for 75% completion of a first order reaction is 20 seconds. What will be its rate constant?

(a) $0.693 sec^{-1}$
(b) $0.0693 sec^{-1}$
(c) $0.693 sec^{-1}$ $mole^{-1}$ It
(d) $0.0693 sec^{-1}$ $mole^{-1}$It

61. Which statement is incorrect for a catalyst?

(a) It decreases the activation energy of a reaction

(b) It increases the proportion of products in less time

(c) It does not affect the equilibrium constant

(d) It increases the free energy change for the reaction

62. During electrophoresis of colloidal sol of $Fe(OH)_3$, the colloidal particles

(a) Move towards anode

(b) Move towards cathode

(c) Move towards anode and cathode both

(d) Do not move

63. In manufacturing of sulphuric acid in presence of platinum catalyst, which metal impurity acts as catalytic poison?

(a) Cu (b) Cr
(c) Fe (d) V

64. Which ion has the least value of theoretical magnetic moment?

(a) Ti^{3+} (b) Co^{3+}
(c) C^{3+} (d) V^{3+}

65. Which of the following mixture can form an alloy?

(a) Fe, Mn, Mg (b) Cr, Co, Na

(c) Fe, Ni, Cr (d) Ni, Mg, Na

66. Which of the following statements is incorrect?

(a) $K_4[Ni(CN)_4]$ is square planar while $K_2[Ni(CN)_4]$ is paramagnetic.

(b) $K_2[Ni(CN)_4]$ is diamagnetic while $K_2[NiCl_4]$ is paramagnetic.

(c) $K_4[Ni(CN)_4]$ and $K_2[Ni(CN)_4]$ both have same magnetic moment

(d) $K_2[NiCl_4]$ and $K_4[Ni(CN)_4]$ both have same geometrical shapes

67. The aqueous solution of which of the following complex has the leaste conductivity under identical conditions.

(a) Hexa aqua chromium (III) chloride

(b) Tetra aqua dichlorido chromium (III) chloride

(c) Penta aqua chlorido chromium (III) chloride

(d) Tri aqua trichlorido chromium (III)

68. Which complex possess facial isomer?

(a) $[Co(NH_3)_4CO_3]Cl$ (b) $[Co(NH_3)_3(NO_2)_3]$

(c) $K[Fe(NH_3)_2(CN)_4]$ (d) $[Ni(H_2O)_4(NH_3)_2]SO_4$

69. Which of the following is not a final product obtained by cross aldol condensation of ethanal and propanal?

(a) But-2-enal (b) 2-Methyl-pent-2-enal

(c) 3-Methyl-but-2-ena (d) Pent-2-enal

70. Which is the main functional group in Acrolein?

(a) Nitrile (b) Alkene
(c) Aldehyde (d) Ester

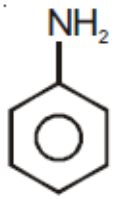
71. Which of the following compound upon oxidation gives isophthalic acid?

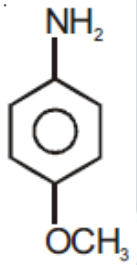
(a) o-Xylene (b) m-Xylene
(c) p-Xylene (d) m-Cresol

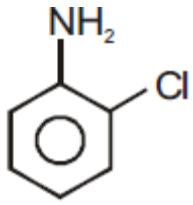
72. Which is the oxidized product obtained when benzene diazonium chloride reacts with phosphonic acid in presence of water?

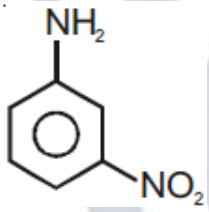
(a) Benzene (b) Phenol
(c) Chloro benzene (d) Phosphorus acid

73. Which of the following compound is the most basic?

(a) 

(b) 

(c) 

(d) 

74. The number of σ and π bonds in orange azo dye is ____ and ___ respectively.

(a) 26 and 7 (b) 24 and 7
(c) 27 and 7 (d) 26 and 6

75. Which one is a purine base?

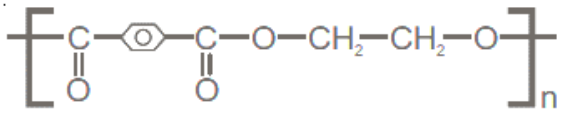
(a) Cytosine (b) Thymine
(c) Uracil (d) Guanine

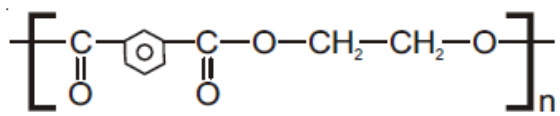
76. Which of the following amino acid has pH greater than 7?

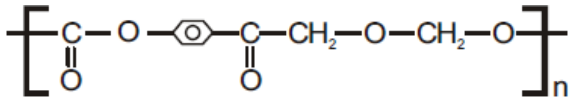
(a) Glycine (b) Lysine

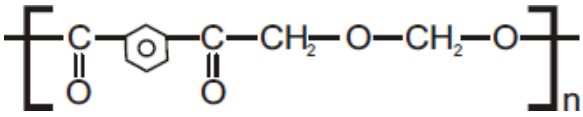
(c) Glutamic acid (d) Alanine

77. Which is the correct structural formula for terylene?

(a) 

(b) 

(c) 

(d) 

78. Which are the monomers of Buna -N?

(a) Buta - 1, 3-diene and prop -2-ene-1-nitrile

(b) Buta - 1, 2-diene and acrylonitrile

(c) Buta - 1, 3-diene and prop-1-ene-1-nitrile

(d) Buta - 1, 2-diene and prop-2-ene-1-nitrile

79. Choose the correct option for the suitable match between Column I and Column II

Column – I	**Column - II**
(P) Artificial Sweetner	**(L) Caramel**
(Q) Food Preservative	**(M) Ascorbic acid**
(R) Anti -Oxidants	**(N) Alitame**

(S) Food colours

(a) $P \to N, Q \to O, R \to M, S \to L$
(b) $P \to N, Q \to M, R \to O, S \to L$
(c) $P \to N, Q \to O, R \to L, S \to M$
(d) $P \to L, Q \to O, R \to M, S \to N$

80. Which of the following drugs gives releif from anxiety and stress?

(a) Luminal (b) Aspirin
(c) Ofloxacin (d) Mestranol

Mathematics

81. Where does $f(x) = x + \sqrt{1-x}; 0 < x < 1$ decrease?

(a) (0,1) (b) (0,3/4)
(c) (3/4,1) (d) $(3/4, \infty)$

82. If $f'(x) = 2 - \frac{5}{x^4}$ and $f(1) = \frac{14}{3}$, then $f(-1) =$

(a) $\frac{11}{3}$ (b) $-\frac{8}{3}$
(c) $-\frac{14}{3}$ (d) 0

83.

$\int \frac{\cos\alpha}{\sin x \cos(x-\alpha)} dx =$ **.....+c where**

$0 < x < \alpha < \pi/2$ and α-constant

(a) $\log|\cot x + \tan\alpha|$
(b) $\log|\tan x + \cot\alpha|$
(c) $-\log|\tan x + \cot\alpha|$
(d) $-\log|\cot x + \tan\alpha|$

84. $\int \frac{e^{\cot^{-1}x}}{1+x^2}(x^2 - x + 1)dx =$ **.....+C**

(a) $x \cdot e^{\cot^{-1}x}$ (b) $e^{\cot^{-1}x}$
(c) $\frac{e^{\cot^{-1}x}}{1+x^2}$ (d) $-e^{\cot^{-1}x}$

85.

$\int_0^{\pi/2}(x-[\cos x])dx = \cdots$ .... where $[t]$ = greatest integer less or equal to t

(a) $\frac{\pi^2}{8}-\frac{\pi}{8}$ (b) $\frac{\pi^2}{8}$

(c) $\frac{\pi^2}{8}-1$ (d) $\frac{\pi}{4}$

86. If $\int_{\log 2}^{a}\frac{e^x}{\sqrt{e^x-1}}dx = 2$, then $a =$

(a) $2\log 2$ (b) $\log 2$

(c) $\log 5$ (d) 0

87. $\int_0^{\sqrt{2}}\sqrt{2-x^2}dx =$

(a) π (b) $-\frac{\pi}{2}$

(c) 0 (d) $\frac{\pi}{2}$

88. Area of the region bounded by rays $|x|+y=1$ and X axis is

(a) 2 (b) 1

(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

89. If area bounded by the curves $x = ay^2$ and $y = ax^2$ is 1 , then $a =$ _____ $(a > 0)$

(a) $\frac{1}{3}$ (b) $\frac{1}{\sqrt{3}}$

(c) $\frac{1}{2}$ (d) $\frac{1}{3}$

90. The solution of the differential equation $2x\frac{dy}{dx}-y=0; y(1)=2$ represents…….

(a) Parabola (b) Straightline

(c) Circle (d) Ellipse

91. Particular solution of differential equation $e^{\frac{dy}{dx}} = x; y(1)=3; x>0$ is.....

(a) $y = \log x - x + 4$ (b) $y^2 = \log x + 4$

(c) $\log y = x^2 + 4$ (d) $2y = x^2 + 5$

92. The population of a city increases at the rate 3% per year. If at time t the population of city is p, then find equation of p in time t.

(a) $p = 3e^{\frac{3t}{100}}$

(b) $p = e^{\frac{3t}{100}}$

(c) $p = ce^{\frac{3t}{100}}$

(d) $p = \frac{3}{100}e^{3t}$

93. If $\bar{a}$ is unit vector, then $|\bar{a}\times\hat{i}|^2+|\bar{a}\times\hat{j}|^2+|\bar{a}\times\hat{k}|^2 =$

(a) 1 (b) 0

(c) 2 (d) 3

94. If for unit vectors $\bar{a}$ and $\bar{b}$, $\bar{a}+2\bar{b}$ and $5\bar{a}-4\bar{b}$ are perpendicular to each other, then $(\bar{a}\wedge\bar{b}) =$

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$

(c) $\cos^{-1}\frac{1}{3}$ (d) $\cos^{-1}\frac{2}{7}$

95. If a vector $\bar{x}$ makes angles with measure $\frac{\pi}{4}$ and $\frac{5\pi}{4}$ with positive directions of X-axis and Y-axis respectively, then $\bar{x}$ made angle of measure ..... with positive direction of Z-axis

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{2}$ (d) $\frac{5\pi}{3}$

96. If a plane has X-intercept I, Y-intercept m and Z intercept n , and perpendicular distance of plane from origin is k, then

(a) $\frac{1}{l^2}+\frac{1}{m^2}+\frac{1}{n^2}=\frac{1}{k^2}$ (b) $l^2+m^2+n^2=k^2$

(c) $l^2+m^2+n^2=\frac{1}{k^2}$ (d) $\frac{1}{l^2}+\frac{1}{m^2}+\frac{1}{n^2}=k^2$

97. Lines $\bar{r}=(3+t)\hat{i}+(1-t)\hat{j}+(-2-2t)\hat{k},\ t\in R$ and $x=4+k, y=-k, z=-4-2k, k\in R$, then relation between lines is

(a) Coincident (b) Parallel
(c) Skew (d) Perpendicular

98. The equation of plane containing intersecting lines $\frac{x+3}{3}=\frac{y}{1}=\frac{z-2}{2}$ and $\frac{x-3}{4}=\frac{y-2}{2}=\frac{z-6}{3}$ is

(a) $2x-y+z+9=0$
(b) $x+y-2z+7=0$
(c) $x+y+z+5=0$
(d) $x+2y-2z+9=0$

99. The number of binary operations on the set $\{1,2,3\}$ is

(a) 9^3 (b) 27
(c) 3^9 (d) 3!

100. Function $f: N \to Z; f(n) = \begin{cases} \frac{n}{2}, & n\text{-even} \\ -\left(\frac{n-1}{2}\right), & n\text{-odd} \end{cases}$

(a) One-one but not onto

(b) One-one and onto

(c) Not one-one but onto

(d) Not one-one and not onto

101. The relation $S=\{(3,3),(4,4)\}$ on the set $A=\{3,4,5\}$ is

(a) Reflexive only

(b) Symmetric only

(c) Not reflexive but symmetric and transitive

(d) An equivalence relation

102. $\cot^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)=$

(a) $\cot^{-1}x$ (b) $\frac{\pi}{2}-\frac{1}{2}\tan^{-1}x$
(c) $-\frac{1}{2}\tan^{-1}x$ (d) $\frac{\pi}{2}-\frac{1}{2}\cot^{-1}x$

103. If $\cos(2\tan^{-1}x)=\frac{1}{2}$, then value of x is

(a) $\pm\sqrt{3}$ (b) $\pm\frac{1}{\sqrt{3}}$
(c) $\sqrt{3}-1$ (d) $1-\frac{1}{\sqrt{3}}$

104. $\sin^{-1}\left(\cos\left(\sin^{-1}x\right)\right)+\cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)=$

(a) $\frac{\pi}{4}$ (b) 0
(c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{2}$

105. If $x^4+y^4+z^4=0$ then $\begin{vmatrix} 1 & xy & yz \\ zx & 1 & xy \\ yz & zx & 1 \end{vmatrix}=$

(where $x,y,z \in R$)

(a) $x+y+z+3$ (b) $xyz+2$
(c) 1 (d) 0

106. $\begin{vmatrix} 10! & 11! & 12! \\ 11! & 12! & 13! \\ 12! & 13! & 14! \end{vmatrix} =$

(a) $2(10! \cdot 11! \cdot 12!)$
(b) $2(10! \cdot 13!)$
(c) $-2(10! \cdot 11! \cdot 12!)$
(d) $2(10! \cdot 12! \cdot 13!)$

107. **If $s = p + q + r$, then value of**

$\begin{vmatrix} s+r & p & q \\ r & s+p & q \\ r & p & s+q \end{vmatrix}$ **is**

(a) $2\ s^3$ (b) $2s^2$
(c) s^3 (d) $3s^3$

108. **If $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $B =$ _____ then $AB = BA$, where $B \neq 1$**

(a) $\begin{bmatrix} x & y \\ 0 & x \end{bmatrix}$ (b) $\begin{bmatrix} x & x \\ y & 0 \end{bmatrix}$
(c) $\begin{bmatrix} x & y \\ 0 & y \end{bmatrix}$ (d) $\begin{bmatrix} x & 0 \\ y & y \end{bmatrix}$

109. **If $A = \begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix}$, then $A^3 =$**

(a) 81 A (b) 27 A
(c) 243 A (d) 729 A

110. $\frac{d}{dx}\log_{|x|} e = \cdots..$

(a) $\frac{1}{(\log x)^2}$ (b) $\frac{1}{|x|}$
(c) $-\frac{1}{x(\log|x|)^2}$ (d) e^x

111.

$\frac{d}{dx}\tan^{-1}\left(\frac{1-x}{1+x}\right) =$

(a) $\frac{-1}{1+x^2}$ (b) $\frac{1}{1+x^2}$
(c) $\frac{2}{1+x^2}$ (d) $\frac{-2}{1+x^2}$

112. **If $x = at^2, y = 2at$, then $\frac{d^2x}{dy^2} = \cdots.$**

(a) $-2at^3$ (b) $\frac{-1}{t^2}$
(c) $\frac{-1}{2at^3}$ (d) $\frac{1}{2a}$

113. $\int xe^{x^2\log 2} \cdot e^{x^2} dx =$ ____ $+C$

(a) $\frac{2^{x^2} \cdot e^{x^2}}{1+\log 2}$ (b) $\frac{e^{x^2\log 2} \cdot e^{x^2}}{\log 2}$
(c) $\frac{2^{x^2} \cdot e^{x^2}}{2(1+\log 2)}$ (d) $\frac{(2e)^{x^2}}{\log(2e)}$

114. $\int \left(\frac{1}{x-3} - \frac{1}{x^2-3x}\right) dx = \cdots \ldots \ldots \ldots + c; x > 3$

(a) $\frac{1}{3}\log(\sqrt{x}(x-3))$ (b) $\frac{2}{3}\log(\sqrt{x}(x-3))$
(c) $\frac{2}{3}\log(x(x-3))$ (d) $\frac{1}{3}\log(x(x-3))$

115. **What is the mean of $f(x) = 3x + 2$ where x is a random variable with probability distribution?**

$X = x$	1	2	3	4
$P(X = x)$	1/6	1/3	1/3	1/6

(a) $\frac{15}{2}$ (b) $\frac{5}{3}$
(c) $\frac{5}{2}$ (d) $\frac{19}{2}$

116. The probability that an event A occurs in a single trial of an experiment is 0.3. Six independent trials of the experiment are performed. What is the variance of probability distribution of occurrence of event A?
(a) 0.18 (b) 1.26
(c) 12.6 (d) 1.8

117. The probability that A speaks truth is $\frac{4}{5}$, while this probability fo B $\frac{3}{5}$. The probability of at least one of them is true when asked to speak on an event is____
(a) $\frac{2}{25}$ (b) $\frac{23}{25}$
(c) $\frac{3}{25}$ (d) $\frac{4}{25}$

118. The corner points of the feasible region determined by the system of linear constraints are $(0, 10), (5, 5), (15, 15), (0, 20)$. Let $Z = px + qy$ where $p, q > 0$. Condition on p and q so that the maximum of z occurs at both the points $(15, 15)$ and $(0, 20)$ is
(a) $p = 2q$ (b) $p = q$
(c) $q = 2p$ (d) $q = 3p$

119. What is the approximate value of $\sqrt[5]{242.999}$?
(a) $\frac{1115}{405}$ (b) $\frac{121499}{40500}$
(c) $\frac{1214999}{405000}$ (d) $\frac{1214999}{4050}$

120. The length of subtangent at any point of the curve $\log y = 25x$ is

(a) Proportional to y (b) Proportional to x

(c) Zero (d) Constant

Biology

121. When the MTP act came into force in India?
(a) 1973 (b) 1972
(c) 1971 (d) 1970

122. Why transgenic mice are being developed?

(a) To stop the harmful activities in house

(b) For the use in Agriculture

(c) Testing the safety of vaccines

(d) In the form of bioinsecticide

123. For DNA fingerprinting, short repetitive nucleotide sequences are known as?
(a) VNTR (b) DNA probes
(c) Introns (d) DNA primers

124. In operon the segments of DNA which carry codes for the synthesis of proteins are known as
(a) structural gene (b) Regulator gene
(c) Repressor gene (d) Promoter gene

125. The amp ^{R} gene has ____ recognition site
(a) Pst-I (b) Pvu-ll
(c) Hind-III (d) BamH – I

126. In Africa, two distinct types of Rhinoceros are found. One is grazing which lives in open land and second is a browsing type which lives in wooded areas. It is which type of adaptive radiation?

(a) Local adaptive branching

(b) Contemporaneous radiation

(c) Continental adaptive radiation

(d) Wide adaptive branching

127. Which gland is associated with regulation of body rhythm and in maintaining sleep-wake cycle?

(a) Pituitary gland (b) Parathyroid gland

(c) Pineal gland (d) Adrenal gland

128. Which part of the brain receives impulses from eyes and muscles of head?

(a) Superior colliculi (b) Inferior colliculi

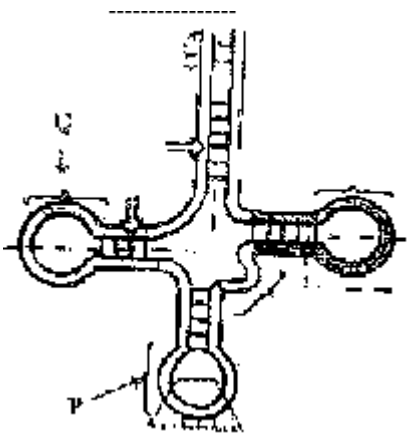
(c) Pineal body (d) All of them

129. under normal conditions the wall of RBC acts as permeable membrane to which ions?

(a) Na^+, K^+ (b) Na^+, HCO_3^-

(c) Cl^-, HCO_3^- (d) K^+, Cl^-

130. Identify P and Q in the following figure?



(a) P- Anti condon;

Q - D - Loop

(b) P - D - Loop;

Q - T ψ C Loop

(c) P – Anti condon Loop;

Q - D - Loop

(d) P - Site of amino acid attachment

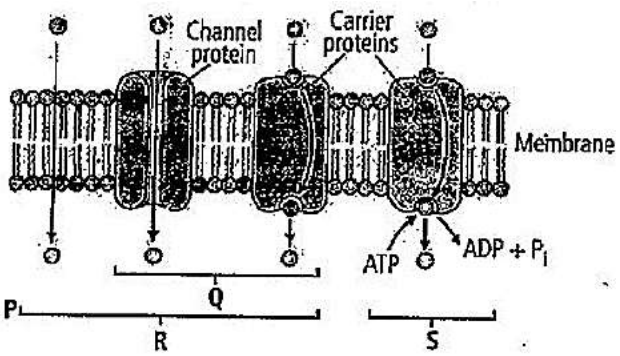
Q - T ψ C Loop

131. How much water is absorbed in 15 hours by a mustard plant having 2 kg wt.

(a) 2 Kg (b) 6 Kg

(c) 4 Kg (d) 12 Kg

132. Identify P and Q in the given diagram



(a) P = Facilitated diffusion

Q = Simple diffusion

(b) P = F Facilitated diffusion

Q = Active transport

(c) P = Simple diffusion

Q = Passive transport

(d) P = Simple diffusion

Q = Active transport

133. What happens when gall bladder is removed in humans?

(a) Lipid metabolism decreases

(b) Jaundice

(c) Protein metabolism decreases

(d) Carbohydrate metabolism decreases

134. Match the following and choose the correct option.

	Column I		Column II
(P)	**SA node**	**(i)**	**lower left corner of the rightatrium**
(Q)	**Purkinje fibres**	**(ii)**	**from the AV node, a tract of conducting fiber**
(R)	**AV node**	**(iii)**	**right upper corner of the right atrium**
(S)	**Bundle of His**	**(iv)**	**branches that emerge from the bundle of His**

(a) (P − iii) (Q − i)(R − iv)(S − ii)

(b) (P − iii) (Q − iv)(R − i)(S − ii)

(c) (P − iii)(Q − iv)(R − ii)(S − i)

(d) (P − iv) (Q − ii)(R − iii)(S − i)

135. The diversity which is richness of different species in a range of habitats within a geological area in known as?

(a) a diversity
(b) delta diversity
(c) ecosystem diversity
(d) γ(gamma) diversity

136. "India is a country of youngesters" on this basis, if age pyramid is made. What type of pyramid it will be?

(a) Triangular shape (b) Bell shape
(c) Urn shape (d) Spindle shape

137. In___ the filtrate and plsama get isotonic.

(a) Distal convoluted tubule

(b) Descending limb of the loop of Henle

(c) Proximal convoluted tubule

(d) Ascending limb of the loop of Henle

138. How the urea enter in descending capillaries?

(a) Diffusion (b) Active transport

(c) Osmosis (d) Diffusion and Osmosis

139. Which company is providing CNG in Surat?

(a) GAIL (b) ADAN
(c) GGCL (d) RELIANCE

140. In which stage in the process of decomposition Bacteria and Fungi become active?

(a) Fragmentation (b) Accumulation

(c) Leaching (d) Catabolism

141. Statement A: All the locomotions are movements. Statement B: All the movements are not locomotions

(a) Statement A and B both are correct

(b) Statement A is true but B is false

(c) Statement A and B both are false

(d) Statement A is false but B is false

142. The vertebral formula of human is

(a) T_{12}, C_7, L_5, S_8
(b) $C_7,\ T_{12},\ L_5,\ S_5$
(c) $C_7,\ L_8,\ T_{12},\ S_5$
(d) $C_7,\ S_5,\ T_{22},\ L_5$

143. How is green -house gas raise the temperature of Earth?

(a) It absorbs the long wave length infrared rays and reflect them back towards the earth

(b) It absorbs sunrays and decreases the temperature of earth

(c) It absorbs sun rays and increases the temperature of earth

(d) It absorb shorter wave length of infrared wave

144. How many ATP are synthesized in Eukaryotic cell during aerobic repiration of 1, 3 biphosphoglyceric acid?
(a) 34 ATP (b) 80 ATP
(c) 38 ATP (d) 68 ATP

145. If Respiratory substrate like sucrose dipeptide protein and lipid are present in living cell, which substrate is utilised first?
(a) Sucrose (b) Lipid
(c) Protein (d) Dipeptide

146. In the presence of bright sunlight small bubbles are formed around the green parts of the plant'. Who showed this?
(a) Joseph Priestley (b) Robert Hill
(c) Jan Ingenhousz (d) Julius Von Sachs

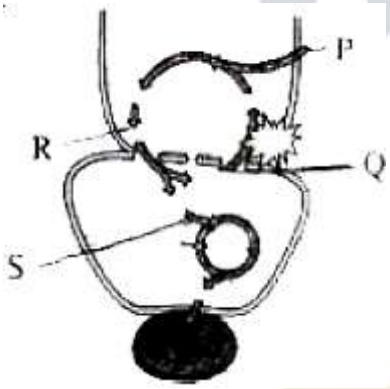
147. If 18 PGAL are formed during dark reaction, how many Calvin cycles and ATPs are required respectively?

(a) 9 Calvin cycle, 24 ATP (b) 6 Calvin cycle, 18 ATP

(c) 9 Calvin cycle, 27 ATP (d) 6 Calvin cycle, 36 ATP

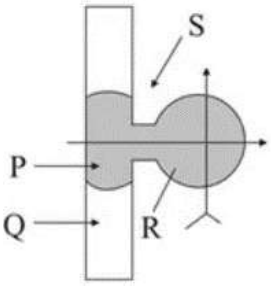
148. What is the time for P wave in ECG?
(a) 0.10 sec (b) 040 sec.
(c) 0.30 sec (d) 0.80 sec

149. At which site CO_2 enters in the given diagram labelled with P, Q, R, S ? Choose the correct option.



(a) P,S (b) R, S
(c) P, R (d) Q,S

150. Identify the part which is made up of peripheral membrane protein complex in the given figure?



(a) P (b) R

(c) Q (d) S

151. Which is correct for VC?

(a) IC + ERV (b) TV + ERV

(c) RV + IRV + ERV (d) VC + RV + TV

152. Morphologically and Physiologically similar and usually motile and flagellated gametes are known as ___ and its correct example?

(a) Isogamete, Fucus

(b) Isogamete, Cladophora

(c) Anisogamete, Spirogyra

(d) Anisogamete, Human gametes

153. Which hormone stimulates the development and differentiation of T-lymphocytes?

(a) Parathormone (b) Thyrocalcitonin

(c) Thyroxine (d) Thymosin

154. Where the pollen grains are develop in anther during microsporogenesis?

(a) Epidermis (b) Sporogenous tissue

(c) Endothecium (d) Tapetum

155. Statement A: Due to sudden influx of a large amount of Na + towards inside, the plasma membrane becomes positively charged on its inner side Statement R: It is said to be depolarized

(a) A and R both are true (b) A is true, R is false

(c) A and R both are false (d) A is false, R is true

156. America obtained a patent for germplam of Indian Basmati rice. This process is known by which name?

(a) Biopatent (b) Bioinsecticide
(c) Biowar (d) Biopiracy

157. By which process uncertainty of flowering due to photoperiodism can be avoided?

(a) Phototropism (b) Senescence

(c) Vernalization (d) Abscissin

158. Klinefelter's syndrome

(a) Trisomy of autosomes

(b) Monosomy of autosome

(c) Trisomy of sex chromosomes

(d) Monosomy of sex chromosome

159. What is the ratio for test cross in dihybrid experiment of Mendel?

(a) 9: 3: 3: 1 (b) 1: 1: 1: 1

(c) 7: 1: 1: 7 (d) 11: 1: 1: 3

160. Which one forms axial filament of the human sperm?

(a) Mitochondria (b) Proximal centriole

(c) Distal centriole (d) Golgi body