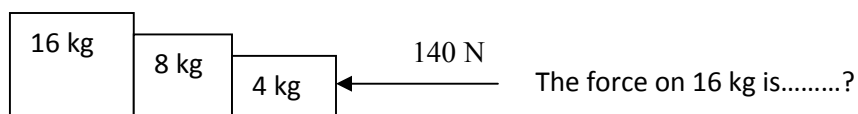


Sr. No.	Question
---------	----------

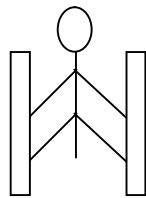
- While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
- What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
- A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
- A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

5.



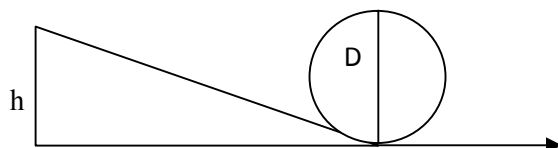
- (A) 140N (B) 120N
 (C) 100N (D) 80N

- A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s/s}$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

7.



Find minimum height in terms of D to complete the loop

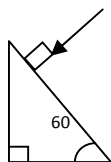
- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$

8. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$
9. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) $75/2$ kg
10. g at a depth of 1600 km inside the earth in m/s/s is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
11. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
12. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
13. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
14. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
15. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
16. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
17. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s/s}$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
18. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3

19. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
20. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
21. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
22. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
23. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
24. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
25. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
26. A 200 turn coil of self inductance 30 mH carries a current of 5 mA . Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
27. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3) \text{ A}$. At what first time the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s

28. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) q
29. A capacitor of $1 \mu\text{F}$ is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
30. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change

31. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.

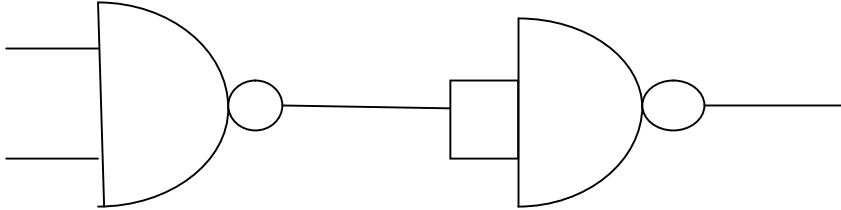


- (A) 30 (B) 45
 (C) 60 (D) 75
32. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ration of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
33. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
34. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
35. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA

36. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
- (A) infinity (B) zero
(C) radio wave (D) X ray

37. Which among the following series gives visible light?
- (A) Lyman (B) Balmer
(C) Brackett (D) None of these

38. Identify the logic operation performed by this circuit



- (A) AND (B) OR
(C) NAND (D) NOR

39. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} m^{-3}$.

- (A) $4.54 \times 10^9 m^{-3}$ (B) $4.95 \times 10^{22} m^{-3}$
(C) $1.5 \times 10^{16} m^{-3}$ (D) $5 \times 10^{28} m^{-3}$

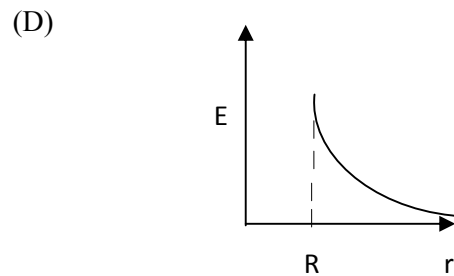
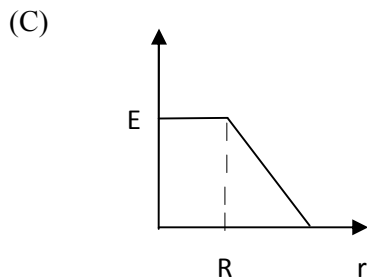
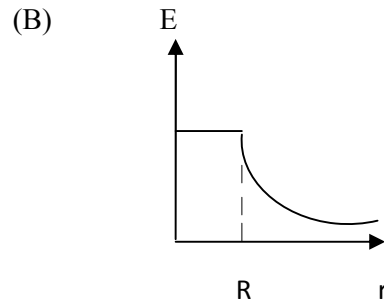
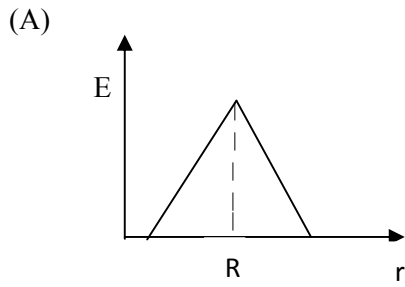
40. Two charges $+5\mu C$ and $-5\mu C$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

- (A) $4.5 \times 10^5 N/C$ (B) $4.5 \times 10^5 NC$
(C) $4.5 \times 10^{-5} N/C$ (D) $4.5 \times 10^{-5} NC$

41. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to

- (A) Only inside charges (B) Only outside charges
(C) All the charges (D) Cannot determine

42. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R



43. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?

- (A) 3 (B) 6
(C) 9 (D) 12

44. An inductor of $5H$ carries a steady current of $2A$. In what time if the current is made zero can a $40V$ self induced emf be produced in the inductor.

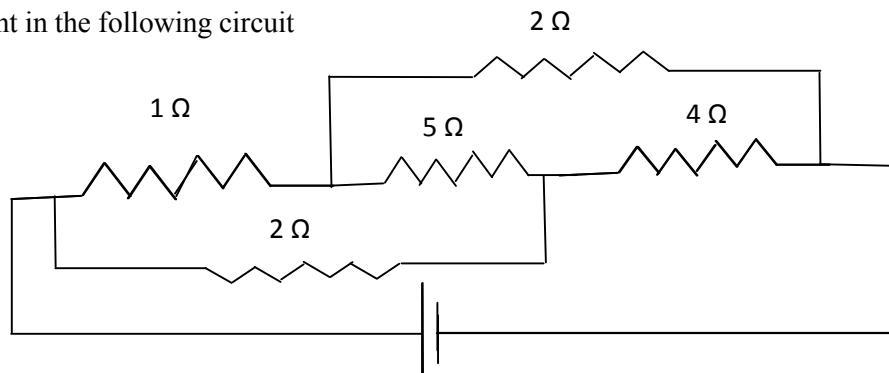
- (A) 2s (B) 1s
(C) 0.5s (D) 0.25s

45. A cell of emf E and internal resistance r gives $0.5A$ with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

- (A) 0.5 (B) 1
(C) 2 (D) 3

46.

Find current in the following circuit



- (A) 1A (B) 2A
(C) 3A (D) 4A

47. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
48. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
49. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
50. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
51. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
52. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
53. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
54. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law
 (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanole acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law
 (D) At specific composition methanole acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
55. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde

56. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F (B) 4F
(C) 6F (D) 5F
57. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
(C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base
58. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area (B) A decrease in ΔH for the reaction
(C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.
59. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease (B) The instantaneous rate a reaction is same at any time during the reaction
(C) For a zero order reaction the concentration of reactants remains changed with passage of time (D) The rate of a reaction decreases with increase in concentration of reactant (s)
60. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K) (B) CH_4 (190K)
(C) SO_2 (630K) (D) CO_2 (304K)
61. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
iii. When $1/n=0$, the adsorption is directly proportional to pressure.
iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii (B) ii and iv
(C) i and iii (D) all are false
62. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
ii. ΔG^0 for the overall reaction is negative
iii. E^0 for the overall reaction is positive
iv. E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
(C) ii and iii (D) iii and iv

63. Which of the following pairs of ions are isoelectronic and isostructural ?
 (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
 (C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}
64. Which of the following hydrides is the strongest reducing agent?
 (A) NH_3 (B) PH_3
 (C) AsH_3 (D) SbH_3
65. Consider the reactions,
 i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
 (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
 (C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
66. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
 (A) 1 (B) 2
 (C) 3 (D) 5
67. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
 (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
68. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
 (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
69. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
 (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
70. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
71. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
72. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
73. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol

74. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula C_3H_6O and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
75. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
76. The carboxylic acid that does not undergo Hell-Vohland-Zelinsky reaction is:
 (A) CH_3COOH (B) $(CH_3)_2CHCOOH$
 (C) $CH_3CH_2CH_2COOH$ (D) $(CH_3)_3CCOOH$
77. $C_2H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{P/Br_2} Y \xrightarrow[NH_3]{(excess)} Z$
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
78. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-SO_3H$ (B) $-OH$
 (C) $-F$ (D) $-Br$
79. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
80. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
81. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
82. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
83. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
84. The equivalent mass of iron in the reaction $2Fe + 3Cl_2 \rightarrow 2FeCl_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass

85. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
86. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
87. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
88. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
89. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
90. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
91. If the bond dissociation energies of XY , X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
92. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) $\text{Water} < \text{ether} < \text{ethanol}$ (B) $\text{Water} < \text{ethanol} < \text{ether}$
 (C) $\text{Ether} < \text{ethanol} < \text{water}$ (D) $\text{Ethanol} < \text{ether} < \text{water}$
93. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
94. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$

95. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
96. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
97. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
98. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
99. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) Cis-2-Butene
 (C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
100. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
101. Crossing over occurs in meiosis I during:
 (A) Metaphase (B) Telophase
 (C) Anaphase (D) Pachytene
102. Power house of the cell:
 (A) Golgi body (B) Ribosomes
 (C) Mitochondria (D) Lysosomes
103. Genetics is the study of:
 (A) Heredity (B) Variation
 (C) Both A and B (D) None of these
104. In sex-linked inheritance, characters are passed from father to the grandsons through his:
 (A) Daughter (B) Son
 (C) Both daughter and son (D) Any of them
105. Which of the following bases is not present in RNA:
 (A) Uracil (B) Thymine
 (C) Adenine (D) Cytosine

106. Mendel's principle of independent assortment can be demonstrated through:
 (A) Monohybrid cross (B) Dihybrid cross
 (C) Both A and B (D) Any of them
107. On hydrolysis, maltose gives
 (A) glucose + glucose (B) glucose + lactose
 (C) glucose + fructose (D) glucose + galactose
108. A dipeptide has ----- peptide bonds.
 (A) Three (B) One
 (C) Two (D) None of them
109. Which vitamin can be synthesized by green plants and various micro-organisms but not by mammals?
 (A) Ascorbic acid (B) Pantothenic acid
 (C) Thiamine (D) Retinol
110. Bacterial cell wall is made up of:
 (A) Chitin (B) Cellulose
 (C) Peptidoglycan (D) All the above
111. Plant viruses are generally of:
 (A) RNA (B) DNA
 (C) mRNA (D) tRNA
112. Gram positive aerobic, filamentous bacteria with hyphae are known as:
 (A) Algae (B) Actinomycetes
 (C) Bacteria (D) Fungi
113. Conversion of organic matter into simple inorganic forms is called:
 (A) Immobilization (B) Mineralization
 (C) CO_2 fixation (D) Nitrification
114. Excess carbon (> C/N ratio) leads to rate of decomposition:
 (A) Slow (B) Fast
 (C) Optimum (D) None
115. N_2 fixing cells of cyanobacteria are known as:
 (A) Cyst (B) Akinetes
 (C) Spores (D) Heterocyst
116. Livestock is important source of:
 (A) Milk (B) Meat
 (C) Manure (D) All of these

117. Dairy cattle and buffalo can be called as:
(A) Caprine (B) Ovine
(C) Bovine (D) Equine
118. Best breed of buffalo in India:
(A) Nili Ravi (B) Murrah
(C) Surti (D) Toda
119. Best layer poultry strain is:
(A) WLH (B) Minorca
(C) Karaknath (D) Sutlez
120. Normal birth weight (Kg) of healthy buffalo calf is:
(A) 20 (B) 30
(C) 40 (D) 50
121. Number of teats in buffalo:
(A) 2 (B) 4
(C) 6 (D) 8
122. Dry matter requirement (kg) of a cow weighing 400 kg is:
(A) 8 (B) 10
(C) 12 (D) 14
123. Green fodder requirement of adult cattle (kg):
(A) 30 (B) 40
(C) 50 (D) 60
124. Which of the following crops is the best for hay making:
(A) Jowar (B) Bajra
(C) Berseem (D) Oat
125. Normal body temperature of healthy poultry bird (°F):
(A) 37.0 (B) 98.6
(C) 107.0 (D) 117.0
126. ICAR-National Dairy Research Institute (NDRI) is located at:
(A) Karnal (B) New Delhi
(C) Bareilly (D) Anand
127. Excessive gas accumulation in rumen indicates:
(A) Impaction (B) Bloat
(C) Milk fever (D) Foot and Mouth Disease

128. Most fatal disease in farm animals is:
 (A) Foot and Mouth Disease (B) HS
 (C) Rinderpest (D) Anthrax
129. Semen is stored in liquid nitrogen at (°C):
 (A) -79 (B) -196
 (C) 79 (D) 196
130. During Artificial Insemination (AI) semen should be deposited
 (A) Vagina (B) Cervix
 (C) Uterus (D) Fallopian tube
131. Seeds of groundnut contain about:
 (A) 25% oil and 50% protein (B) 20% oil and 40% protein
 (C) 40% oil and 40% protein (D) 50% oil and 25% protein
132. Organic carbon is a measure of
 (A) Available nitrogen in soil (B) Available nutrient in soil
 (C) Excess of carbon in soil (D) Excess of iron in soil
133. Which among the following element is considered immobile in the plant
 (A) Calcium (B) Phosphorus
 (C) Nitrogen (D) Magnesium
134. Which among the following is recommended variety of durum wheat:
 (A) HD 2960 (B) WH 896
 (C) PBW 725 (D) WH 711
135. Recommended dose of nutrients for berseem (kg/acre) is:
 (A) 10 kg N, 28 kg P₂O₅ (B) 40 kg N, 25 kg P₂O₅
 (C) 20 kg N, 40 kg P₂O₅ (D) 20 kg N, 20 kg P₂O₅
136. Optimum row spacing for cotton is:
 (A) 50 cm (B) 60 cm
 (C) 67.5 cm (D) 75 cm
137. Optimum sowing time of summer moong in the state is:
 (A) March (B) Second fortnight of February
 (C) First fortnight of April (D) End June-early July
138. 'White alkali' soil refers to:
 (A) Acid soil (B) Saline soil
 (C) Salina sodic soil (D) Sodic soil
139. The exchange sodium percentage (ESP) of alkali soils is always:
 (A) More than 15 (B) Any value
 (C) Less than 15 (D) Less than 7.5

140. ICAR-Central Arid Zone Research Institute is located at:
(A) Nagpur (B) Hyderabad
(C) New Delhi (D) Jodhpur
141. India is divided in to ----- ecological zones.
(A) 12 (B) 10
(C) 15 (D) 20
142. Recommended seed rate (kg/ha) of dhaincha or sunhemp for green manuring is:
(A) 20 (B) 30
(C) 40 (D) 50
143. Recommended seed rate for *spring* season mungbean is
(A) 15-20 kg per acre (B) 25-30 kg per hectare
(C) 15-20 kg per hectare (D) 10 kg per hectare
144. For transplanting of pearl millet (bajra) in Haryana, optimum age of seedlings is:
(A) Two weeks (B) Three weeks
(C) Four weeks (D) Five weeks
145. Blind tillage refers to:
(A) Summer ploughing (B) Primary tillage
(C) Hoeing before germination (D) Hoeing in standing crop rows
146. Flame photometer is used for the determination of:
(A) Nitrogen (B) Phosphorus
(C) Potassium (D) Boron
147. Tetrazolium test is conducted to test the:
(A) Physical purity of seed (B) Percentage of weed seeds
(C) Viability of seed (D) Seed germination
148. World Food Day is celebrated on:
(A) 5 June (B) 20 June
(C) 28 February (D) 16 October
149. Which among the following is the best and cheapest method of weed control:
(A) Cultural measures (B) Herbicide based weed control
(C) Biological control (D) Preventive measures
150. Black soils in India belong to soil order:
(A) Alfisol (B) Inceptisol
(C) Vertisol (D) Oxisol
151. Which among the following crop has epigeal germination?
(A) Sunflower (B) Chickpea
(C) Rice (D) Pearl millet

152. Which fraction of soil organic matter is soluble in both alkali and acid:
 (A) Humic acid (B) Fulvic acid
 (C) Hymatomelonic acid (D) Humin acid
153. Nitrogen use efficiency in rice can be increased by:
 (A) Delayed application of N (B) Use of biofertilizers
 (C) Application of S-coated urea (D) Application of blue green algae
154. Which stage of sugarcane is most critical for irrigation?
 (A) Germination (B) Formative stage
 (C) Grand growth phase (D) Ripening stage
155. The largest producer of rapeseed-mustard in India is
 (A) Haryana (B) Uttar Pradesh
 (C) Rajasthan (D) Gujarat
156. The term Functional or Metabolic Nutrients was proposed by:
 (A) JV Leibig (B) DJ Nicholas
 (C) DI Arnon (D) Mosanoba Fukuoka
157. Botanical name of sunnhemp is
 (A) *Sesbania aculeata* (B) *Trifolium alexandrinum*
 (C) *Carthamus tinctorium* (D) *Crotolaria juncea*
158. The upper limit of soil moisture available for plant growth is:
 (A) PWP (15 bars) (B) Hygroscopic coefficient
 (C) Field capacity (1/3 bars) (D) Gravitational potential
159. For which fertilizer, India is fully dependent on import?
 (A) N fertilizers (B) K fertilizers
 (C) P fertilizers (D) S fertilizers
160. Agrostology is the branch of Agronomy that deals with cultivation of:
 (A) Aromatic and medicinal crops (B) Non edible oilseeds
 (C) Fodder crops (D) Green manure crops
161. With excessive use of nitrogen in sugarcane, the sugar content in juice is:
 (A) Increased (B) Remains same
 (C) Decreased (D) Not affected
162. Bacteria responsible for nitrogen fixation in soybean is
 (A) *Rhizobium leguminosarum* (B) *Rhizobium japonicum*
 (C) *Rhizobium phaseoli* (D) *Rhizobium trifoli*
163. The most critical stage of irrigation in maize is:
 (A) Silking stage (B) Tasseling stage
 (C) Grain development stage (D) Dough stage
164. Nipping in chickpea is beneficial to:
 (A) Promote branching (B) Promote flowering
 (C) Check excessive vegetative growth (D) Improve seed setting

165. Quantity of urea required by wheat for one acre at a dose of 125 kg per hectare is:
 (A) 130 (B) 90
 (C) 110 (D) 275
166. Congress grass (*Parthenium hysterophorus*) can be controlled by insect:
 (A) *Chrysoperla* (B) *Dactylopius tomentosus*
 (C) *Zygotogramma bicolorata* (D) *Bacillus thuringiensis*
167. Application of organic material with wider C:N ratio (usually more than (20:1) to soil leads to:
 (A) N immobilization (B) N leaching
 (C) Immediate release in N (D) N mineralization
168. Heavy shedding of buds and bolls in cotton occurs due to:
 (A) Deficiency of N in soil (B) Water stress at bud formation stage
 (C) Deficiency of P in soil (D) Excess of N in soil
169. 'Whip tail' in brassica is due to the deficiency of:
 (A) Calcium (B) Magnesium
 (C) Manganese (D) Zinc
170. Which kind of soil mineralogy has the highest 'cation exchange capacity':
 (A) Kaolinite (B) Illite
 (C) Montmorillonite (D) Humus
171. Optimum row spacing for fodder crops is:
 (A) 30 cm (B) 60 cm
 (C) 45 cm (D) 75 cm
172. The balance sheet of a dairy farm represents:
 (A) Assets (B) Liabilities
 (C) Both (A) and (B) (D) None of these
173. Main limitation in keeping farm records in India is:
 (A) Illiteracy (B) Nature of farming
 (C) Big size of holding (D) None of these
174. Profit and loss account is a type of:
 (A) Personal account (B) Real account
 (C) Nominal account (D) None of these
175. Which is the most prominent book for keeping farm records and accounts:
 (A) Journal (B) Ledger
 (C) Cash book (D) Purchase register
176. The list of all the physical property of a business along with their values at a specific point of time is known as:
 (A) Assets (B) Liabilities
 (C) Farm inventory (D) None of these
177. The decline in value of assets due to usage, accidental damage and time obsolescence is known as:
 (A) Appreciation (B) Depreciation
 (C) Interest (D) None of these

178. Which of the following is not a component of farm business:
 (A) Capital (B) Land
 (C) Market (D) Labour and management
179. Queen of Fruits is:
 (A) Mango (B) Apple
 (C) Litchi (D) Banana
180. Low chilling pears are trained by:
 (A) Espalier system (B) Centre leader system
 (C) Modified leader system (D) Y trellies system
181. Wind break established in the orchards is of:
 (A) Jamun (B) Jhatti Khatti
 (C) Karonda (D) Galgal
182. Strawberry is propagated through:
 (A) Stolon (B) Runners
 (C) Crown (D) Suckers
183. Epicotyl grafting is commonly done in:
 (A) Guava (B) Litchi
 (C) Pear (D) Mango
184. Daisy is cross between:
 (A) Fortune x Fremont mandarin (B) King x Willow leaf
 (C) *Citrus grandis* Osbeck × *Citrus Paradisi* Macf. (D) Sweet orange x *C trifoliata*
185. Arunika is cross between:
 (A) Dashehari x Neelum (B) Neelum x Dashehari
 (C) Amrapali x Vanraj (D) Sensation x Amrapali
186. *Phytophthora* is controlled with the application of:
 (A) Ridomil (B) Bayleton
 (C) c. M 45 (D) All of these
187. Yellow pigment in papaya fruit is:
 (A) Xanthophyll (B) Carotene
 (C) Lycopene (D) Caricaxanthin
188. Which garden is also referred as ‘Nature in Miniature’:
 (A) Japanese (B) Mughals
 (C) English (D) Persian
189. Tree with drooping inflorescence is:
 (A) *Jacaranda mimosaeifolia* (B) *Salyx baylonica*
 (C) *Bassia latifolia* (D) *Kigelia pinnata*
190. Red scarlet is a cultivar of:
 (A) Radish (B) Carrot
 (C) Onion (D) Turnip

191. Which of the following is a climacteric fruit?
 (A) Muskmelon (B) Tomato
 (C) Both A and B (D) None of these
192. Sun scalding incidence usually occurs in:
 (A) Brinjal (B) Tomato
 (C) Muskmelon (D) Cauliflower
193. Sex expression in pointed gourd is:
 (A) Monoecious (B) Andromonoecious
 (C) Dioecious (D) Hermaphrodite
194. Which of the following soil is most suitable for vegetables?
 (A) Sandy (B) Sandy Loam
 (C) Clay loam (d) Clay
195. The seed required for one hectare sowing of carrot is
 (A) 1-2 kg (B) 10-15 kg
 (C) 4-5 kg (D) 15-20 kg
196. The main reason for blanching of fruits and vegetables is:
 (A) To make them soft (B) To inactivate enzymes
 (C) To make the products taste better (D) For long term preservation of products
197. What is Canning
 (A) Placing of foods in sealed metal containers (B) Storage of foods in hermetically sealed containers
 (C) Placing cans in retorts (D) None of these
198. What is Brine
 (A) A solution of sugar and water (B) A solution of salt and water
 (C) A solution of vinegar and water (D) An additive used in food processing
199. The most economical way of drying fruits and vegetables is
 (A) Solar drying (B) Oven drying
 (C) Mechanical drying (D) None of these
200. Preservative used in tomato Ketchup is
 (A) Potassium Metabisulphite (B) Sodium Benzoate
 (C) Citric acid (D) None of these

Sr. No.	Question
1.	<p>Among the following, the most stable complex is</p> <p>(A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$ (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$</p>
2.	<p>Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?</p> <p>(A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3</p>
3.	<p>In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:</p> <p>(A) ABO_3 (B) A_3BO (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$</p>
4.	<p>On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?</p> <p>(A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law (C) At specific composition methanole acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanole acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law</p>
5.	<p>K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:</p> <p>(A) formaldehyde<methane<carbon dioxide<argon (B) formaldehyde< carbon dioxide <methane<argon (C) argon<carbon dioxide< methane<formaldehyde (D) argon <methane <carbon dioxide <formaldehyde</p>
6.	<p>The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:</p> <p>(A) 3F (B) 4F (C) 6F (D) 5F</p>
7.	<p>The positive value of the standard electrode potential of Ag^+/Ag indicates that:</p> <p>(A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple (C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base</p>
8.	<p>Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:</p> <p>(A) A decrease in surface area (B) A decrease in ΔH for the reaction (C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.</p>

9. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
- (B) The instantaneous rate a reaction is same at any time during the reaction
- (C) For a zero order reaction the concentration of reactants remains changed with passage of time
- (D) The rate of a reaction decreases with increase in concentration of reactant (s)
10. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
- (B) CH_4 (190K)
- (C) SO_2 (630K)
- (D) CO_2 (304K)
11. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
- ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
- iii. When $1/n=0$, the adsorption is directly proportional to pressure.
- iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
- (B) ii and iv
- (C) i and iii
- (D) all are false
12. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
- ii. ΔG^0 for the overall reaction is negative
- iii. E^0 for the overall reaction is positive
- iv. E^0 for the overall reaction is negative
- (A) i and iv
- (B) i and iii
- (C) ii and iii
- (D) iii and iv
13. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^-
- (B) ClO_3^- and ICl_4^-
- (C) XeO_3^{2-} and PCl_3
- (D) ClO_3^- and SO_3^{2-}
14. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3
- (B) PH_3
- (C) AsH_3
- (D) SbH_3
15. Consider the reactions,
- i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
- ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
- Compounds X and Y are, respectively
- (A) N_2O , NO
- (B) NO_2 , NO_2
- (C) N_2 , N_2O
- (D) NO_2 , NO
16. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1
- (B) 2
- (C) 3
- (D) 5

17. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
18. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
19. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
20. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
- (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
21. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
- (A) 8 (B) 2
 (C) 4 (D) 6
22. 2-Methoxy-2-methylpropane on heating with HI produces:
- (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
23. The least acidic compound among the following is:
- (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
24. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
- (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
25. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
- (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
26. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
- (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
27. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$
- In the above sequence, Z is:
- (A) cyanoethane (B) ethanamide
 (C) methanamine (D) Ethanamine

28. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
29. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
30. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
31. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
32. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
33. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
34. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
35. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
36. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
37. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
38. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
39. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
40. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$

41. If the bond dissociation energies of XY, X₂, Y₂ (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200KJmol^{-1} , the bond dissociation energy of X₂ will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
42. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
43. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
44. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
45. 30-volume hydrogen peroxide means:
 (A) 30% H₂O₂ by volume (B) 30g of H₂O₂ solution containing 1g of it
 (C) 1 cm³ of solution liberates 30 cm³ of O₂ gas at STP (D) 30 cm³ of the solution contains one mole of H₂O₂
46. The correct sequence of covalent character is represented by:
 (A) LiCl < NaCl < BeCl₂ (B) BeCl₂ < LiCl < NaCl
 (C) NaCl < LiCl < BeCl₂ (D) BeCl₂ < NaCl < LiCl
47. Which of the following is known as pyrene?
 (A) CCl₄ (B) CS₂
 (C) S₂Cl₂ (D) Solid CO₂
48. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
49. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) Cis-2-Butene
 (C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
50. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
51. Crossing over occurs in meiosis I during:
 (A) Metaphase (B) Telophase
 (C) Anaphase (D) Pachytene
52. Power house of the cell:
 (A) Golgi body (B) Ribosomes
 (C) Mitochondria (D) Lysosomes

53. Genetics is the study of:
 (A) Heredity (B) Variation
 (C) Both A and B (D) None of these
54. In sex -linked inheritance, characters are passed from father to the grandsons through his:
 (A) Daughter (B) Son
 (C) Both daughter and son (D) Any of them
55. Which of the following bases is not present in RNA:
 (A) Uracil (B) Thymine
 (C) Adenine (D) Cytosine
56. Mendel's principle of independent assortment can be demonstrated through:
 (A) Monohybrid cross (B) Dihybrid cross
 (C) Both A and B (D) Any of them
57. On hydrolysis, maltose gives
 (A) glucose + glucose (B) glucose + lactose
 (C) glucose + fructose (D) glucose + galactose
58. A dipeptide has ----- peptide bonds.
 (A) Three (B) One
 (C) Two (D) None of them
59. Which vitamin can be synthesized by green plants and various micro-organisms but not by mammals?
 (A) Ascorbic acid (B) Pantothenic acid
 (C) Thiamine (D) Retinol
60. Bacterial cell wall is made up of:
 (A) Chitin (B) Cellulose
 (C) Peptidoglycan (D) All the above
61. Plant viruses are generally of:
 (A) RNA (B) DNA
 (C) mRNA (D) tRNA
62. Gram positive aerobic, filamentous bacteria with hyphae are known as:
 (A) Algae (B) Actinomycetes
 (C) Bacteria (D) Fungi
63. Conversion of organic matter into simple inorganic forms is called:
 (A) Immobilization (B) Mineralization
 (C) CO₂ fixation (D) Nitrification

64. Excess carbon ($> C/N$ ratio) leads to rate of decomposition:
(A) Slow (B) Fast
(C) Optimum (D) None
65. N_2 fixing cells of cyanobacteria are known as:
(A) Cyst (B) Akinetes
(C) Spores (D) Heterocyst
66. Livestock is important source of:
(A) Milk (B) Meat
(C) Manure (D) All of these
67. Dairy cattle and buffalo can be called as:
(A) Caprine (B) Ovine
(C) Bovine (D) Equine
68. Best breed of buffalo in India:
(A) Nili Ravi (B) Murrah
(C) Surti (D) Toda
69. Best layer poultry strain is:
(A) WLH (B) Minorca
(C) Karaknath (D) Sutlez
70. Normal birth weight (Kg) of healthy buffalo calf is:
(A) 20 (B) 30
(C) 40 (D) 50
71. Number of teats in buffalo:
(A) 2 (B) 4
(C) 6 (D) 8
72. Dry matter requirement (kg) of a cow weighing 400 kg is:
(A) 8 (B) 10
(C) 12 (D) 14
73. Green fodder requirement of adult cattle (kg):
(A) 30 (B) 40
(C) 50 (D) 60
74. Which of the following crops is the best for hay making:
(A) Jowar (B) Bajra
(C) Berseem (D) Oat

75. Normal body temperature of healthy poultry bird (°F):
(A) 37.0 (B) 98.6
(C) 107.0 (D) 117.0
76. ICAR-National Dairy Research Institute (NDRI) is located at:
(A) Karnal (B) New Delhi
(C) Bareilly (D) Anand
77. Excessive gas accumulation in rumen indicates:
(A) Impaction (B) Bloat
(C) Milk fever (D) Foot and Mouth Disease
78. Most fatal disease in farm animals is:
(A) Foot and Mouth Disease (B) HS
(C) Rinderpest (D) Anthrax
79. Semen is stored in liquid nitrogen at (°C):
(A) -79 (B) -196
(C) 79 (D) 196
80. During Artificial Insemination (AI) semen should be deposited
(A) Vagina (B) Cervix
(C) Uterus (D) Fallopian tube
81. Seeds of groundnut contain about:
(A) 25% oil and 50% protein (B) 20% oil and 40% protein
(C) 40% oil and 40% protein (D) 50% oil and 25% protein
82. Organic carbon is a measure of
(A) Available nitrogen in soil (B) Available nutrient in soil
(C) Excess of carbon in soil (D) Excess of iron in soil
83. Which among the following element is considered immobile in the plant
(A) Calcium (B) Phosphorus
(C) Nitrogen (D) Magnesium
84. Which among the following is recommended variety of durum wheat:
(A) HD 2960 (B) WH 896
(C) PBW 725 (D) WH 711
85. Recommended dose of nutrients for berseem (kg/acre) is:
(A) 10 kg N, 28 kg P₂O₅ (B) 40 kg N, 25 kg P₂O₅
(C) 20 kg N, 40 kg P₂O₅ (D) 20 kg N, 20 kg P₂O₅
86. Optimum row spacing for cotton is:
(A) 50 cm (B) 60 cm
(C) 67.5 cm (D) 75 cm

87. Optimum sowing time of summer moong in the state is:
(A) March (B) Second fortnight of February
(C) First fortnight of April (D) End June-early July
88. 'White alkali' soil refers to:
(A) Acid soil (B) Saline soil
(C) Salina sodic soil (D) Sodic soil
89. The exchange sodium percentage (ESP) of alkali soils is always:
(A) More than 15 (B) Any value
(C) Less than 15 (D) Less than 7.5
90. ICAR-Central Arid Zone Research Institute is located at:
(A) Nagpur (B) Hyderabad
(C) New Delhi (D) Jodhpur
91. India is divided in to ----- ecological zones.
(A) 12 (B) 10
(C) 15 (D) 20
92. Recommended seed rate (kg/ha) of dhaincha or sunhemp for green manuring is:
(A) 20 (B) 30
(C) 40 (D) 50
93. Recommended seed rate for *spring* season mungbean is
(A) 15-20 kg per acre (B) 25-30 kg per hectare
(C) 15-20 kg per hectare (D) 10 kg per hectare
94. For transplanting of pearl millet (bajra) in Haryana, optimum age of seedlings is:
(A) Two weeks (B) Three weeks
(C) Four weeks (D) Five weeks
95. Blind tillage refers to:
(A) Summer ploughing (B) Primary tillage
(C) Hoeing before germination (D) Hoeing in standing crop rows
96. Flame photometer is used for the determination of:
(A) Nitrogen (B) Phosphorus
(C) Potassium (D) Boron
97. Tetrazolium test is conducted to test the:
(A) Physical purity of seed (B) Percentage of weed seeds
(C) Viability of seed (D) Seed germination
98. World Food Day is celebrated on:
(A) 5 June (B) 20 June
(C) 28 February (D) 16 October

99. Which among the following is the best and cheapest method of weed control:
 (A) Cultural measures (B) Herbicide based weed control
 (C) Biological control (D) Preventive measures
100. Black soils in India belong to soil order:
 (A) Alfisol (B) Inceptisol
 (C) Vertisol (D) Oxisol
101. Which among the following crop has epigeal germination?
 (A) Sunflower (B) Chickpea
 (C) Rice (D) Pearl millet
102. Which fraction of soil organic matter is soluble in both alkali and acid:
 (A) Humic acid (B) Fulvic acid
 (C) Hymatomelonic acid (D) Humin acid
103. Nitrogen use efficiency in rice can be increased by:
 (A) Delayed application of N (B) Use of biofertilizers
 (C) Application of S-coated urea (D) Application of blue green algae
104. Which stage of sugarcane is most critical for irrigation?
 (A) Germination (B) Formative stage
 (C) Grand growth phase (D) Ripening stage
105. The largest producer of rapeseed-mustard in India is
 (A) Haryana (B) Uttar Pradesh
 (C) Rajasthan (D) Gujarat
106. The term Functional or Metabolic Nutrients was proposed by:
 (A) JV Leibig (B) DJ Nicholas
 (C) DI Arnon (D) Mosanoba Fukuoka
107. Botanical name of sunnhemp is
 (A) *Sesbania aculeata* (B) *Trifolium alexandrinum*
 (C) *Carthamus tinctorium* (D) *Crotolaria juncea*
108. The upper limit of soil moisture available for plant growth is:
 (A) PWP (15 bars) (B) Hygroscopic coefficient
 (C) Field capacity (1/3 bars) (D) Gravitational potential
109. For which fertilizer, India is fully dependent on import?
 (A) N fertilizers (B) K fertilizers
 (C) P fertilizers (D) S fertilizers
110. Agrostology is the branch of Agronomy that deals with cultivation of:
 (A) Aromatic and medicinal crops (B) Non edible oilseeds
 (C) Fodder crops (D) Green manure crops

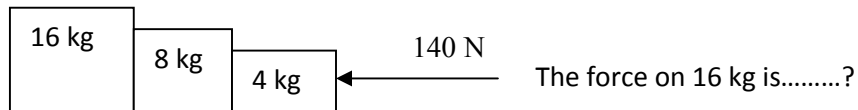
111. With excessive use of nitrogen in sugarcane, the sugar content in juice is:
 (A) Increased (B) Remains same
 (C) Decreased (D) Not affected
112. Bacteria responsible for nitrogen fixation in soybean is
 (A) *Rhizobium leguminosarum* (B) *Rhizobium japonicum*
 (C) *Rhizobium phaseoli* (D) *Rhizobium trifoli*
113. The most critical stage of irrigation in maize is:
 (A) Silking stage (B) Tasseling stage
 (C) Grain development stage (D) Dough stage
114. Nipping in chickpea is beneficial to:
 (A) Promote branching (B) Promote flowering
 (C) Check excessive vegetative growth (D) Improve seed setting
115. Quantity of urea required by wheat for one acre at a dose of 125 kg per hectare is:
 (A) 130 (B) 90
 (C) 110 (D) 275
116. Congress grass (*Parthenium hysterophorus*) can be controlled by insect:
 (A) *Chrysoperla* (B) *Dactylopius tomentosus*
 (C) *Zygogramma bicolorata* (D) *Bacillus thuringiensis*
117. Application of organic material with wider C:N ratio (usually more than 20:1) to soil leads to:
 (A) N immobilization (B) N leaching
 (C) Immediate release in N (D) N mineralization
118. Heavy shedding of buds and bolls in cotton occurs due to:
 (A) Deficiency of N in soil (B) Water stress at bud formation stage
 (C) Deficiency of P in soil (D) Excess of N in soil
119. 'Whip tail' in brassica is due to the deficiency of:
 (A) Calcium (B) Magnesium
 (C) Manganese (D) Zinc
120. Which kind of soil mineralogy has the highest 'cation exchange capacity':
 (A) Kaolinite (B) Illite
 (C) Montmorillonite (D) Humus
121. Optimum row spacing for fodder crops is:
 (A) 30 cm (B) 60 cm
 (C) 45 cm (D) 75 cm
122. The balance sheet of a dairy farm represents:
 (A) Assets (B) Liabilities
 (C) Both (A) and (B) (D) None of these
123. Main limitation in keeping farm records in India is:
 (A) Illiteracy (B) Nature of farming
 (C) Big size of holding (D) None of these

124. Profit and loss account is a type of:
 (A) Personal account (B) Real account
 (C) Nominal account (D) None of these
125. Which is the most prominent book for keeping farm records and accounts:
 (A) Journal (B) Ledger
 (C) Cash book (D) Purchase register
126. The list of all the physical property of a business along with their values at a specific point of time is known as:
 (A) Assets (B) Liabilities
 (C) Farm inventory (D) None of these
127. The decline in value of assets due to usage, accidental damage and time obsolescence is known as:
 (A) Appreciation (B) Depreciation
 (C) Interest (D) None of these
128. Which of the following is not a component of farm business:
 (A) Capital (B) Land
 (C) Market (D) Labour and management
129. Queen of Fruits is:
 (A) Mango (B) Apple
 (C) Litchi (D) Banana
130. Low chilling pears are trained by:
 (A) Espalier system (B) Centre leader system
 (C) Modified leader system (D) Y trellies system
131. Wind break established in the orchards is of:
 (A) Jamun (B) Jhatti Khatti
 (C) Karonda (D) Galgal
132. Strawberry is propagated through:
 (A) Stolon (B) Runners
 (C) Crown (D) Suckers
133. Epicotyl grafting is commonly done in:
 (A) Guava (B) Litchi
 (C) Pear (D) Mango
134. Daisy is cross between:
 (A) Fortune x Fremont mandarin (B) King x Willow leaf
 (C) *Citrus grandis* Osbeck × *Citrus* (D) Sweet orange x *C trifoliata*
Paradisi Macf.
135. Arunika is cross between:
 (A) Dashehari x Neelum (B) Neelum x Dashehari
 (C) Amrapali x Vanraj (D) Sensation x Amrapali

136. *Phytophthora* is controlled with the application of:
 (A) Ridomil (B) Bayleton
 (C) c. M 45 (D) All of these
137. Yellow pigment in papaya fruit is:
 (A) Xanthophyll (B) Carotene
 (C) Lycopene (D) Caricaxanthin
138. Which garden is also referred as 'Nature in Miniature':
 (A) Japanese (B) Mughals
 (C) English (D) Persian
139. Tree with drooping inflorescence is:
 (A) *Jacaranda mimosaeifolia* (B) *Salyx baylonica*
 (C) *Bassia latifolia* (D) *Kigelia pinnata*
140. Red scarlet is a cultivar of:
 (A) Radish (B) Carrot
 (C) Onion (D) Turnip
141. Which of the following is a climacteric fruit?
 (A) Muskmelon (B) Tomato
 (C) Both A and B (D) None of these
142. Sun scalding incidence usually occurs in:
 (A) Brinjal (B) Tomato
 (C) Muskmelon (D) Cauliflower
143. Sex expression in pointed gourd is:
 (A) Monoecious (B) Andromonoecious
 (C) Dioecious (D) Hermaphrodite
144. Which of the following soil is most suitable for vegetables?
 (A) Sandy (B) Sandy Loam
 (C) Clay loam (d) Clay
145. The seed required for one hectare sowing of carrot is
 (A) 1-2 kg (B) 10-15 kg
 (C) 4-5 kg (D) 15-20 kg
146. The main reason for blanching of fruits and vegetables is:
 (A) To make them soft (B) To inactivate enzymes
 (C) To make the products taste better (D) For long term preservation of products
147. What is Canning
 (A) Placing of foods in sealed metal containers (B) Storage of foods in hermetically sealed containers
 (C) Placing cans in retorts (D) None of these
148. What is Brine
 (A) A solution of sugar and water (B) A solution of salt and water
 (C) A solution of vinegar and water (D) An additive used in food processing

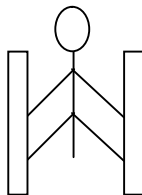
149. The most economical way of drying fruits and vegetables is
 (A) Solar drying (B) Oven drying
 (C) Mechanical drying (D) None of these
150. Preservative used in tomato Ketchup is
 (A) Potassium Metabisulphite (B) Sodium Benzoate
 (C) Citric acid (D) None of these
151. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
152. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
153. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
154. A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

155.



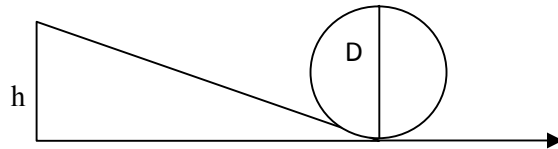
- (A) 140N (B) 120N
 (C) 100N (D) 80N

156. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

157.

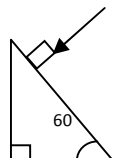


Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
(C) $5D/4$ (D) $3D/4$
158. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
(A) $F/9$ (B) $3F$
(C) F (D) $F/3$
159. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
(A) infinity (B) 150kg
(C) zero (D) $75/2$ kg
160. g at a depth of 1600 km inside the earth in $m/s/s$ is
(A) 6.65 (B) 7.35
(C) 8.65 (D) 4.35
161. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
(A) 140 (B) $20\sqrt{19.6}$
(C) $20\sqrt{9.8}$ (D) 20
162. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
(A) 20 (B) 62.5
(C) 23 (D) 60
163. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
(A) 2600W (B) 250W
(C) 325W (D) 2500W
164. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
(A) $ML^2/3$ (B) $ML^2/6$
(C) $ML^2/9$ (D) $ML^2/12$
165. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
(A) $\sqrt{2}V$ (B) V
(C) $2V$ (D) $V/\sqrt{2}$
166. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
(A) 1:2 (B) 2:1
(C) 1:4 (D) 4:1

167. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g = 10 \text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
168. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
169. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
170. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
171. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
172. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
173. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
174. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
175. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
176. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
177. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s
178. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) Q

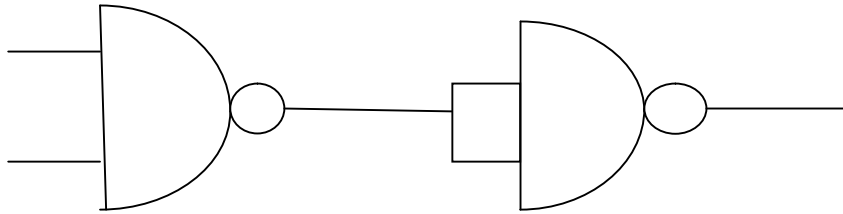
179. A capacitor of $1 \mu\text{F}$ is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
180. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change
181. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75
182. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ration of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
183. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
184. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
185. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA
186. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
 (A) infinity (B) zero
 (C) radio wave (D) X ray
187. Which among the following series gives visible light?
 (A) Lyman (B) Balmer
 (C) Brackett (D) None of these

188. Identify the logic operation performed by this circuit

A



B

- (A) AND
(C) NAND

- (B) OR
(D) NOR

189. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.

- (A) $4.54 \times 10^9 \text{ m}^{-3}$
(C) $1.5 \times 10^{16} \text{ m}^{-3}$

- (B) $4.95 \times 10^{22} \text{ m}^{-3}$
(D) $5 \times 10^{28} \text{ m}^{-3}$

190. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

- (A) $4.5 \times 10^5 \text{ N/C}$
(C) $4.5 \times 10^{-5} \text{ N/C}$

- (B) $4.5 \times 10^5 \text{ NC}$
(D) $4.5 \times 10^{-5} \text{ NC}$

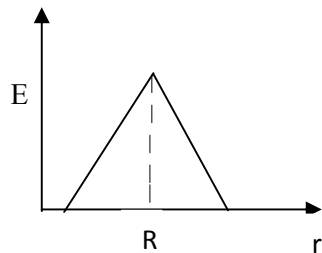
191. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to

- (A) Only inside charges
(C) All the charges

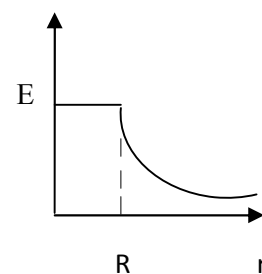
- (B) Only outside charges
(D) Cannot determine

192. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

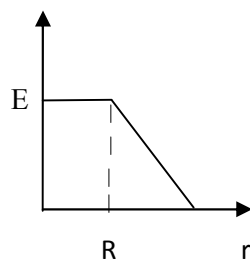
(A)



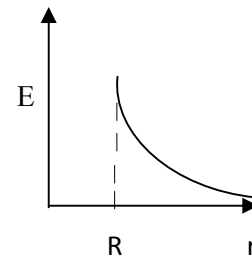
(B)



(C)



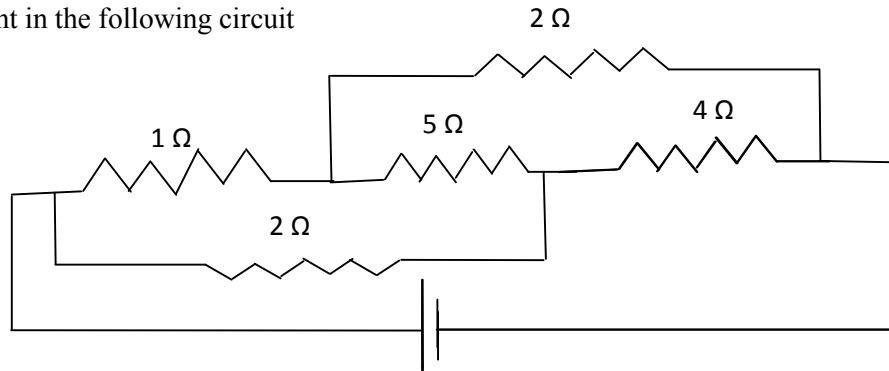
(D)



193. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?
 (A) 3 (B) 6
 (C) 9 (D) 12
194. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.
 (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s
195. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be
 (A) 0.5 (B) 1
 (C) 2 (D) 3

196.

Find current in the following circuit



- (A) 1A (B) 2A
 (C) 3A (D) 4A
197. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find the midpoint of the axis between them if same current I flows through both loops.
 (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
198. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
 (A) 19N (B) 18 N
 (C) 16N (D) 9.8N

199. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
(A) 1H (B) 2H
(C) 3H (D) 4H
200. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
(A) 500 (B) 800
(C) 900 (D) 1000

Sr. No.	Question
---------	----------

1. Crossing over occurs in meiosis I during:

(A) Metaphase	(B) Telophase
(C) Anaphase	(D) Pachytene

2. Power house of the cell:

(A) Golgi body	(B) Ribosomes
(C) Mitochondria	(D) Lysosomes

3. Genetics is the study of:

(A) Heredity	(B) Variation
(C) Both A and B	(D) None of these

4. In sex -linked inheritance, characters are passed from father to the grandsons through his:

(A) Daughter	(B) Son
(C) Both daughter and son	(D) Any of them

5. Which of the following bases is not present in RNA:

(A) Uracil	(B) Thymine
(C) Adenine	(D) Cytosine

6. Mendel's principle of independent assortment can be demonstrated through:

(A) Monohybrid cross	(B) Dihybrid cross
(C) Both A and B	(D) Any of them

7. On hydrolysis, maltose gives

(A) glucose + glucose	(B) glucose + lactose
(C) glucose + fructose	(D) glucose + galactose

8. A dipeptide has ----- peptide bonds.

(A) Three	(B) One
(C) Two	(D) None of them

9. Which vitamin can be synthesized by green plants and various micro-organisms but not by mammals?

(A) Ascorbic acid	(B) Pantothenic acid
(C) Thiamine	(D) Retinol

10. Bacterial cell wall is made up of:

(A) Chitin	(B) Cellulose
(C) Peptidoglycan	(D) All the above

11. Plant viruses are generally of:
(A) RNA (B) DNA
(C) mRNA (D) tRNA
12. Gram positive aerobic, filamentous bacteria with hyphae are known as:
(A) Algae (B) Actinomycetes
(C) Bacteria (D) Fungi
13. Conversion of organic matter in to simple inorganic forms is called:
(A) Immobilization (B) Mineralization
(C) CO_2 fixation (D) Nitrification
14. Excess carbon ($> \text{C/N}$ ratio) leads to rate of decomposition:
(A) Slow (B) Fast
(C) Optimum (D) None
15. N_2 fixing cells of cyanobacteria are known as:
(A) Cyst (B) Akinetes
(C) Spores (D) Heterocyst
16. Livestock is important source of:
(A) Milk (B) Meat
(C) Manure (D) All of these
17. Dairy cattle and buffalo can be called as:
(A) Caprine (B) Ovine
(C) Bovine (D) Equine
18. Best breed of buffalo in India:
(A) Nili Ravi (B) Murrah
(C) Surti (D) Toda
19. Best layer poultry strain is:
(A) WLH (B) Minorca
(C) Karaknath (D) Sutlez
20. Normal birth weight (Kg) of healthy buffalo calf is:
(A) 20 (B) 30
(C) 40 (D) 50
21. Number of teats in buffalo:
(A) 2 (B) 4
(C) 6 (D) 8

22. Dry matter requirement (kg) of a cow weighing 400 kg is:
(A) 8 (B) 10
(C) 12 (D) 14
23. Green fodder requirement of adult cattle (kg):
(A) 30 (B) 40
(C) 50 (D) 60
24. Which of the following crops is the best for hay making:
(A) Jowar (B) Bajra
(C) Berseem (D) Oat
25. Normal body temperature of healthy poultry bird (°F):
(A) 37.0 (B) 98.6
(C) 107.0 (D) 117.0
26. ICAR-National Dairy Research Institute (NDRI) is located at:
(A) Karnal (B) New Delhi
(C) Bareilly (D) Anand
27. Excessive gas accumulation in rumen indicates:
(A) Impaction (B) Bloat
(C) Milk fever (D) Foot and Mouth Disease
28. Most fatal disease in farm animals is:
(A) Foot and Mouth Disease (B) HS
(C) Rinderpest (D) Anthrax
29. Semen is stored in liquid nitrogen at (°C):
(A) -79 (B) -196
(C) 79 (D) 196
30. During Artificial Insemination (AI) semen should be deposited
(A) Vagina (B) Cervix
(C) Uterus (D) Fallopian tube
31. Seeds of groundnut contain about:
(A) 25% oil and 50% protein (B) 20% oil and 40% protein
(C) 40% oil and 40% protein (D) 50% oil and 25% protein
32. Organic carbon is a measure of
(A) Available nitrogen in soil (B) Available nutrient in soil
(C) Excess of carbon in soil (D) Excess of iron in soil

33. Which among the following element is considered immobile in the plant
 (A) Calcium (B) Phosphorus
 (C) Nitrogen (D) Magnesium
34. Which among the following is recommended variety of durum wheat:
 (A) HD 2960 (B) WH 896
 (C) PBW 725 (D) WH 711
35. Recommended dose of nutrients for berseem (kg/acre) is:
 (A) 10 kg N, 28 kg P₂O₅ (B) 40 kg N, 25 kg P₂O₅
 (C) 20 kg N, 40 kg P₂O₅ (D) 20 kg N, 20 kg P₂O₅
36. Optimum row spacing for cotton is:
 (A) 50 cm (B) 60 cm
 (C) 67.5 cm (D) 75 cm
37. Optimum sowing time of summer moong in the state is:
 (A) March (B) Second fortnight of February
 (C) First fortnight of April (D) End June-early July
38. 'White alkali' soil refers to:
 (A) Acid soil (B) Saline soil
 (C) Salina sodic soil (D) Sodic soil
39. The exchange sodium percentage (ESP) of alkali soils is always:
 (A) More than 15 (B) Any value
 (C) Less than 15 (D) Less than 7.5
40. ICAR-Central Arid Zone Research Institute is located at:
 (A) Nagpur (B) Hyderabad
 (C) New Delhi (D) Jodhpur
41. India is divided in to ----- ecological zones.
 (A) 12 (B) 10
 (C) 15 (D) 20
42. Recommended seed rate (kg/ha) of dhaincha or sunhemp for green manuring is:
 (A) 20 (B) 30
 (C) 40 (D) 50
43. Recommended seed rate for *spring* season mungbean is
 (A) 15-20 kg per acre (B) 25-30 kg per hectare
 (C) 15-20 kg per hectare (D) 10 kg per hectare
44. For transplanting of pearl millet (bajra) in Haryana, optimum age of seedlings is:
 (A) Two weeks (B) Three weeks
 (C) Four weeks (D) Five weeks

45. Blind tillage refers to:
 (A) Summer ploughing (B) Primary tillage
 (C) Hoeing before germination (D) Hoeing in standing crop rows
46. Flame photometer is used for the determination of:
 (A) Nitrogen (B) Phosphorus
 (C) Potassium (D) Boron
47. Tetrazolium test is conducted to test the:
 (A) Physical purity of seed (B) Percentage of weed seeds
 (C) Viability of seed (D) Seed germination
48. World Food Day is celebrated on:
 (A) 5 June (B) 20 June
 (C) 28 February (D) 16 October
49. Which among the following is the best and cheapest method of weed control:
 (A) Cultural measures (B) Herbicide based weed control
 (C) Biological control (D) Preventive measures
50. Black soils in India belong to soil order:
 (A) Alfisol (B) Inceptisol
 (C) Vertisol (D) Oxisol
51. Which among the following crop has epigeal germination?
 (A) Sunflower (B) Chickpea
 (C) Rice (D) Pearl millet
52. Which fraction of soil organic matter is soluble in both alkali and acid:
 (A) Humic acid (B) Fulvic acid
 (C) Hymatomelonic acid (D) Humin acid
53. Nitrogen use efficiency in rice can be increased by:
 (A) Delayed application of N (B) Use of biofertilizers
 (C) Application of S-coated urea (D) Application of blue green algae
54. Which stage of sugarcane is most critical for irrigation?
 (A) Germination (B) Formative stage
 (C) Grand growth phase (D) Ripening stage
55. The largest producer of rapeseed-mustard in India is
 (A) Haryana (B) Uttar Pradesh
 (C) Rajasthan (D) Gujarat
56. The term Functional or Metabolic Nutrients was proposed by:
 (A) JV Leibig (B) DJ Nicholas
 (C) DI Arnon (D) Mosanoba Fukuoka

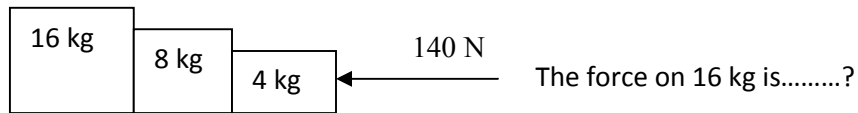
57. Botanical name of sunnhemp is
 (A) *Sesbania aculeata* (B) *Trifolium alexandrinum*
 (C) *Carthamus tinctorium* (D) *Crotolaria juncea*
58. The upper limit of soil moisture available for plant growth is:
 (A) PWP (15 bars) (B) Hygroscopic coefficient
 (C) Field capacity (1/3 bars) (D) Gravitational potential
59. For which fertilizer, India is fully dependent on import?
 (A) N fertilizers (B) K fertilizers
 (C) P fertilizers (D) S fertilizers
60. Agrostology is the branch of Agronomy that deals with cultivation of:
 (A) Aromatic and medicinal crops (B) Non edible oilseeds
 (C) Fodder crops (D) Green manure crops
61. With excessive use of nitrogen in sugarcane, the sugar content in juice is:
 (A) Increased (B) Remains same
 (C) Decreased (D) Not affected
62. Bacteria responsible for nitrogen fixation in soybean is
 (A) *Rhizobium leguminosarum* (B) *Rhizobium japonicum*
 (C) *Rhizobium phaseoli* (D) *Rhizobium trifoli*
63. The most critical stage of irrigation in maize is:
 (A) Silking stage (B) Tasseling stage
 (C) Grain development stage (D) Dough stage
64. Nipping in chickpea is beneficial to:
 (A) Promote branching (B) Promote flowering
 (C) Check excessive vegetative growth (D) Improve seed setting
65. Quantity of urea required by wheat for one acre at a dose of 125 kg per hectare is:
 (A) 130 (B) 90
 (C) 110 (D) 275
66. Congress grass (*Parthenium hysterophorus*) can be controlled by insect:
 (A) *Chrysoperla* (B) *Dactylopius tomentosus*
 (C) *Zygogramma bicolorata* (D) *Bacillus thuringiensis*
67. Application of organic material with wider C:N ratio (usually more than (20:1) to soil leads to:
 (A) N immobilization (B) N leaching
 (C) Immediate release in N (D) N mineralization
68. Heavy shedding of buds and bolls in cotton occurs due to:
 (A) Deficiency of N in soil (B) Water stress at bud formation stage
 (C) Deficiency of P in soil (D) Excess of N in soil

69. 'Whip tail' in brassica is due to the deficiency of:
 (A) Calcium (B) Magnesium
 (C) Manganese (D) Zinc
70. Which kind of soil mineralogy has the highest 'cation exchange capacity':
 (A) Kaolinite (B) Illite
 (C) Montmorillonite (D) Humus
71. Optimum row spacing for fodder crops is:
 (A) 30 cm (B) 60 cm
 (C) 45 cm (D) 75 cm
72. The balance sheet of a dairy farm represents:
 (A) Assets (B) Liabilities
 (C) Both (A) and (B) (D) None of these
73. Main limitation in keeping farm records in India is:
 (A) Illiteracy (B) Nature of farming
 (C) Big size of holding (D) None of these
74. Profit and loss account is a type of:
 (A) Personal account (B) Real account
 (C) Nominal account (D) None of these
75. Which is the most prominent book for keeping farm records and accounts:
 (A) Journal (B) Ledger
 (C) Cash book (D) Purchase register
76. The list of all the physical property of a business along with their values at a specific point of time is known as:
 (A) Assets (B) Liabilities
 (C) Farm inventory (D) None of these
77. The decline in value of assets due to usage, accidental damage and time obsolescence is known as:
 (A) Appreciation (B) Depreciation
 (C) Interest (D) None of these
78. Which of the following is not a component of farm business:
 (A) Capital (B) Land
 (C) Market (D) Labour and management
79. Queen of Fruits is:
 (A) Mango (B) Apple
 (C) Litchi (D) Banana
80. Low chilling pears are trained by:
 (A) Espalier system (B) Centre leader system
 (C) Modified leader system (D) Y trellies system
81. Wind break established in the orchards is of:
 (A) Jamun (B) Jhatti Khatti
 (C) Karonda (D) Galgal

82. Strawberry is propagated through:
 (A) Stolon (B) Runners
 (C) Crown (D) Suckers
83. Epicotyl grafting is commonly done in:
 (A) Guava (B) Litchi
 (C) Pear (D) Mango
84. Daisy is cross between:
 (A) Fortune x Fremont mandarin (B) King x Willow leaf
 (C) *Citrus grandis* Osbeck × *Citrus Paradisi* Macf. (D) Sweet orange x *C trifoliata*
85. Arunika is cross between:
 (A) Dashehari x Neelum (B) Neelum x Dashehari
 (C) Amrapali x Vanraj (D) Sensation x Amrapali
86. *Phytophthora* is controlled with the application of:
 (A) Ridomil (B) Bayleton
 (C) c. M 45 (D) All of these
87. Yellow pigment in papaya fruit is:
 (A) Xanthophyll (B) Carotene
 (C) Lycopene (D) Caricaxanthin
88. Which garden is also referred as 'Nature in Miniature':
 (A) Japanese (B) Mughals
 (C) English (D) Persian
89. Tree with drooping inflorescence is:
 (A) *Jacaranda mimosaeifolia* (B) *Salix baylonica*
 (C) *Bassia latifolia* (D) *Kigelia pinnata*
90. Red scarlet is a cultivar of:
 (A) Radish (B) Carrot
 (C) Onion (D) Turnip
91. Which of the following is a climacteric fruit?
 (A) Muskmelon (B) Tomato
 (C) Both A and B (D) None of these
92. Sun scalding incidence usually occurs in:
 (A) Brinjal (B) Tomato
 (C) Muskmelon (D) Cauliflower

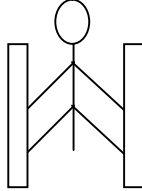
93. Sex expression in pointed gourd is:
 (A) Monoecious (B) Andromonoecious
 (C) Dioecious (D) Hermaphrodite
94. Which of the following soil is most suitable for vegetables?
 (A) Sandy (B) Sandy Loam
 (C) Clay loam (d) Clay
95. The seed required for one hectare sowing of carrot is
 (A) 1-2 kg (B) 10-15 kg
 (C) 4-5 kg (D) 15-20 kg
96. The main reason for blanching of fruits and vegetables is:
 (A) To make them soft (B) To inactivate enzymes
 (C) To make the products taste better (D) For long term preservation of products
97. What is Canning
 (A) Placing of foods in sealed metal containers (B) Storage of foods in hermetically sealed containers
 (C) Placing cans in retorts (D) None of these
98. What is Brine
 (A) A solution of sugar and water (B) A solution of salt and water
 (C) A solution of vinegar and water (D) An additive used in food processing
99. The most economical way of drying fruits and vegetables is
 (A) Solar drying (B) Oven drying
 (C) Mechanical drying (D) None of these
100. Preservative used in tomato Ketchup is
 (A) Potassium Metabisulphite (B) Sodium Benzoate
 (C) Citric acid (D) None of these
101. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
102. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
103. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
104. A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

105.



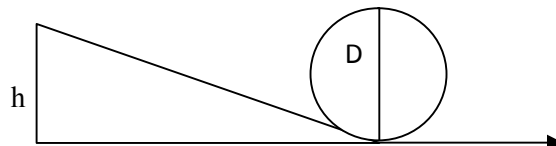
- (A) 140N (B) 120N
(C) 100N (D) 80N

106. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
(C) 80 N (D) 50 N

107.



Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
(C) $5D/4$ (D) $3D/4$

108. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be

- (A) $F/9$ (B) $3F$
(C) F (D) $F/3$

109. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is

- (A) infinity (B) 150kg
(C) zero (D) $75/2 \text{ kg}$

110. g at a depth of 1600 km inside the earth in m/s^2 is

- (A) 6.65 (B) 7.35
(C) 8.65 (D) 4.35

111. A block of mass $19M$ is suspended by a string of length 1m . A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is

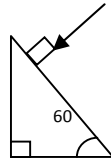
- (A) 140 (B) $20\sqrt{19.6}$
(C) $20\sqrt{9.8}$ (D) 20

112. A rubber ball falls from a height of 4m and rebounds to 1.5m . The % loss of energy during the impact is

- (A) 20 (B) 62.5
(C) 23 (D) 60

113. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
114. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
115. If the velocity of C.M of a rolling body is V, then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) 2V (D) $V/\sqrt{2}$
116. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
117. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g = 10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
118. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
119. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
120. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10\text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4\text{ cm}^2$ (D) $2 \times 10^{10}\text{ cm}^2$
121. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
122. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
123. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
124. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases

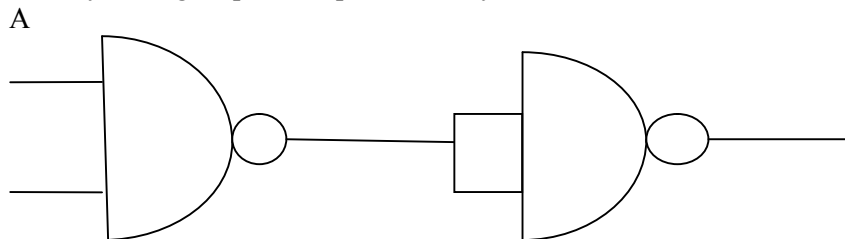
125. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
126. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) 7.5×10^{-7} Wb (B) 1.6×10^{-7} Wb
 (C) 3×10^{-7} Wb (D) 1.5×10^{-7} Wb
127. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) 1/100 s (B) 1/200 s
 (C) 1/500 s (D) 1 s
128. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) 1/C (D) q
129. A capacitor of 1 μ F is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
130. An electromagnetic wave is travelling in vacuum with a speed of 3×10^8 m/s. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8$ m/s (B) 1.5×10^8 m/s
 (C) 2×10^8 m/s (D) No change
131. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75
132. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ration of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
133. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
134. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67

135. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227\AA (B) 12.27\AA
 (C) 122.7\AA (D) 1227\AA
136. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
 (A) infinity (B) zero
 (C) radio wave (D) X ray
137. Which among the following series gives visible light?
 (A) Lyman (B) Balmer
 (C) Brackett (D) None of these

138. Identify the logic operation performed by this circuit

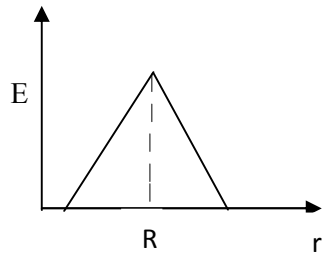


B

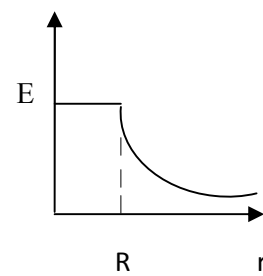
- (A) AND (B) OR
 (C) NAND (D) NOR
139. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{m}^{-3}$.
 (A) $4.54 \times 10^9 \text{m}^{-3}$ (B) $4.95 \times 10^{22} \text{m}^{-3}$
 (C) $1.5 \times 10^{16} \text{m}^{-3}$ (D) $5 \times 10^{28} \text{m}^{-3}$
140. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
 (A) $4.5 \times 10^5 \text{N/C}$ (B) $4.5 \times 10^5 \text{NC}$
 (C) $4.5 \times 10^{-5} \text{N/C}$ (D) $4.5 \times 10^{-5} \text{NC}$
141. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to
 (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine

142. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

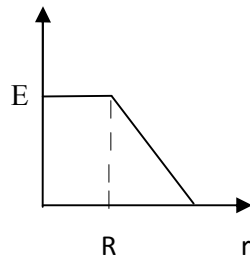
(A)



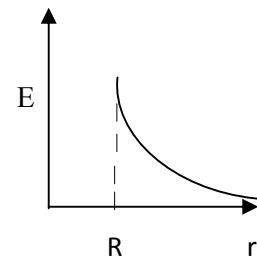
(B)



(C)



(D)



143. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?

- (A) 3
(C) 9

- (B) 6
(D) 12

144. An inductor of $5H$ carries a steady current of $2A$. In what time if the current is made zero can a $40V$ self induced emf be produced in the inductor.

- (A) 2s
(C) 0.5s

- (B) 1s
(D) 0.25s

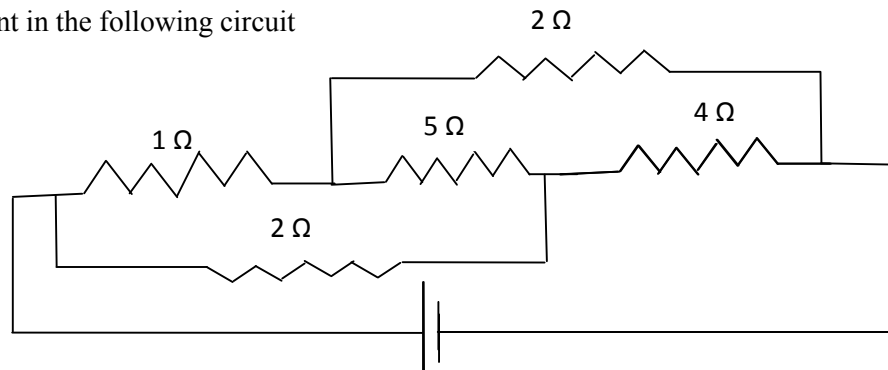
145. A cell of emf E and internal resistance r gives $0.5A$ with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

- (A) 0.5
(C) 2

- (B) 1
(D) 3

146.

Find current in the following circuit



- (A) 1A
(C) 3A

- (B) 2A
(D) 4A

147. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
148. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
149. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
150. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
151. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
152. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
153. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
154. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanole acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanole acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
155. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde

156. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F (B) 4F
(C) 6F (D) 5F
157. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
(C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base
158. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area (B) A decrease in ΔH for the reaction
(C) A decrease in the fraction of particles possessing sufficient energy. (D) The introduction of an alternative pathway with greater activation energy.
159. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease (B) The instantaneous rate a reaction is same at any time during the reaction
(C) For a zero order reaction the concentration of reactants remains changed with passage of time (D) The rate of a reaction decreases with increase in concentration of reactant (s)
160. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K) (B) CH_4 (190K)
(C) SO_2 (630K) (D) CO_2 (304K)
161. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- When $1/n=0$, the adsorption is independent of pressure.
 - When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 - When $1/n=0$, the adsorption is directly proportional to pressure.
 - When $n=0$, plot of x/m vs p is a curve
- (A) i and ii (B) ii and iv
(C) i and iii (D) all are false
162. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- ΔG^0 for the overall reaction is positive
 - ΔG^0 for the overall reaction is negative
 - E^0 for the overall reaction is positive
 - E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
(C) ii and iii (D) iii and iv
163. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
(C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}

164. Which of the following hydrides is the strongest reducing agent?
 (A) NH_3 (B) PH_3
 (C) AsH_3 (D) SbH_3
165. Consider the reactions,
 i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
 (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
 (C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
166. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
 (A) 1 (B) 2
 (C) 3 (D) 5
167. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
 (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
168. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
 (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
169. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
 (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
170. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
171. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
172. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
173. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
174. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone

175. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
176. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
 (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
177.
$$\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P/Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$$

 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
178. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
179. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
180. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
181. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
182. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
183. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
184. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
185. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
186. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
187. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2

188. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
189. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
190. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
191. If the bond dissociation energies of XY, X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
192. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
193. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
194. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
195. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
196. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
197. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
198. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$

199. The molecule that will have dipole moment is:
- (A) 2,2-Dimethylpropane (B) Cis-2-Butene
(C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
200. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
- (A) 2-Methylpentane (B) 2,2-Dimethylbutane
(C) 2,3-Dimethylbutane (D) n-Hexane

Sr. No.	Question
---------	----------

1. Which among the following crop has epigeal germination?
 (A) Sunflower (B) Chickpea
 (C) Rice (D) Pearl millet
2. Which fraction of soil organic matter is soluble in both alkali and acid:
 (A) Humic acid (B) Fulvic acid
 (C) Hymatomelonic acid (D) Humin acid
3. Nitrogen use efficiency in rice can be increased by:
 (A) Delayed application of N (B) Use of biofertilizers
 (C) Application of S-coated urea (D) Application of blue green algae
4. Which stage of sugarcane is most critical for irrigation?
 (A) Germination (B) Formative stage
 (C) Grand growth phase (D) Ripening stage
5. The largest producer of rapeseed-mustard in India is
 (A) Haryana (B) Uttar Pradesh
 (C) Rajasthan (D) Gujarat
6. The term Functional or Metabolic Nutrients was proposed by:
 (A) JV Leibig (B) DJ Nicholas
 (C) DI Arnon (D) Mosanoba Fukuoka
7. Botanical name of sunnhemp is
 (A) *Sesbania aculeata* (B) *Trifolium alexandrinum*
 (C) *Carthamus tinctorium* (D) *Crotolaria juncea*
8. The upper limit of soil moisture available for plant growth is:
 (A) PWP (15 bars) (B) Hygroscopic coefficient
 (C) Field capacity (1/3 bars) (D) Gravitational potential
9. For which fertilizer, India is fully dependent on import?
 (A) N fertilizers (B) K fertilizers
 (C) P fertilizers (D) S fertilizers
10. Agrostology is the branch of Agronomy that deals with cultivation of:
 (A) Aromatic and medicinal crops (B) Non edible oilseeds
 (C) Fodder crops (D) Green manure crops
11. With excessive use of nitrogen in sugarcane, the sugar content in juice is:
 (A) Increased (B) Remains same
 (C) Decreased (D) Not affected
12. Bacteria responsible for nitrogen fixation in soybean is
 (A) *Rhizobium leguminosarum* (B) *Rhizobium japonicum*
 (C) *Rhizobium phaseoli* (D) *Rhizobium trifoli*

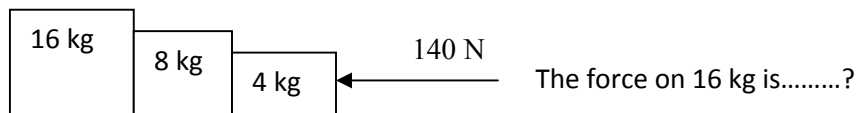
13. The most critical stage of irrigation in maize is:
 - (A) Silking stage
 - (B) Tasseling stage
 - (C) Grain development stage
 - (D) Dough stage
14. Nipping in chickpea is beneficial to:
 - (A) Promote branching
 - (B) Promote flowering
 - (C) Check excessive vegetative growth
 - (D) Improve seed setting
15. Quantity of urea required by wheat for one acre at a dose of 125 kg per hectare is:
 - (A) 130
 - (B) 90
 - (C) 110
 - (D) 275
16. Congress grass (*Parthenium hysterophorus*) can be controlled by insect:
 - (A) *Chrysoperla*
 - (B) *Dactylopius tomentosus*
 - (C) *Zygogramma bicolorata*
 - (D) *Bacillus thuringiensis*
17. Application of organic material with wider C:N ratio (usually more than (20:1) to soil leads to:
 - (A) N immobilization
 - (B) N leaching
 - (C) Immediate release in N
 - (D) N mineralization
18. Heavy shedding of buds and bolls in cotton occurs due to:
 - (A) Deficiency of N in soil
 - (B) Water stress at bud formation stage
 - (C) Deficiency of P in soil
 - (D) Excess of N in soil
19. 'Whip tail' in brassica is due to the deficiency of:
 - (A) Calcium
 - (B) Magnesium
 - (C) Manganese
 - (D) Zinc
20. Which kind of soil mineralogy has the highest 'cation exchange capacity':
 - (A) Kaolinite
 - (B) Illite
 - (C) Montmorillonite
 - (D) Humus
21. Optimum row spacing for fodder crops is:
 - (A) 30 cm
 - (B) 60 cm
 - (C) 45 cm
 - (D) 75 cm
22. The balance sheet of a dairy farm represents:
 - (A) Assets
 - (B) Liabilities
 - (C) Both (A) and (B)
 - (D) None of these
23. Main limitation in keeping farm records in India is:
 - (A) Illiteracy
 - (B) Nature of farming
 - (C) Big size of holding
 - (D) None of these
24. Profit and loss account is a type of:
 - (A) Personal account
 - (B) Real account
 - (C) Nominal account
 - (D) None of these
25. Which is the most prominent book for keeping farm records and accounts:
 - (A) Journal
 - (B) Ledger
 - (C) Cash book
 - (D) Purchase register

26. The list of all the physical property of a business along with their values at a specific point of time is known as:
 (A) Assets (B) Liabilities
 (C) Farm inventory (D) None of these
27. The decline in value of assets due to usage, accidental damage and time obsolescence is known as:
 (A) Appreciation (B) Depreciation
 (C) Interest (D) None of these
28. Which of the following is not a component of farm business:
 (A) Capital (B) Land
 (C) Market (D) Labour and management
29. Queen of Fruits is:
 (A) Mango (B) Apple
 (C) Litchi (D) Banana
30. Low chilling pears are trained by:
 (A) Espalier system (B) Centre leader system
 (C) Modified leader system (D) Y trellies system
31. Wind break established in the orchards is of:
 (A) Jamun (B) Jhatti Khatti
 (C) Karonda (D) Galgal
32. Strawberry is propagated through:
 (A) Stolon (B) Runners
 (C) Crown (D) Suckers
33. Epicotyl grafting is commonly done in:
 (A) Guava (B) Litchi
 (C) Pear (D) Mango
34. Daisy is cross between:
 (A) Fortune x Fremont mandarin (B) King x Willow leaf
 (C) *Citrus grandis* Osbeck × *Citrus Paradisi* Macf. (D) Sweet orange x *C trifoliata*
35. Arunika is cross between:
 (A) Dashehari x Neelum (B) Neelum x Dashehari
 (C) Amrapali x Vanraj (D) Sensation x Amrapali
36. *Phytophthora* is controlled with the application of:
 (A) Ridomil (B) Bayleton
 (C) c. M 45 (D) All of these
37. Yellow pigment in papaya fruit is:
 (A) Xanthophyll (B) Carotene
 (C) Lycopene (D) Caricaxanthin

38. Which garden is also referred as 'Nature in Miniature':
 (A) Japanese (B) Mughals
 (C) English (D) Persian
39. Tree with drooping inflorescence is:
 (A) *Jacaranda mimosaeifolia* (B) *Salix baylonica*
 (C) *Bassia latifolia* (D) *Kigelia pinnata*
40. Red scarlet is a cultivar of:
 (A) Radish (B) Carrot
 (C) Onion (D) Turnip
41. Which of the following is a climacteric fruit?
 (A) Muskmelon (B) Tomato
 (C) Both A and B (D) None of these
42. Sun scalding incidence usually occurs in:
 (A) Brinjal (B) Tomato
 (C) Muskmelon (D) Cauliflower
43. Sex expression in pointed gourd is:
 (A) Monoecious (B) Andromonoecious
 (C) Dioecious (D) Hermaphrodite
44. Which of the following soil is most suitable for vegetables?
 (A) Sandy (B) Sandy Loam
 (C) Clay loam (d) Clay
45. The seed required for one hectare sowing of carrot is
 (A) 1-2 kg (B) 10-15 kg
 (C) 4-5 kg (D) 15-20 kg
46. The main reason for blanching of fruits and vegetables is:
 (A) To make them soft (B) To inactivate enzymes
 (C) To make the products taste better (D) For long term preservation of products
47. What is Canning
 (A) Placing of foods in sealed metal containers (B) Storage of foods in hermetically sealed containers
 (C) Placing cans in retorts (D) None of these
48. What is Brine
 (A) A solution of sugar and water (B) A solution of salt and water
 (C) A solution of vinegar and water (D) An additive used in food processing

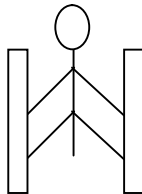
49. The most economical way of drying fruits and vegetables is
 (A) Solar drying (B) Oven drying
 (C) Mechanical drying (D) None of these
50. Preservative used in tomato Ketchup is
 (A) Potassium Metabisulphite (B) Sodium Benzoate
 (C) Citric acid (D) None of these
51. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
52. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
53. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
54. A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

55.



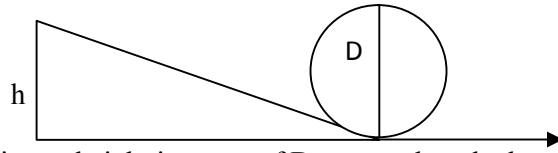
- (A) 140N (B) 120N
 (C) 100N (D) 80N

56. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

57.

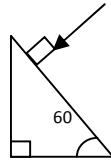


Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$
58. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$
59. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) $75/2$ kg
60. g at a depth of 1600 km inside the earth in m/s^2 is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
61. A block of mass $19M$ is suspended by a string of length $1m$. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
62. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
63. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
64. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
65. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$

66. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
67. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g = 10 \text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
68. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
69. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
70. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
71. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
72. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
73. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
74. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
75. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
76. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
77. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s

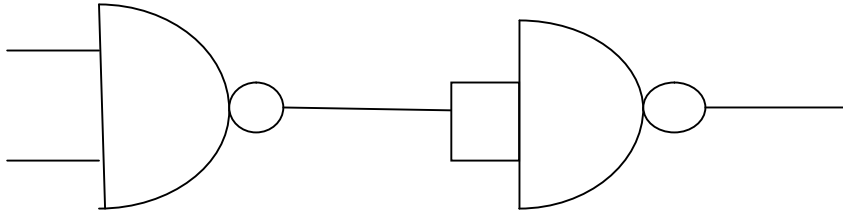
78. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) Q
79. A capacitor of $1 \mu\text{F}$ is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
80. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change
81. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75
82. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ration of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
83. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
84. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
85. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA
86. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
 (A) infinity (B) zero
 (C) radio wave (D) X ray
87. Which among the following series gives visible light?
 (A) Lyman (B) Balmer
 (C) Brackett (D) None of these

88. Identify the logic operation performed by this circuit

A



B

- (A) AND
(C) NAND

- (B) OR
(D) NOR

89. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.

- (A) $4.54 \times 10^9 \text{ m}^{-3}$
(C) $1.5 \times 10^{16} \text{ m}^{-3}$

- (B) $4.95 \times 10^{22} \text{ m}^{-3}$
(D) $5 \times 10^{28} \text{ m}^{-3}$

90. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

- (A) $4.5 \times 10^5 \text{ N/C}$
(C) $4.5 \times 10^{-5} \text{ N/C}$

- (B) $4.5 \times 10^5 \text{ NC}$
(D) $4.5 \times 10^{-5} \text{ NC}$

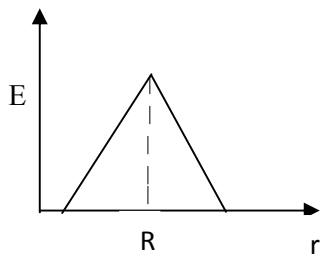
91. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to

- (A) Only inside charges
(C) All the charges

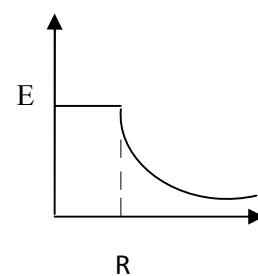
- (B) Only outside charges
(D) Cannot determine

92. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

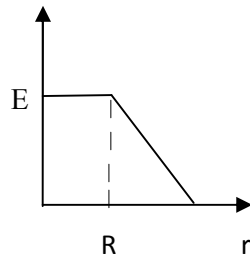
(A)



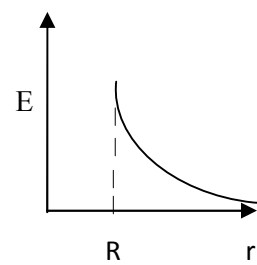
(B)



(C)

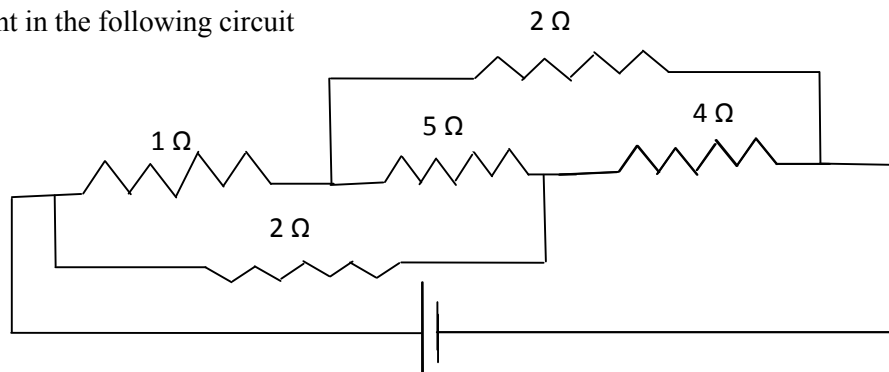


(D)



93. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?
 (A) 3 (B) 6
 (C) 9 (D) 12
94. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.
 (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s
95. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be
 (A) 0.5 (B) 1
 (C) 2 (D) 3
- 96.

Find current in the following circuit



- (A) 1A (B) 2A
 (C) 3A (D) 4A
97. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find the midpoint of the axis between them if same current I flows through both loops.
 (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
98. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
 (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
99. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.

- (A) 1H (B) 2H
(C) 3H (D) 4H
100. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
(A) 500 (B) 800
(C) 900 (D) 1000
101. Among the following, the most stable complex is
(A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
(C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
102. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
(A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
(C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
103. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
(A) ABO_3 (B) A_3BO
(C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
104. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
(A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law
(B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
(C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law
(D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
105. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
(A) formaldehyde < methane < carbon dioxide < argon
(B) formaldehyde < carbon dioxide < methane < argon
(C) argon < carbon dioxide < methane < formaldehyde
(D) argon < methane < carbon dioxide < formaldehyde
106. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
(A) 3F (B) 4F
(C) 6F (D) 5F
107. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
(A) This redox couple is a stronger reducing agent than H^+/H_2 couple
(B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple

- (C) Ag can displace H₂ from acid (D) Ag can displace H₂ from base
108. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
 (A) A decrease in surface area (B) A decrease in ΔH for the reaction
 (C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.
109. Which of the following statements is not correct?
 (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease (B) The instantaneous rate a reaction is same at any time during the reaction
 (C) For a zero order reaction the concentration of reactants remains changed with passage of time (D) The rate of a reaction decreases with increase in concentration of reactant (s)
110. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
 (A) H₂ (33K) (B) CH₄ (190K)
 (C) SO₂ (630K) (D) CO₂ (304K)
111. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
 i. When $1/n=0$, the adsorption is independent of pressure.
 ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 iii. When $1/n=0$, the adsorption is directly proportional to pressure.
 iv. When $n=0$, plot of x/m vs p is a curve
 (A) i and ii (B) ii and iv
 (C) i and iii (D) all are false
112. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
 i. ΔG^0 for the overall reaction is positive
 ii. ΔG^0 for the overall reaction is negative
 iii. E^0 for the overall reaction is positive
 iv. E^0 for the overall reaction is negative
 (A) i and iv (B) i and iii
 (C) ii and iii (D) iii and iv
113. Which of the following pairs of ions are isoelectronic and isostructural ?
 (A) NO₂⁺ and NO₃⁻ (B) ClO₃⁻ and ICl₄⁻
 (C) XeO₃²⁻ and PCl₃ (D) ClO₃⁻ and SO₃²⁻
114. Which of the following hydrides is the strongest reducing agent?
 (A) NH₃ (B) PH₃
 (C) AsH₃ (D) SbH₃
115. Consider the reactions,
 i. Zn + Conc. HNO₃ (hot) \longrightarrow Zn (NO₃)₂ + X + H₂O

- ii. $\text{Zn} + \text{dil. HNO}_3 \text{ (cold)} \rightarrow \text{Zn (NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
Compounds X and Y are, respectively
- (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
(C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
116. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
(A) 1 (B) 2
(C) 3 (D) 5
117. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
(A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
(C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
118. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
(A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
(C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
119. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
(A) 2-Ethoxypentane (B) Pent-1-ene
(C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
120. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
(A) Chloroethane (B) Isopropyl chloride
(C) Chlorobenzene (D) Benzyl chloride
121. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
(A) 8 (B) 2
(C) 4 (D) 6
122. 2-Methoxy-2-methylpropane on heating with HI produces:
(A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
(C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
123. The least acidic compound among the following is:
(A) o-Nitrophenol (B) m-Nitrophenol
(C) p-Nitrophenol (D) Phenol
124. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
(A) 2-Butanone (B) 2-Pentanone
(C) 3-Pentanone (D) Propanone
125. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
(A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
(C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
126. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
(A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
(C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$

127.
$$\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$$
- In the above sequence, Z is:
- (A) cyanoethane (B) ethanamide
(C) methanamine (D) ethanamine
128. The attachment of which of the following group at para position in aniline will raise the K_b value?
- (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
(C) $-\text{F}$ (D) $-\text{Br}$
129. Which of the following is an example of globular protein?
- (A) myosin (B) collagen
(C) keratin (D) Haemoglobin
130. Which one of the following is synthesized in our body by sun rays?
- (A) Vitamin D (B) Vitamin B
(C) Vitamin K (D) Vitamin A
131. Caprolactum is the starting material for the synthesis of
- (A) Nylon-6 (B) Nylon6,6
(C) Terylene (D) Nylon 10
132. The species which can serve as an initiator for cationic polymerization is
- (A) Lithium aluminium hydride (B) Nitric acid
(C) Aluminium chloride (D) BuLi
133. Aspirin is an:
- (A) analgesic (B) antipyretic
(C) antimalarial (D) Both analgesic and antipyretic
134. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
- (A) Half of its atomic mass (B) One third of its atomic mass
(C) Same as atomic mass (D) One fourth of its atomic mass
135. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
- (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
(C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
136. The correct sequence of atomic radii is:
- (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
(C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
137. In which of the following, the bond angle around the central atom is maximum?
- (A) NH_3 (B) NH_4^+
(C) PCl_3 (D) SCl_2
138. Which of the following molecule does not exist
- (A) NF_3 (B) NF_5
(C) PF_5 (D) N_2H_4
139. If helium is allowed to expand in vacuum, it liberates heat because
- (A) It is an inert gas (B) It is an ideal gas
(C) Its critical temp. is low (D) It is a light gas
140. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two

- reactions,
- (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
141. If the bond dissociation energies of XY, X₂, Y₂ (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 kJ mol^{-1} , the bond dissociation energy of X₂ will be:
 (A) 400 kJ mol^{-1} (B) 300 kJ mol^{-1}
 (C) 200 kJ mol^{-1} (D) 100 kJ mol^{-1}
142. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
143. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
144. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
145. 30-volume hydrogen peroxide means:
 (A) 30% H₂O₂ by volume (B) 30g of H₂O₂ solution containing 1g of it
 (C) 1 cm³ of solution liberates 30 cm³ of O₂ gas at STP (D) 30 cm³ of the solution contains one mole of H₂O₂
146. The correct sequence of covalent character is represented by:
 (A) LiCl < NaCl < BeCl₂ (B) BeCl₂ < LiCl < NaCl
 (C) NaCl < LiCl < BeCl₂ (D) BeCl₂ < NaCl < LiCl
147. Which of the following is known as pyrene?
 (A) CCl₄ (B) CS₂
 (C) S₂Cl₂ (D) Solid CO₂
148. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
149. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) Cis-2-Butene
 (C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
150. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
151. Crossing over occurs in meiosis I during:
 (A) Metaphase (B) Telophase
 (C) Anaphase (D) Pachytene

152. Power house of the cell:
 (A) Golgi body (B) Ribosomes
 (C) Mitochondria (D) Lysosomes
153. Genetics is the study of:
 (A) Heredity (B) Variation
 (C) Both A and B (D) None of these
154. In sex -linked inheritance, characters are passed from father to the grandsons through his:
 (A) Daughter (B) Son
 (C) Both daughter and son (D) Any of them
155. Which of the following bases is not present in RNA:
 (A) Uracil (B) Thymine
 (C) Adenine (D) Cytosine
156. Mendel's principle of independent assortment can be demonstrated through:
 (A) Monohybrid cross (B) Dihybrid cross
 (C) Both A and B (D) Any of them
157. On hydrolysis, maltose gives
 (A) glucose + glucose (B) glucose + lactose
 (C) glucose + fructose (D) glucose + galactose
158. A dipeptide has ----- peptide bonds.
 (A) Three (B) One
 (C) Two (D) None of them
159. Which vitamin can be synthesized by green plants and various micro-organisms but not by mammals?
 (A) Ascorbic acid (B) Pantothenic acid
 (C) Thiamine (D) Retinol
160. Bacterial cell wall is made up of:
 (A) Chitin (B) Cellulose
 (C) Peptidoglycan (D) All the above
161. Plant viruses are generally of:
 (A) RNA (B) DNA
 (C) mRNA (D) tRNA
162. Gram positive aerobic, filamentous bacteria with hyphae are known as:
 (A) Algae (B) Actinomycetes

- (C) Bacteria (D) Fungi
163. Conversion of organic matter in to simple inorganic forms is called:
(A) Immobilization (B) Mineralization
(C) CO_2 fixation (D) Nitrification
164. Excess carbon ($> \text{C/N}$ ratio) leads to rate of decomposition:
(A) Slow (B) Fast
(C) Optimum (D) None
165. N_2 fixing cells of cyanobacteria are known as:
(A) Cyst (B) Akinetes
(C) Spores (D) Heterocyst
166. Livestock is important source of:
(A) Milk (B) Meat
(C) Manure (D) All of these
167. Dairy cattle and buffalo can be called as:
(A) Caprine (B) Ovine
(C) Bovine (D) Equine
168. Best breed of buffalo in India:
(A) Nili Ravi (B) Murrah
(C) Surti (D) Toda
169. Best layer poultry strain is:
(A) WLH (B) Minorca
(C) Karaknath (D) Sutlez
170. Normal birth weight (Kg) of healthy buffalo calf is:
(A) 20 (B) 30
(C) 40 (D) 50
171. Number of teats in buffalo:
(A) 2 (B) 4
(C) 6 (D) 8
172. Dry matter requirement (kg) of a cow weighing 400 kg is:
(A) 8 (B) 10
(C) 12 (D) 14
173. Green fodder requirement of adult cattle (kg):
(A) 30 (B) 40
(C) 50 (D) 60

174. Which of the following crops is the best for hay making:
(A) Jowar (B) Bajra
(C) Berseem (D) Oat
175. Normal body temperature of healthy poultry bird (°F):
(A) 37.0 (B) 98.6
(C) 107.0 (D) 117.0
176. ICAR-National Dairy Research Institute (NDRI) is located at:
(A) Karnal (B) New Delhi
(C) Bareilly (D) Anand
177. Excessive gas accumulation in rumen indicates:
(A) Impaction (B) Bloat
(C) Milk fever (D) Foot and Mouth Disease
178. Most fatal disease in farm animals is:
(A) Foot and Mouth Disease (B) HS
(C) Rinderpest (D) Anthrax
179. Semen is stored in liquid nitrogen at (°C):
(A) -79 (B) -196
(C) 79 (D) 196
180. During Artificial Insemination (AI) semen should be deposited
(A) Vagina (B) Cervix
(C) Uterus (D) Fallopian tube
181. Seeds of groundnut contain about:
(A) 25% oil and 50% protein (B) 20% oil and 40% protein
(C) 40% oil and 40% protein (D) 50% oil and 25% protein
182. Organic carbon is a measure of
(A) Available nitrogen in soil (B) Available nutrient in soil
(C) Excess of carbon in soil (D) Excess of iron in soil
183. Which among the following element is considered immobile in the plant
(A) Calcium (B) Phosphorus
(C) Nitrogen (D) Magnesium
184. Which among the following is recommended variety of durum wheat:
(A) HD 2960 (B) WH 896

- (C) PBW 725 (D) WH 711
185. Recommended dose of nutrients for berseem (kg/acre) is:
 (A) 10 kg N, 28 kg P₂O₅ (B) 40 kg N, 25 kg P₂O₅
 (C) 20 kg N, 40 kg P₂O₅ (D) 20 kg N, 20 kg P₂O₅
186. Optimum row spacing for cotton is:
 (A) 50 cm (B) 60 cm
 (C) 67.5 cm (D) 75 cm
187. Optimum sowing time of summer moong in the state is:
 (A) March (B) Second fortnight of February
 (C) First fortnight of April (D) End June-early July
188. 'White alkali' soil refers to:
 (A) Acid soil (B) Saline soil
 (C) Salina sodic soil (D) Sodic soil
189. The exchange sodium percentage (ESP) of alkali soils is always:
 (A) More than 15 (B) Any value
 (C) Less than 15 (D) Less than 7.5
190. ICAR-Central Arid Zone Research Institute is located at:
 (A) Nagpur (B) Hyderabad
 (C) New Delhi (D) Jodhpur
191. India is divided in to ----- ecological zones.
 (A) 12 (B) 10
 (C) 15 (D) 20
192. Recommended seed rate (kg/ha) of dhaincha or sunhemp for green manuring is:
 (A) 20 (B) 30
 (C) 40 (D) 50
193. Recommended seed rate for *spring* season mungbean is
 (A) 15-20 kg per acre (B) 25-30 kg per hectare
 (C) 15-20 kg per hectare (D) 10 kg per hectare
194. For transplanting of pearl millet (bajra) in Haryana, optimum age of seedlings is:
 (A) Two weeks (B) Three weeks
 (C) Four weeks (D) Five weeks
195. Blind tillage refers to:
 (A) Summer ploughing (B) Primary tillage
 (C) Hoeing before germination (D) Hoeing in standing crop rows
196. Flame photometer is used for the determination of:

- (A) Nitrogen
(C) Potassium
- (B) Phosphorus
(D) Boron
197. Tetrazolium test is conducted to test the:
(A) Physical purity of seed
(C) Viability of seed
- (B) Percentage of weed seeds
(D) Seed germination
198. World Food Day is celebrated on:
(A) 5 June
(C) 28 February
- (B) 20 June
(D) 16 October
199. Which among the following is the best and cheapest method of weed control:
(A) Cultural measures
(C) Biological control
- (B) Herbicide based weed control
(D) Preventive measures
200. Black soils in India belong to soil order:
(A) Alfisol
(C) Vertisol
- (B) Inceptisol
(D) Oxisol

Sr. No.	Question
1.	Which of the following cells in plants show totipotency (A) Xylem vessels (B) Sieve tubes (C) Meristem (D) Cork cells
2.	Father of taxonomy is (A) John Ray (B) Linnaeus (C) Aristotle (D) Lamark
3.	Which of the following has more characters in common (A) Species (B) Genus (C) Class (D) Division
4.	Riccia is a liverwort as it (A) produces liver diseases (B) is present in liver (C) cures liver diseases (D) is like a flat lobed thallus
5.	Gymnosperms are characterized by (A) Large leaves (B) Ciliated sperms (C) Naked ovules (D) Scale leaves
6.	A root parasite is (A) <i>Cuscuta</i> (B) <i>Striga</i> (C) <i>Brassica</i> (D) <i>Ioranthus</i>
7.	Roots that grow from any part of the plant body other than the radicles are (A) Adventitious roots (B) Tap roots (C) Modified roots (D) Aerial roots
8.	Parallel venation is a characteristic of (A) Parasitic plants (B) Xerophytic plants (C) Legumes (D) Grasses
9.	A bisexual flower which never opens in its life span is called (A) Cleistogamus (B) Heterogamus (C) Homogamus (D) Dichogamus
10.	Quiescent centre is located in (A) Shoot apex (B) Root apex (C) Leaf apex (D) Bud apex
11.	Casparian strips occur in the cells of (A) Epidermis (B) Exodermis (C) Endodermis (D) Hypodermis
12.	Vascular bundles are absent in (A) Monocots (B) Dicots (C) Gymnosperms (D) Pteridophytes
13.	Aerenchyma is derived from (A) Parenchyma (B) Sclerenchyma (C) Phloem (D) Xylem
14.	Vascular bundle having cambium is (A) closed (B) open (C) conjoint (D) collateral
15.	What do you eat in coconut (A) Embryo (B) Mesocarp (C) Entire seed (D) Fruit wall
16.	Phyllode is a modification of (A) Flower (B) Bud (C) Root (D) Petiole

17. Fingermillet is
 (A) *Eleusine* (B) *Setaria*
 (C) *Pennisetum* (D) *Sorghum*
18. Microsporophyll of *Cycas* is equivalent to----- of angiosperms
 (A) Sepal (B) Stamen
 (C) Ovary (D) Ovule
19. Jackfruit is an example of
 (A) Multiple fruit (B) Aggregate fruit
 (C) Simple fruit (D) None of these
20. Anther wall in angiosperms contain how many wall layers
 (A) 3 (B) 4
 (C) 5 (D) 6
21. If an endosperm cell of angiosperm has 36 chromosomes, the root cell should have
 (A) 18 (B) 16
 (C) 4 (D) 24
22. Amino acid synthetase enzyme is activated by
 (A) Mg (B) Cu
 (C) Zn (D) Fe
23. Number of net gain ATP in aerobic respiration is
 (A) 2 (B) 42
 (C) 38 (D) 41
24. One glucose molecule partially oxidized in anaerobic respiration produces
 (A) 30 ATPs (B) 38 ATPs
 (C) 2 ATPs (D) 15 ATPs
25. In forest ecosystem green plants are
 (A) Primary consumers (B) Primary producers
 (C) Decomposers (D) None of these
26. The largest cell in the embryo sac is
 (A) Central cell (B) Egg
 (C) Synergids (D) None of these
27. Double membrane is absent in
 (A) Mitochondria (B) Chloroplast
 (C) Peroxisome (D) Golgi body
28. DNA content is doubled in ----- stage of cell division
 (A) Prophase (B) Metaphase
 (C) G₁-phase (D) S- phase
29. A group of individuals of different species is called
 (A) Population (B) Community
 (C) Biome (D) None of these
30. Purines are
 (A) Adenine and Guanine (B) Guanine and Cytosine
 (C) Thymine and Cytocine (D) Adenine and Thymine
31. The pigment which is absent in chloroplast is
 (A) Chlorophyll 'a' (B) Chlorophyll 'b'
 (C) Xanthophyll (D) Anthocyanine
32. Rate of transpiration is measured by
 (A) Manometer (B) Potometer
 (C) Auxanometer (D) None of these
33. The site of primary photochemical reaction is
 (A) Stroma (B) Grana
 (C) Periplast cavity (D) Inner layer

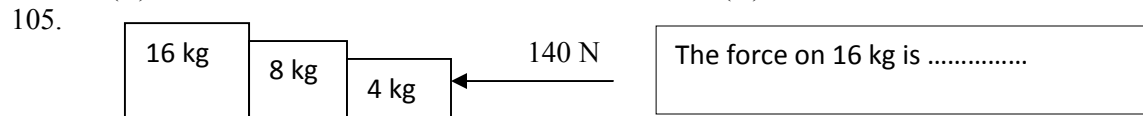
34. Father of green revolution in India is
 (A) N. Borlaug (B) K.C. Mehta
 (C) M.S. Swaminathan (D) None of these
35. Plants which grow in shade are
 (A) Sciophytes (B) Heliophytes
 (C) Halophytes (D) Psamophytes
36. The amount of living material in different trophic levels is called
 (A) Standing crop (B) Standing state
 (C) Dry weight (D) Biomass
37. In pond ecosystem pyramid of number is always
 (A) Straight (B) Linear
 (C) Upright (D) Inverted
38. Vegetation dominated by shrubs with few tall trees is called
 (A) Serule (B) Marsh
 (C) Grassland (D) Forest
39. Total energy produced during photosynthesis is called
 (A) Total biomass (B) Net biomass
 (C) Net primary production (D) Gross primary production
40. Secondary producers of the ecosystem are
 (A) Green plants (B) Primary consumers
 (C) Top consumers (D) None of these
41. The chemical knives of DNA are
 (A) Ligases (B) Polymerases
 (C) Endonucleases (D) Transcriptases
42. The Indian variety of rice patented by an American company is
 (A) IR 8 (B) Jaya
 (C) Sona masoori (D) Basmati
43. Pusa Komal is a variety of
 (A) Cowpea (B) Wheat
 (C) Brassica (D) Chilli
44. The stalk of the ovule that attaches it to the placenta in angiosperms is
 (A) Pedicel (B) Funiculus
 (C) Integument (D) Hilum
45. Vallisneria usually favours
 (A) Zoophily (B) Entomophily
 (C) Hydrophily (D) Anemophily
46. An example of single cell protein is
 (A) Spirulina (B) Volvox
 (C) Spirogyra (D) Chlamydomonas
47. Which forest is named as the “Lungs of the planet”?
 (A) Western ghats (B) Eastern ghats
 (C) Amazon rain forest (D) Sahara desert
48. The earth summit held at Rio de Janeiro was in the year
 (A) 1986 (B) 1902
 (C) 1992 (D) 1996
49. Lignified cell wall occurs in
 (A) Epidermal cells (B) Cambial cells
 (C) Phloem cells (D) Xylem cells

50. A slide of TS dicot stem shows
 (A) Scattered vascular bundles (B) Vascular bundles arranged in a ring
 (C) Radial vascular bundles (D) Closed vascular bundles
51. Once formed, red blood cells normally have an average life span of
 (A) 30 days (B) 60 days
 (C) 90 days (D) 120 days
52. Heparin, an anticoagulant is manufactured by
 (A) Plasma cells (B) Mast cells
 (C) Lymphocytes (D) Blood platelets
53. Function of long bones in mammals is to
 (A) Provide support only (B) Provide support and production of RBC only
 (C) Provide support and production of WBC only (D) Provide support and production of RBC and WBC
54. Binocular vision is seen in
 (A) Man (B) Rabbit
 (C) Rat (D) Guinea pig
55. Spermatogenesis is influenced by
 (A) Testosterone (B) Luteinizing hormone
 (C) FSH (D) All of these
56. The type of respiration found in man is
 (A) Cutaneous (B) Subcutaneous
 (C) Pulmonary (D) Diffusion
57. What happens if RBCs are put in a hypertonic solution
 (A) They will contract and loose water (B) They will swell up and burst
 (C) They will show clumping (D) None of these
58. In man, urea is formed in the
 (A) Body tissues (B) Kidney
 (C) Liver (D) Spleen
59. Which of the following stood erect first
 (A) Java man (B) Peking man
 (C) Australopithecus (D) Cro-Magnon man
60. The first autotrophs on the earth were
 (A) Viruses (B) Bacteria
 (C) Green algae (D) Blue green algae
61. The 'Use and disuse' principle of evolution was proposed by
 (A) Lamarck (B) Weisman
 (C) Hugo de Vries (D) Charles Darwin
62. The following is an example of inborn error in metabolism
 (A) Spina bifida (B) Phenylketonuria
 (C) Phocomelia (D) Mongolism
63. Identical twins develop from
 (A) One ovum and two sperms (B) Two ova and one sperm
 (C) Two ova and two sperms (D) None of these
64. The chromosomes are best studied at the following stage of mitosis
 (A) Prophase (B) Metaphase
 (C) Anaphase (D) Telophase
65. A monosomic individual can be mathematically represented as
 (A) $2n-2$ (B) $2n+1$
 (C) $2n-1$ (D) $2n-4$

66. In a fruit fly, a white eyed XXY female is mated to a red eyed XY male. The female progeny would be
 (A) All red eyed (B) All white eyed
 (C) Mainly red eyed with a few white eyed (D) Mainly white eyed with a few red eyed
67. One of the following is a sex linked trait in humans
 (A) Curly hairs (B) Sickle cell anemia
 (C) Colour blindness (D) Down's syndrome
68. First experimental evidence for triplet code was given by
 (A) Nirenberg (B) H.G. Khorana
 (C) Watson (D) F.H.C. Crick
69. Protein coat virus is known as
 (A) Capsid (B) Capsomere
 (C) Virion (D) Viroid
70. Chemically a gene is
 (A) Nucleoprotein (B) Polypeptide
 (C) Ribonucleic acid (D) Polynucleotide
71. Apes differ from man in having
 (A) Arms shorter than legs (B) Legs shorter than arms
 (C) Length of arms and legs is similar (D) A tail
72. The disease transmitted through sexual contact is
 (A) Measles (B) Syphilis
 (C) Polio (D) Small pox
73. Hypersensitivity of tissue occurs in
 (A) Cancer (B) Malaria
 (C) Allergy (D) Small pox
74. The sporozoites of malarial parasites are stored in
 (A) Liver of man (B) Blood of man
 (C) Stomach of females anopheles (D) Salivary glands of female anopheles
75. The following plant has male and female reproductive parts in the same flower
 (A) Papaya (B) Datepalm
 (C) Cycas (D) Datura
76. Opium is derived from
 (A) Latex of *Papaver somniferum* (B) Seeds of *Papaver somniferum*
 (C) Seeds of *Coffea arabica* (D) Leaves of datura
77. *Penicillium* was first isolated from
 (A) *Penicillium nigricans* (B) *Penicillium chrysogenum*
 (C) *Penicillium notatum* (D) *Penicillium griseofulvum*
78. Which of the following is an implant?
 (A) Blood dialyzer (B) Heart valve
 (C) Artificial limbs (D) Oxygenator
79. Chemical nature of jute fibre is
 (A) Lignin (B) Cellulose
 (C) Pectin (D) Suberin
80. The conversion of molecular nitrogen to ammonia is known as
 (A) Nitrification (B) Denitrification
 (C) Ammonification (D) Nitrogen fixation
81. Cocaine is a powerful stimulant of
 (A) Heart beat (B) Central nervous system
 (C) Muscles (D) Breathing

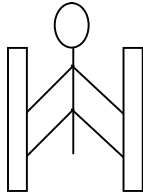
82. Diagnosis of typhoid is done by
 (A) ESR (B) ELISA test
 (C) DLC (D) WIDAL test
83. Scientific study of human population is called
 (A) Demography (B) Geography
 (C) Anthropology (D) Biogeography
84. Vinegar is obtained due to biological activity of
 (A) Acetobactor (B) Lactobacillus
 (C) Nostoc (D) Anabaena
85. The following disease involves change in chromosome number
 (A) Colour blindness (B) Haemophilia
 (C) Down's syndrome (D) Jaundice
86. Ringworm disease is caused by
 (A) Annelid (B) Helminthes
 (C) A fungus (D) A bacterium
87. The open type of circulatory system is found in
 (A) Nereis (B) Octopus
 (C) Prawn (D) Frog
88. The process of translation is
 (A) Ribosome synthesis (B) Protein synthesis
 (C) DNA synthesis (D) RNA synthesis
89. Dengue is transmitted by
 (A) Culex (B) Male anopheles
 (C) Aedes (D) Female anopheles
90. Young of cockroach is called
 (A) Ephyra (B) Nymph
 (C) Maggot (D) Juvenile
91. Number of mitotic divisions required to produce 128 cells from a single cell is
 (A) 7 (B) 14
 (C) 16 (D) 32
92. Distance between two adjacent nitrogen bases of DNA is
 (A) 2.4 \AA (B) 3.4 \AA
 (C) 24 \AA (D) 34 \AA
93. In addition to the nucleus, DNA also occurs in
 (A) Mitochondria (B) Lysosome
 (C) Ribosome (D) Golgi apparatus
94. First photosynthetic organisms to develop on earth were
 (A) Bacteria (B) Diatoms
 (C) Cyanobacteria (D) Green algae
95. The vector for causing sleeping sickness in man is
 (A) House fly (B) Tse-Tse fly
 (C) Butterfly (D) Mosquito
96. Chromosomes are stained with
 (A) Saffranine (B) Acetocarmine
 (C) Schiff's reagent (D) Ethanol
97. The universal recipient blood group is
 (A) A (B) AB
 (C) O (D) B
98. Arsenic pollutant in drinking water causes
 (A) Liver and lung diseases (B) Paralysis
 (C) Kidney diseases (D) Cancer

99. In the colony of *Apis indica*, the one formed by parthenogenesis is
 (A) Queen (B) Worker
 (C) Drone (D) Both B and C
100. The pollutant responsible for chromosomal mutations in man is
 (A) Lead (B) Manganese
 (C) Arsenic (D) Mercury
101. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
102. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
103. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
104. A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000



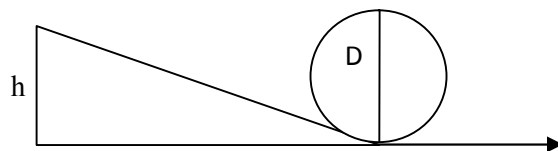
- (A) 140N (B) 120N
 (C) 100N (D) 80N

106. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

107.



Find minimum height in terms of D to complete the loop

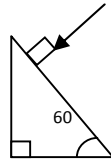
- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$

108. Gravitational force between two bodies is F. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be

- (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$

109. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) 75/2 kg
110. g at a depth of 1600 km inside the earth in m/s/s is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
111. A block of mass $19M$ is suspended by a string of length $1m$. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
112. A rubber ball falls from a height of $4m$ and rebounds to $1.5m$. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
113. 25 kg of sand is deposited each second on a conveyor belt moving at $10m/s$. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
114. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
115. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
116. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
117. The level of water in a tank is $5m$. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s/s}$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
118. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
119. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
120. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g=10\text{ m/s/s}$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4\text{ cm}^2$ (D) $2 \times 10^{10}\text{ cm}^2$
121. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit

122. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
123. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
124. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
125. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
126. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) 7.5×10^{-7} Wb (B) 1.6×10^{-7} Wb
 (C) 3×10^{-7} Wb (D) 1.5×10^{-7} Wb
127. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) 1/100 s (B) 1/200 s
 (C) 1/500 s (D) 1 s
128. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) 1/C (D) q
129. A capacitor of 1 μ F is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
130. An electromagnetic wave is travelling in vacuum with a speed of 3×10^8 m/s. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8$ m/s (B) 1.5×10^8 m/s
 (C) 2×10^8 m/s (D) No change
131. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.

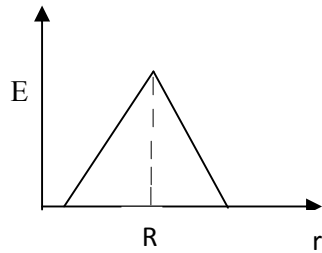


- (A) 30 (B) 45
 (C) 60 (D) 75
132. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49

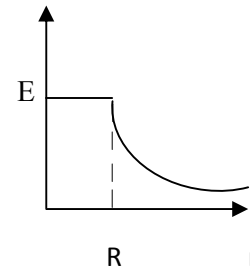
133. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
134. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
135. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA
136. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
 (A) infinity (B) zero
 (C) radio wave (D) X ray
137. Which among the following series gives visible light?
 (A) Lyman (B) Balmer
 (C) Brackett (D) None
138. Identify the logic operation performed by this circuit
 A
-
- B
- (A) AND (B) OR
 (C) NAND (D) NOR
139. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.
 (A) $4.54 \times 10^9 \text{ m}^{-3}$ (B) $4.95 \times 10^{22} \text{ m}^{-3}$
 (C) $1.5 \times 10^{16} \text{ m}^{-3}$ (D) $5 \times 10^{28} \text{ m}^{-3}$
140. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
 (A) $4.5 \times 10^5 \text{ N/C}$ (B) $4.5 \times 10^5 \text{ NC}$
 (C) $4.5 \times 10^{-5} \text{ N/C}$ (D) $4.5 \times 10^{-5} \text{ NC}$
141. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to
 (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine

142. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

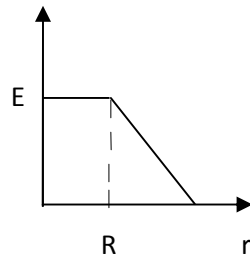
(A)



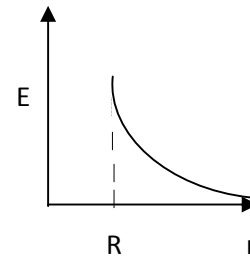
(B)



(C)



(D)



143. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?

(A) 3

(B) 6

(C) 9

(D) 12

144. An inductor of $5H$ carries a steady current of $2A$. In what time if the current is made zero can a $40V$ self induced emf be produced in the inductor.

(A) $2s$

(B) $1s$

(C) $0.5s$

(D) $0.25s$

145. A cell of emf E and internal resistance r gives $0.5A$ with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

(A) 0.5

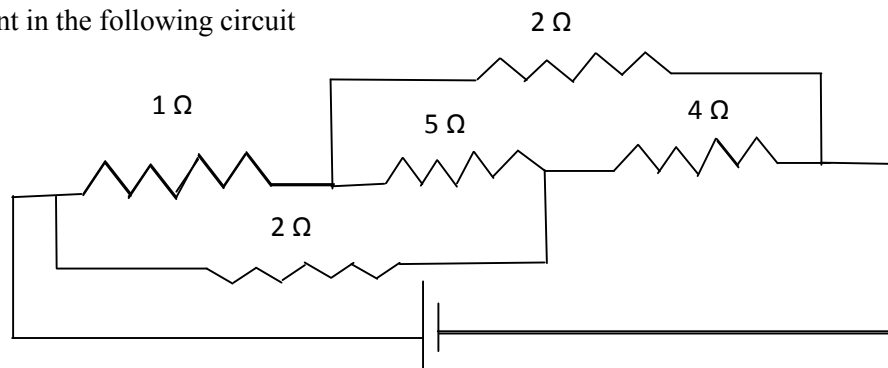
(B) 1

(C) 2

(D) 3

146.

Find current in the following circuit



(A) $1A$

(B) $2A$

(C) $3A$

(D) $4A$

147. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
148. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
149. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
150. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
151. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
152. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
153. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
154. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
155. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde
156. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F (B) 4F
 (C) 6F (D) 5F

157. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple
 (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
 (C) Ag can displace H_2 from acid
 (D) Ag can displace H_2 from base
158. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area
 (B) A decrease in ΔH for the reaction
 (C) A decrease in the fraction of particles possessing sufficient energy
 (D) The introduction of an alternative pathway with greater activation energy.
159. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
 (B) The instantaneous rate a reaction is same at any time during the reaction
 (C) For a zero order reaction the concentration of reactants remains changed with passage of time
 (D) The rate of a reaction decreases with increase in concentration of reactant (s)
160. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
 (B) CH_4 (190K)
 (C) SO_2 (630K)
 (D) CO_2 (304K)
161. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
 ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 iii. When $1/n=0$, the adsorption is directly proportional to pressure.
 iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
 (B) ii and iv
 (C) i and iii
 (D) all are false
162. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
 ii. ΔG^0 for the overall reaction is negative
 iii. E^0 for the overall reaction is positive
 iv. E^0 for the overall reaction is negative
- (A) i and iv
 (B) i and iii
 (C) ii and iii
 (D) iii and iv
163. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^-
 (B) ClO_3^- and ICl_4^-
 (C) XeO_3^{2-} and PCl_3
 (D) ClO_3^- and SO_3^{2-}
164. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3
 (B) PH_3
 (C) AsH_3
 (D) SbH_3

165. Consider the reactions,
- $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 - $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
- Compounds X and Y are, respectively
- (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
 (C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
166. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1 (B) 2
 (C) 3 (D) 5
167. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
168. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
169. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
170. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
- (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
171. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
- (A) 8 (B) 2
 (C) 4 (D) 6
172. 2-Methoxy-2-methylpropane on heating with HI produces:
- (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
173. The least acidic compound among the following is:
- (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
174. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
- (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
175. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
- (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$

176. The carboxylic acid that does not undergo Hell-Vohland-Zelinsky reaction is:
 (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
177. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
178. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
179. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
180. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
181. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
182. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
183. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
184. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
185. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
186. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
187. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
188. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4

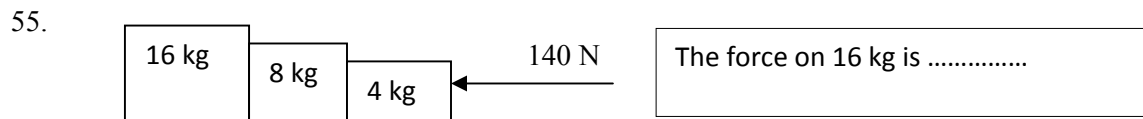
189. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
190. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
191. If the bond dissociation energies of XY, X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f \text{H}$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
192. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
193. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
194. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
195. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
196. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
197. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
198. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
199. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) cis-2-Butene
 (C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
200. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane

Sr. No.	Question
1.	Once formed, red blood cells normally have an average life span of (A) 30 days (B) 60 days (C) 90 days (D) 120 days
2.	Heparin, an anticoagulant is manufactured by (A) Plasma cells (B) Mast cells (C) Lymphocytes (D) Blood platelets
3.	Function of long bones in mammals is to (A) Provide support only (B) Provide support and production of RBC only (C) Provide support and production of WBC only (D) Provide support and production of RBC and WBC
4.	Binocular vision is seen in (A) Man (B) Rabbit (C) Rat (D) Guinea pig
5.	Spermatogenesis is influenced by (A) Testosterone (B) Luteinizing hormone (C) FSH (D) All of these
6.	The type of respiration found in man is (A) Cutaneous (B) Subcutaneous (C) Pulmonary (D) Diffusion
7.	What happens if RBCs are put in a hypertonic solution (A) They will contract and loose water (B) They will swell up and burst (C) They will show clumping (D) None of these
8.	In man, urea is formed in the (A) Body tissues (B) Kidney (C) Liver (D) Spleen
9.	Which of the following stood erect first (A) Java man (B) Peking man (C) Australopithecus (D) Cro-Magnon man
10.	The first autotrophs on the earth were (A) Viruses (B) Bacteria (C) Green algae (D) Blue green algae
11.	The 'Use and disuse' principle of evolution was proposed by (A) Lamarck (B) Weisman (C) Hugo de Vries (D) Charles Darwin
12.	The following is an example of inborn error in metabolism (A) Spina bifida (B) Phenylketonuria (C) Phocomelia (D) Mongolism
13.	Identical twins develop from (A) One ovum and two sperms (B) Two ova and one sperm (C) Two ova and two sperms (D) None of these
14.	The chromosomes are best studied at the following stage of mitosis (A) Prophase (B) Metaphase (C) Anaphase (D) Telophase

15. A monosomic individual can be mathematically represented as
 (A) $2n-2$ (B) $2n+1$
 (C) $2n-1$ (D) $2n-4$
16. In a fruit fly, a white eyed XXY female is mated to a red eyed XY male. The female progeny would be
 (A) All red eyed (B) All white eyed
 (C) Mainly red eyed with a few white eyed (D) Mainly white eyed with a few red eyed
17. One of the following is a sex linked trait in humans
 (A) Curly hairs (B) Sickle cell anemia
 (C) Colour blindness (D) Down's syndrome
18. First experimental evidence for triplet code was given by
 (A) Nirenberg (B) H.G. Khorana
 (C) Watson (D) F.H.C. Crick
19. Protein coat virus is known as
 (A) Capsid (B) Capsomere
 (C) Virion (D) Viroid
20. Chemically a gene is
 (A) Nucleoprotein (B) Polypeptide
 (C) Ribonucleic acid (D) Polynucleotide
21. Apes differ from man in having
 (A) Arms shorter than legs (B) Legs shorter than arms
 (C) Length of arms and legs is similar (D) A tail
22. The disease transmitted through sexual contact is
 (A) Measles (B) Syphilis
 (C) Polio (D) Small pox
23. Hypersensitivity of tissue occurs in
 (A) Cancer (B) Malaria
 (C) Allergy (D) Small pox
24. The sporozoites of malarial parasites are stored in
 (A) Liver of man (B) Blood of man
 (C) Stomach of females anopheles (D) Salivary glands of female anopheles
25. The following plant has male and female reproductive parts in the same flower
 (A) Papaya (B) Datepalm
 (C) Cycas (D) Datura
26. Opium is derived from
 (A) Latex of *Papaver somniferum* (B) Seeds of *Papaver somniferum*
 (C) Seeds of *Coffea arabica* (D) Leaves of datura
27. *Penicillium* was first isolated from
 (A) *Penicillium nigricans* (B) *Penicillium chrysogenum*
 (C) *Penicillium notatum* (D) *Penicillium griseofulvum*
28. Which of the following is an implant?
 (A) Blood diasyser (B) Heart valve
 (C) Artificial limbs (D) Oxygenator
29. Chemical nature of jute fibre is
 (A) Lignin (B) Cellulose
 (C) Pectin (D) Suberin
30. The conversion of molecular nitrogen to ammonia is known as
 (A) Nitrification (B) Denitrification
 (C) Ammonification (D) Nitrogen fixation

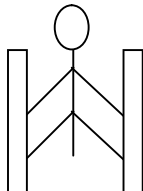
31. Cocaine is a powerful stimulant of
 (A) Heart beat (B) Central nervous system
 (C) Muscles (D) Breathing
32. Diagnosis of typhoid is done by
 (A) ESR (B) ELISA test
 (C) DLC (D) WIDAL test
33. Scientific study of human population is called
 (A) Demography (B) Geography
 (C) Anthropology (D) Biogeography
34. Vinegar is obtained due to biological activity of
 (A) Acetobactor (B) Lactobacillus
 (C) Nostoc (D) Anabaena
35. The following disease involves change in chromosome number
 (A) Colour blindness (B) Haemophilia
 (C) Down's syndrome (D) Jaundice
36. Ringworm disease is caused by
 (A) Annelid (B) Helminthes
 (C) A fungus (D) A bacterium
37. The open type of circulatory system is found in
 (A) Nereis (B) Octopus
 (C) Prawn (D) Frog
38. The process of translation is
 (A) Ribosome synthesis (B) Protein synthesis
 (C) DNA synthesis (D) RNA synthesis
39. Dengue is transmitted by
 (A) Culex (B) Male anopheles
 (C) Aedes (D) Female anopheles
40. Young of cockroach is called
 (A) Ephyra (B) Nymph
 (C) Maggot (D) Juvenile
41. Number of mitotic divisions required to produce 128 cells from a single cell is
 (A) 7 (B) 14
 (C) 16 (D) 32
42. Distance between two adjacent nitrogen bases of DNA is
 (A) 2.4 A° (B) 3.4 A°
 (C) 24 A° (D) 34 A°
43. In addition to the nucleus, DNA also occurs in
 (A) Mitochondria (B) Lysosome
 (C) Ribosome (D) Golgi apparatus
44. First photosynthetic organisms to develop on earth were
 (A) Bacteria (B) Diatoms
 (C) Cyanobacteria (D) Green algae
45. The vector for causing sleeping sickness in man is
 (A) House fly (B) Tse-Tse fly
 (C) Butterfly (D) Mosquito
46. Chromosomes are stained with
 (A) Saffranine (B) Acetocarmine
 (C) Sciff's reagent (D) Ethanol

47. The universal recipient blood group is
 (A) A (B) AB
 (C) O (D) B
48. Arsenic pollutant in drinking water causes
 (A) Liver and lung diseases (B) Paralysis
 (C) Kidney diseases (D) Cancer
49. In the colony of *Apis indica*, the one formed by parthenogenesis is
 (A) Queen (B) Worker
 (C) Drone (D) Both B and C
50. The pollutant responsible for chromosomal mutations in man is
 (A) Lead (B) Manganese
 (C) Arsenic (D) Mercury
51. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
52. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
53. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
54. A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000



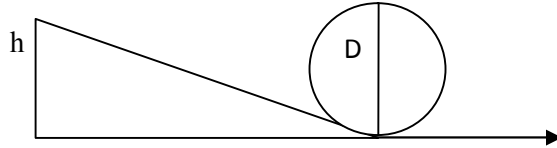
- (A) 140N (B) 120N
 (C) 100N (D) 80N

56. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

57.

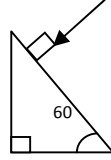


Find minimum height in terms of D to complete the loop

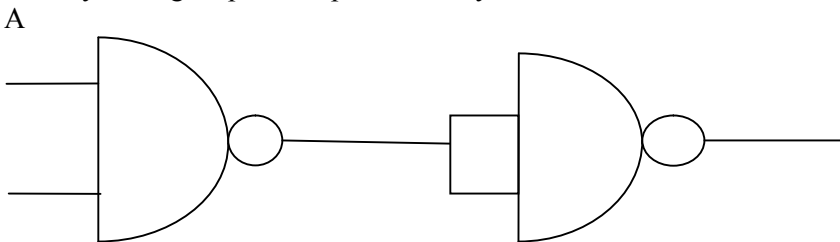
- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$
58. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$
59. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) $75/2$ kg
60. g at a depth of 1600 km inside the earth in m/s^2 is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
61. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
62. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
63. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
64. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
65. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
66. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
67. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
68. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3

69. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
70. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
71. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
72. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
73. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
74. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
75. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
76. A 200 turn coil of self inductance 30 mH carries a current of 5 mA . Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
77. The instantaneous value of current in an AC circuit is $I = 2 \sin(100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s
78. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) q
79. A capacitor of $1 \mu\text{F}$ is charged with 0.01 C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
80. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1 , respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change

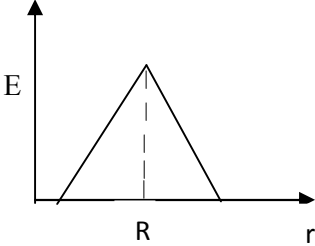
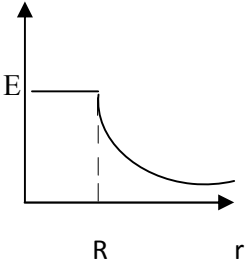
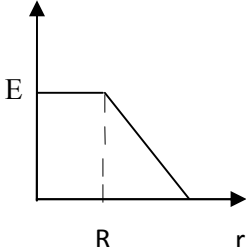
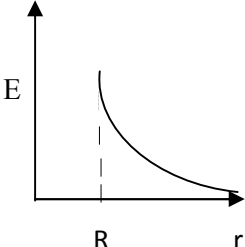
81. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
(C) 60 (D) 75
82. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
(A) 8:1 (B) 64:1
(C) 9:7 (D) 81:49
83. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
(A) 1 mm (B) 1.5 mm
(C) 2 mm (D) 2.5 mm
84. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
(A) 37 (B) 47
(C) 57 (D) 67
85. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
(A) 1.227 \AA (B) 12.27 \AA
(C) 122.7 \AA (D) 1227 \AA
86. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
(A) infinity (B) zero
(C) radio wave (D) X ray
87. Which among the following series gives visible light?
(A) Lyman (B) Balmer
(C) Brackett (D) None
88. Identify the logic operation performed by this circuit

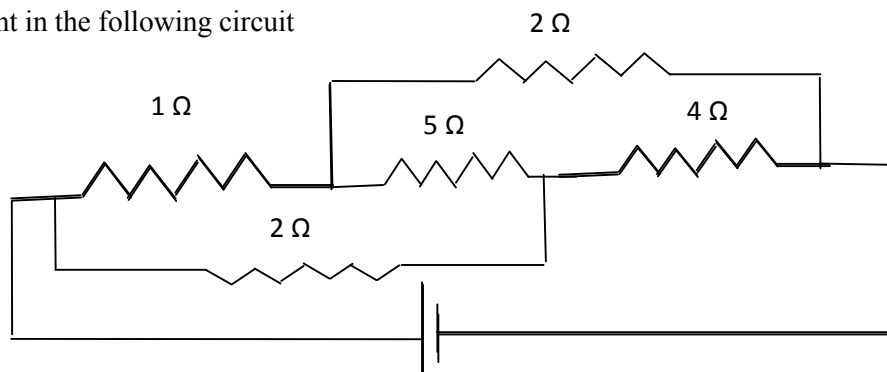


- A
- (A) AND (B) OR
(C) NAND (D) NOR
89. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.
(A) $4.54 \times 10^9 \text{ m}^{-3}$ (B) $4.95 \times 10^{22} \text{ m}^{-3}$
(C) $1.5 \times 10^{16} \text{ m}^{-3}$ (D) $5 \times 10^{28} \text{ m}^{-3}$

90. Two charges $+5\mu C$ and $-5\mu C$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
- (A) $4.5 \times 10^5 \text{N/C}$ (B) $4.5 \times 10^5 \text{NC}$
 (C) $4.5 \times 10^{-5} \text{N/C}$ (D) $4.5 \times 10^{-5} \text{NC}$
91. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to
- (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine
92. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R
- (A)  (B) 
- (C)  (D) 
93. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?
- (A) 3 (B) 6
 (C) 9 (D) 12
94. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.
- (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s
95. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be
- (A) 0.5 (B) 1
 (C) 2 (D) 3

96.

Find current in the following circuit



- (A) 1A (B) 2A
(C) 3A (D) 4A

97. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
 (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
98. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
 (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
99. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
 (A) 1H (B) 2H
 (C) 3H (D) 4H
100. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
 (A) 500 (B) 800
 (C) 900 (D) 1000
101. Among the following, the most stable complex is
 (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
102. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
 (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
103. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
 (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$

104. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law
- (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
- (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law
- (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
105. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon
- (B) formaldehyde < carbon dioxide < methane < argon
- (C) argon < carbon dioxide < methane < formaldehyde
- (D) argon < methane < carbon dioxide < formaldehyde
106. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F
- (B) 4F
- (C) 6F
- (D) 5F
107. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple
- (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
- (C) Ag can displace H_2 from acid
- (D) Ag can displace H_2 from base
108. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area
- (B) A decrease in ΔH for the reaction
- (C) A decrease in the fraction of particles possessing sufficient energy
- (D) The introduction of an alternative pathway with greater activation energy.
109. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
- (B) The instantaneous rate a reaction is same at any time during the reaction
- (C) For a zero order reaction the concentration of reactants remains changed with passage of time
- (D) The rate of a reaction decreases with increase in concentration of reactant (s)
110. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
- (B) CH_4 (190K)
- (C) SO_2 (630K)
- (D) CO_2 (304K)
111. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
- ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
- iii. When $1/n=0$, the adsorption is directly proportional to pressure.
- iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
- (B) ii and iv
- (C) i and iii
- (D) all are false

112. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- ΔG^0 for the overall reaction is positive
 - ΔG^0 for the overall reaction is negative
 - E^0 for the overall reaction is positive
 - E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
(C) ii and iii (D) iii and iv
113. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
(C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}
114. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3 (B) PH_3
(C) AsH_3 (D) SbH_3
115. Consider the reactions,
- $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 - $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
- Compounds X and Y are, respectively
- (A) N_2O , NO (B) NO_2 , NO_2
(C) N_2 , N_2O (D) NO_2 , NO
116. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1 (B) 2
(C) 3 (D) 5
117. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
(C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
118. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
(C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
119. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
(C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
120. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
- (A) Chloroethane (B) Isopropyl chloride
(C) Chlorobenzene (D) Benzyl chloride
121. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
- (A) 8 (B) 2
(C) 4 (D) 6
122. 2-Methoxy-2-methylpropane on heating with HI produces:
- (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
(C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
123. The least acidic compound among the following is:
- (A) o-Nitrophenol (B) m-Nitrophenol
(C) p-Nitrophenol (D) Phenol

124. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula C_3H_6O and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
125. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
126. The carboxylic acid that does not undergo Hell-Vohland-Zelinsky reaction is:
 (A) CH_3COOH (B) $(CH_3)_2CHCOOH$
 (C) $CH_3CH_2CH_2COOH$ (D) $(CH_3)_3CCOOH$
127.
$$C_2H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{P/Br_2} Y \xrightarrow[NH_3]{(excess)} Z$$

 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) Ethanamine
128. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-SO_3H$ (B) $-OH$
 (C) $-F$ (D) $-Br$
129. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
130. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
131. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
132. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
133. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
134. The equivalent mass of iron in the reaction $2Fe + 3Cl_2 \rightarrow 2FeCl_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
135. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
136. The correct sequence of atomic radii is:
 (A) $Na > Mg > Al > Si$ (B) $Al > Si > Na > Mg$
 (C) $Si > Al > Mg > Na$ (D) $Si > Al > Na > Mg$

137. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
138. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
139. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
140. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
141. If the bond dissociation energies of XY , X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f\text{H}$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
142. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
143. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
144. Which of the following species involves the transfer of $5N_A$ electrons per mole of it?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
145. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
146. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
147. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
148. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
149. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) cis-2-Butene
 (C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
150. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane

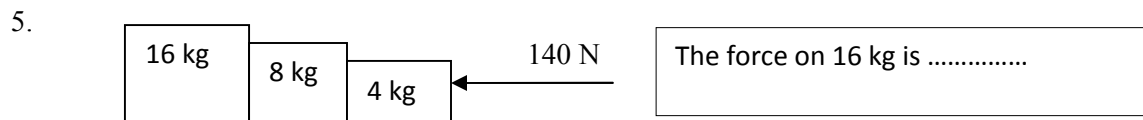
151. Which of the following cells in plants show totipotency
 (A) Xylem vessels (B) Sieve tubes
 (C) Meristem (D) Cork cells
152. Father of taxonomy is
 (A) John Ray (B) Linnaeus
 (C) Aristotle (D) Lamark
153. Which of the following has more characters in common
 (A) Species (B) Genus
 (C) Class (D) Division
154. Riccia is a liverwort as it
 (A) produces liver diseases (B) is present in liver
 (C) cures liver diseases (D) is like a flat lobed thallus
155. Gymnosperms are characterized by
 (A) Large leaves (B) Ciliated sperms
 (C) Naked ovules (D) Scale leaves
156. A root parasite is
 (A) Cuscuta (B) Striga
 (C) *Brassica* (D) *Ioranthus*
157. Roots that grow from any part of the plant body other than the radicles are
 (A) Adventitious roots (B) Tap roots
 (C) Modified roots (D) Aerial roots
158. Parallel venation is a characteristic of
 (A) Parasitic plants (B) Xerophytic plants
 (C) Legumes (D) Grasses
159. A bisexual flower which never opens in its life span is called
 (A) Cleistogamus (B) Heterogamus
 (C) Homogamus (D) Dichogamus
160. Quiescent centre is located in
 (A) Shoot apex (B) Root apex
 (C) Leaf apex (D) Bud apex
161. Casparian strips occur in the cells of
 (A) Epidermis (B) Exodermis
 (C) Endodermis (D) Hypodermis
162. Vascular bundles are absent in
 (A) Monocots (B) Dicots
 (C) Gymnosperms (D) Pteridophytes
163. Aerenchyma is derived from
 (A) Parenchyma (B) Sclerenchyma
 (C) Phloem (D) Xylem
164. Vascular bundle having cambium is
 (A) closed (B) open
 (C) conjoint (D) collateral
165. What do you eat in coconut
 (A) Embryo (B) Mesocarp
 (C) Entire seed (D) Fruit wall
166. Phyllode is a modification of
 (A) Flower (B) Bud
 (C) Root (D) Petiole
167. Fingermillet is
 (A) *Eleusine* (B) *Setaria*
 (C) *Pennisetum* (D) *Sorghum*

168. Microsporophyll of *Cycas* is equivalent to----- of angiosperms
 (A) Sepal (B) Stamen
 (C) Ovary (D) Ovule
169. Jackfruit is an example of
 (A) Multiple fruit (B) Aggregate fruit
 (C) Simple fruit (D) None of these
170. Anther wall in angiosperms contain how many wall layers
 (A) 3 (B) 4
 (C) 5 (D) 6
171. If an endosperm cell of angiosperm has 36 chromosomes, the root cell should have
 (A) 18 (B) 16
 (C) 4 (D) 24
172. Amino acid synthetase enzyme is activated by
 (A) Mg (B) Cu
 (C) Zn (D) Fe
173. Number of net gain ATP in aerobic respiration is
 (A) 2 (B) 42
 (C) 38 (D) 41
174. One glucose molecule partially oxidized in anaerobic respiration produces
 (A) 30 ATPs (B) 38 ATPs
 (C) 2 ATPs (D) 15 ATPs
175. In forest ecosystem green plants are
 (A) Primary consumers (B) Primary producers
 (C) Decomposers (D) None of these
176. The largest cell in the embryo sac is
 (A) Central cell (B) Egg
 (C) Synergids (D) None of these
177. Double membrane is absent in
 (A) Mitochondria (B) Chloroplast
 (C) Peroxisome (D) Golgi body
178. DNA content is doubled in ----- stage of cell division
 (A) Prophase (B) Metaphase
 (C) G1-phase (D) S- phase
179. A group of individuals of different species is called
 (A) Population (B) Community
 (C) Biome (D) None of these
180. Purines are
 (A) Adenine and Guanine (B) Guanine and Cytosine
 (C) Thymine and Cytocine (D) Adenine and Thymine
181. The pigment which is absent in chloroplast is
 (A) Chlorophyll 'a' (B) Chlorophyll 'b'
 (C) Xanthophyll (D) Anthocyanine
182. Rate of transpiration is measured by
 (A) Manometer (B) Potometer
 (C) Auxanometer (D) None of these
183. The site of primary photochemical reaction is
 (A) Stroma (B) Grana
 (C) Periplast cavity (D) Inner layer
184. Father of green revolution in India is
 (A) N. Borlaug (B) K.C. Mehta
 (C) M.S. Swaminathan (D) None of these

185. Plants which grow in shade are
 (A) Sciophytes (B) Heliophytes
 (C) Halophytes (D) Psamophytes
186. The amount of living material in different trophic levels is called
 (A) Standing crop (B) Standing state
 (C) Dry weight (D) Biomass
187. In pond ecosystem pyramid of number is always
 (A) Straight (B) Linear
 (C) Upright (D) Inverted
188. Vegetation dominated by shrubs with few tall trees is called
 (A) Serule (B) Marsh
 (C) Grassland (D) Forest
189. Total energy produced during photosynthesis is called
 (A) Total biomass (B) Net biomass
 (C) Net primary production (D) Gross primary production
190. Secondary producers of the ecosystem are
 (A) Green plants (B) Primary consumers
 (C) Top consumers (D) None of these
191. The chemical knives of DNA are
 (A) Ligases (B) Polymerases
 (C) Endonucleases (D) Transcriptases
192. The Indian variety of rice patented by an American company is
 (A) IR 8 (B) Jaya
 (C) Sona masoori (D) Basmati
193. Pusa Komal is a variety of
 (A) Cowpea (B) Wheat
 (C) Brassica (D) Chilli
194. The stalk of the ovule that attaches it to the placenta in angiosperms is
 (A) Pedicel (B) Funiculus
 (C) Integument (D) Hilum
195. Vallisneria usually favours
 (A) Zoophily (B) Entomophily
 (C) Hydrophily (D) Anemophily
196. An example of single cell protein is
 (A) Spirulina (B) Volvox
 (C) Spirogyra (D) Chlamydomonas
197. Which forest is named as the “Lungs of the planet”?
 (A) Western ghats (B) Eastern ghats
 (C) Amazon rain forest (D) Sahara desert
198. The earth summit held at Rio de Janeiro was in the year
 (A) 1986 (B) 1902
 (C) 1992 (D) 1996
199. Lignified cell wall occurs in
 (A) Epidermal cells (B) Cambial cells
 (C) Phloem cells (D) Xylem cells
200. A slide of TS dicot stem shows
 (A) Scattered vascular bundles (B) Vascular bundles arranged in a ring
 (C) Radial vascular bundles (D) Closed vascular bundles

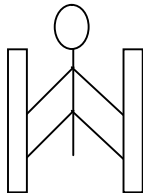
Sr. No.	Question
---------	----------

- While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
- What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
- A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
- A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

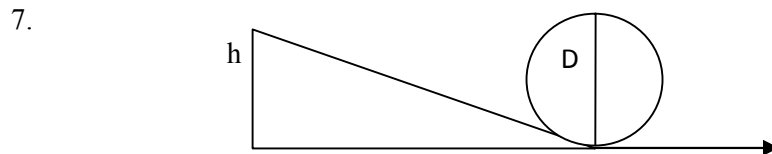


- (A) 140N (B) 120N
 (C) 100N (D) 80N

- A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N

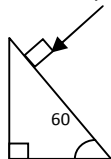


- Find minimum height in terms of D to complete the loop
 (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$

- Gravitational force between two bodies is F. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$

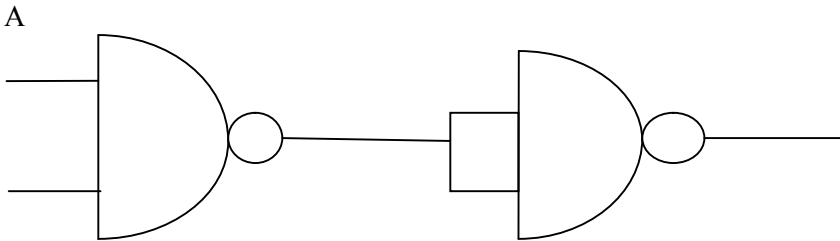
9. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) 75/2 kg
10. g at a depth of 1600 km inside the earth in m/s/s is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
11. A block of mass $19M$ is suspended by a string of length $1m$. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
12. A rubber ball falls from a height of $4m$ and rebounds to $1.5m$. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
13. 25 kg of sand is deposited each second on a conveyor belt moving at $10m/s$. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
14. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
15. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
16. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
17. The level of water in a tank is $5m$. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
18. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
19. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
20. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g=10\text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4\text{ cm}^2$ (D) $2 \times 10^{10}\text{ cm}^2$

21. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
22. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
23. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
24. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
25. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
26. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
27. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) $1/100$ s (B) $1/200$ s
 (C) $1/500$ s (D) 1 s
28. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) q
29. A capacitor of $1 \mu\text{F}$ is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
30. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change
31. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75

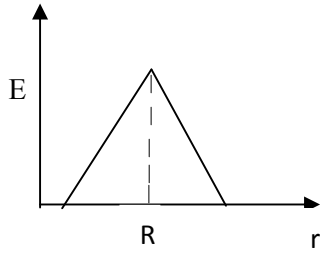
32. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ration of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
33. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
34. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
35. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA
36. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
 (A) infinity (B) zero
 (C) radio wave (D) X ray
37. Which among the following series gives visible light?
 (A) Lyman (B) Balmer
 (C) Brackett (D) None
38. Identify the logic operation performed by this circuit



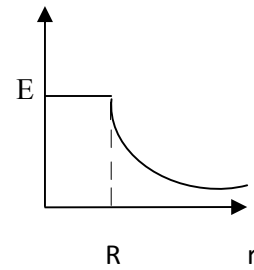
- B
- (A) AND (B) OR
 (C) NAND (D) NOR
39. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.
 (A) $4.54 \times 10^9 \text{ m}^{-3}$ (B) $4.95 \times 10^{22} \text{ m}^{-3}$
 (C) $1.5 \times 10^{16} \text{ m}^{-3}$ (D) $5 \times 10^{28} \text{ m}^{-3}$
40. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
 (A) $4.5 \times 10^5 \text{ N/C}$ (B) $4.5 \times 10^5 \text{ NC}$
 (C) $4.5 \times 10^{-5} \text{ N/C}$ (D) $4.5 \times 10^{-5} \text{ NC}$
41. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to
 (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine

42. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

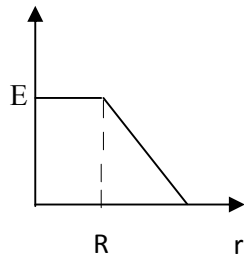
(A)



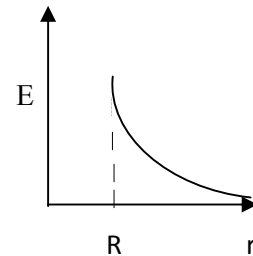
(B)



(C)



(D)



43. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?

(A) 3

(B) 6

(C) 9

(D) 12

44. An inductor of $5H$ carries a steady current of $2A$. In what time if the current is made zero can a $40V$ self induced emf be produced in the inductor.

(A) 2s

(B) 1s

(C) 0.5s

(D) 0.25s

45. A cell of emf E and internal resistance r gives $0.5A$ with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

(A) 0.5

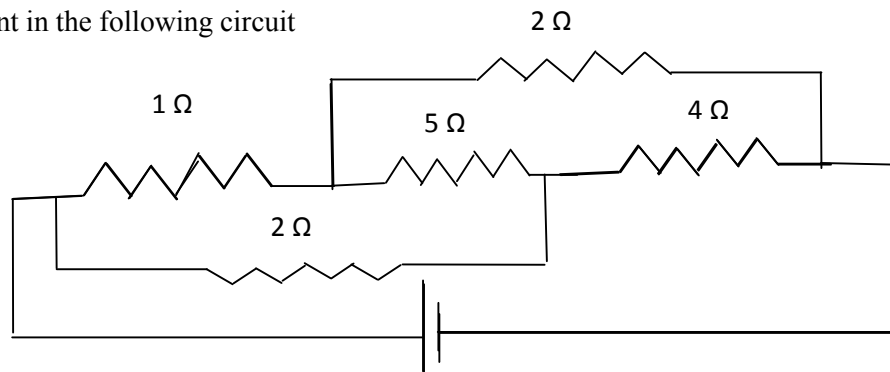
(B) 1

(C) 2

(D) 3

46.

Find current in the following circuit



(A) 1A

(B) 2A

(C) 3A

(D) 4A

47. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
48. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
49. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
50. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
51. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
52. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
53. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
54. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
55. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde
56. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F (B) 4F
 (C) 6F (D) 5F

57. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple
 (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
 (C) Ag can displace H_2 from acid
 (D) Ag can displace H_2 from base
58. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area
 (B) A decrease in ΔH for the reaction
 (C) A decrease in the fraction of particles possessing sufficient energy
 (D) The introduction of an alternative pathway with greater activation energy.
59. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
 (B) The instantaneous rate a reaction is same at any time during the reaction
 (C) For a zero order reaction the concentration of reactants remains unchanged with passage of time
 (D) The rate of a reaction decreases with increase in concentration of reactant (s)
60. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
 (B) CH_4 (190K)
 (C) SO_2 (630K)
 (D) CO_2 (304K)
61. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
 ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 iii. When $1/n=0$, the adsorption is directly proportional to pressure.
 iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
 (B) ii and iv
 (C) i and iii
 (D) all are false
62. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
 ii. ΔG^0 for the overall reaction is negative
 iii. E^0 for the overall reaction is positive
 iv. E^0 for the overall reaction is negative
- (A) i and iv
 (B) i and iii
 (C) ii and iii
 (D) iii and iv
63. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^-
 (B) ClO_3^- and ICl_4^-
 (C) XeO_3^{2-} and PCl_3
 (D) ClO_3^- and SO_3^{2-}
64. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3
 (B) PH_3
 (C) AsH_3
 (D) SbH_3
65. Consider the reactions,
- i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
- (A) N_2O , NO
 (B) NO_2 , NO_2
 (C) N_2 , N_2O
 (D) NO_2 , NO

66. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
 (A) 1 (B) 2
 (C) 3 (D) 5
67. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
 (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
68. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
 (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
69. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
 (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
70. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
71. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
72. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
73. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
74. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
75. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
76. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
 (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
77. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) Ethanamine
78. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$

79. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
80. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
81. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
82. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
83. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
84. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
85. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
86. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
87. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
88. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
89. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
90. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
91. If the bond dissociation energies of XY, X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
92. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) $\text{Water} < \text{ether} < \text{ethanol}$ (B) $\text{Water} < \text{ethanol} < \text{ether}$
 (C) $\text{Ether} < \text{ethanol} < \text{water}$ (D) $\text{Ethanol} < \text{ether} < \text{water}$
93. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase

94. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $MnO_4^{2-} \rightarrow MnO_4^-$ (B) $MnO_4^- \rightarrow Mn^{2+}$
 (C) $MnO_4^- \rightarrow MnO_2$ (D) $CrO_4^{2-} \rightarrow Cr^{3+}$
95. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
96. The correct sequence of covalent character is represented by:
 (A) $LiCl < NaCl < BeCl_2$ (B) $BeCl_2 < LiCl < NaCl$
 (C) $NaCl < LiCl < BeCl_2$ (D) $BeCl_2 < NaCl < LiCl$
97. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
98. The most stable carbocation amongst the following is:
 (A) $(CH_3)_2CH^+$ (B) Ph_3C^+
 (C) $CH_3CH_2^+$ (D) $CH_2=CH-CH_2^+$
99. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) Cis-2-Butene
 (C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
100. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
101. Which of the following cells in plants show totipotency
 (A) Xylem vessels (B) Sieve tubes
 (C) Meristem (D) Cork cells
102. Father of taxonomy is
 (A) John Ray (B) Linnaeus
 (C) Aristotle (D) Lamark
103. Which of the following has more characters in common
 (A) Species (B) Genus
 (C) Class (D) Division
104. Riccia is a liverwort as it
 (A) produces liver diseases (B) is present in liver
 (C) cures liver diseases (D) is like a flat lobed thallus
105. Gymnosperms are characterized by
 (A) Large leaves (B) Ciliated sperms
 (C) Naked ovules (D) Scale leaves
106. A root parasite is
 (A) *Cuscuta* (B) *Striga*
 (C) *Brassica* (D) *Ioranthus*
107. Roots that grow from any part of the plant body other than the radicles are
 (A) Adventitious roots (B) Tap roots
 (C) Modified roots (D) Aerial roots
108. Parallel venation is a characteristic of
 (A) Parasitic plants (B) Xerophytic plants
 (C) Legumes (D) Grasses

109. A bisexual flower which never opens in its life span is called
 (A) Cleistogamus (B) Heterogamus
 (C) Homogamus (D) Dichogamus
110. Quiescent centre is located in
 (A) Shoot apex (B) Root apex
 (C) Leaf apex (D) Bud apex
111. Casparian strips occur in the cells of
 (A) Epidermis (B) Exodermis
 (C) Endodermis (D) Hypodermis
112. Vascular bundles are absent in
 (A) Monocots (B) Dicots
 (C) Gymnosperms (D) Pteridophytes
113. Aerenchyma is derived from
 (A) Parenchyma (B) Sclerenchyma
 (C) Phloem (D) Xylem
114. Vascular bundle having cambium is
 (A) closed (B) open
 (C) conjoint (D) collateral
115. What do you eat in coconut
 (A) Embryo (B) Mesocarp
 (C) Entire seed (D) Fruit wall
116. Phyllode is a modification of
 (A) Flower (B) Bud
 (C) Root (D) Petiole
117. Fingermillet is
 (A) *Eleusine* (B) *Setaria*
 (C) *Pennisetum* (D) *Sorghum*
118. Microsporophyll of *Cycas* is equivalent to----- of angiosperms
 (A) Sepal (B) Stamen
 (C) Ovary (D) Ovule
119. Jackfruit is an example of
 (A) Multiple fruit (B) Aggregate fruit
 (C) Simple fruit (D) None of these
120. Anther wall in angiosperms contain how many wall layers
 (A) 3 (B) 4
 (C) 5 (D) 6
121. If an endosperm cell of angiosperm has 36 chromosomes, the root cell should have
 (A) 18 (B) 16
 (C) 4 (D) 24
122. Amino acid synthetase enzyme is activated by
 (A) Mg (B) Cu
 (C) Zn (D) Fe
123. Number of net gain ATP in aerobic respiration is
 (A) 2 (B) 42
 (C) 38 (D) 41
124. One glucose molecule partially oxidized in anaerobic respiration produces
 (A) 30 ATPs (B) 38 ATPs
 (C) 2 ATPs (D) 15 ATPs

125. In forest ecosystem green plants are
 (A) Primary consumers (B) Primary producers
 (C) Decomposers (D) None of these
126. The largest cell in the embryo sac is
 (A) Central cell (B) Egg
 (C) Synergids (D) None of these
127. Double membrane is absent in
 (A) Mitochondria (B) Chloroplast
 (C) Peroxisome (D) Golgi body
128. DNA content is doubled in ----- stage of cell division
 (A) Prophase (B) Metaphase
 (C) G₁ phase (D) S- phase
129. A group of individuals of different species is called
 (A) Population (B) Community
 (C) Biome (D) None of these
130. Purines are
 (A) Adenine and Guanine (B) Guanine and Cytosine
 (C) Thymine and Cytocine (D) Adenine and Thymine
131. The pigment which is absent in chloroplast is
 (A) Chlorophyll 'a' (B) Chlorophyll 'b'
 (C) Xanthophyll (D) Anthocyanine
132. Rate of transpiration is measured by
 (A) Manometer (B) Potometer
 (C) Auxanometer (D) None of these
133. The site of primary photochemical reaction is
 (A) Stroma (B) Grana
 (C) Periplast cavity (D) Inner layer
134. Father of green revolution in India is
 (A) N. Borlaug (B) K.C. Mehta
 (C) M.S. Swaminathan (D) None of these
135. Plants which grow in shade are
 (A) Sciophytes (B) Heliophytes
 (C) Halophytes (D) Psamophytes
136. The amount of living material in different trophic levels is called
 (A) Standing crop (B) Standing state
 (C) Dry weight (D) Biomass
137. In pond ecosystem pyramid of number is always
 (A) Straight (B) Linear
 (C) Upright (D) Inverted
138. Vegetation dominated by shrubs with few tall trees is called
 (A) Serule (B) Marsh
 (C) Grassland (D) Forest
139. Total energy produced during photosynthesis is called
 (A) Total biomass (B) Net biomass
 (C) Net primary production (D) Gross primary production
140. Secondary producers of the ecosystem are
 (A) Green plants (B) Primary consumers
 (C) Top consumers (D) None of these

141. The chemical knives of DNA are
 (A) Ligases (B) Polymerases
 (C) Endonucleases (D) Transcriptases
142. The Indian variety of rice patented by an American company is
 (A) IR 8 (B) Jaya
 (C) Sona masoori (D) Basmati
143. Pusa Komal is a variety of
 (A) Cowpea (B) Wheat
 (C) Brassica (D) Chilli
144. The stalk of the ovule that attaches it to the placenta in angiosperms is
 (A) Pedicel (B) Funiculus
 (C) Integument (D) Hilum
145. Vallisneria usually favours
 (A) Zoophily (B) Entomophily
 (C) Hydrophily (D) Anemophily
146. An example of single cell protein is
 (A) Spirulina (B) Volvox
 (C) Spirogyra (D) Chlamydomonas
147. Which forest is named as the “Lungs of the planet”?
 (A) Western ghats (B) Eastern ghats
 (C) Amazon rain forest (D) Sahara desert
148. The earth summit held at Rio de Janeiro was in the year
 (A) 1986 (B) 1902
 (C) 1992 (D) 1996
149. Lignified cell wall occurs in
 (A) Epidermal cells (B) Cambial cells
 (C) Phloem cells (D) Xylem cells
150. A slide of TS dicot stem shows
 (A) Scattered vascular bundles (B) Vascular bundles arranged in a ring
 (C) Radial vascular bundles (D) Closed vascular bundles
151. Once formed, red blood cells normally have an average life span of
 (A) 30 days (B) 60 days
 (C) 90 days (D) 120 days
152. Heparin, an anticoagulant is manufactured by
 (A) Plasma cells (B) Mast cells
 (C) Lymphocytes (D) Blood platelets
153. Function of long bones in mammals is to
 (A) Provide support only (B) Provide support and production of RBC only
 (C) Provide support and production of WBC only (D) Provide support and production of RBC and WBC
154. Binocular vision is seen in
 (A) Man (B) Rabbit
 (C) Rat (D) Guinea pig
155. Spermatogenesis is influenced by
 (A) Testosterone (B) Luteinizing hormone
 (C) FSH (D) All of these

156. The type of respiration found in man is
 (A) Cutaneous (B) Subcutaneous
 (C) Pulmonary (D) Diffusion
157. What happens if RBCs are put in a hypertonic solution
 (A) They will contract and loose water (B) They will swell up and burst
 (C) They will show clumping (D) None of these
158. In man, urea is formed in the
 (A) Body tissues (B) Kidney
 (C) Liver (D) Spleen
159. Which of the following stood erect first
 (A) Java man (B) Peking man
 (C) Australopithecus (D) Cro-Magnon man
160. The first autotrophs on the earth were
 (A) Viruses (B) Bacteria
 (C) Green algae (D) Blue green algae
161. The 'Use and disuse' principle of evolution was proposed by
 (A) Lamarck (B) Weisman
 (C) Hugo de Vries (D) Charles Darwin
162. The following is an example of inborn error in metabolism
 (A) Spina bifida (B) Phenylketonuria
 (C) Phocomelia (D) Mongolism
163. Identical twins develop from
 (A) One ovum and two sperms (B) Two ova and one sperm
 (C) Two ova and two sperms (D) None of these
164. The chromosomes are best studied at the following stage of mitosis
 (A) Prophase (B) Metaphase
 (C) Anaphase (D) Telophase
165. A monosomic individual can be mathematically represented as
 (A) $2n-2$ (B) $2n+1$
 (C) $2n-1$ (D) $2n-4$
166. In a fruit fly, a white eyed XXY female is mated to a red eyed XY male. The female progeny would be
 (A) All red eyed (B) All white eyed
 (C) Mainly red eyed with a few white eyed (D) Mainly white eyed with a few red eyed
167. One of the following is a sex linked trait in humans
 (A) Curly hairs (B) Sickle cell anemia
 (C) Colour blindness (D) Down's syndrome
168. First experimental evidence for triplet code was given by
 (A) Nirenberg (B) H.G. Khorana
 (C) Watson (D) F.H.C. Crick
169. Protein coat virus is known as
 (A) Capsid (B) Capsomere
 (C) Virion (D) Viroid
170. Chemically a gene is
 (A) Nucleoprotein (B) Polypeptide
 (C) Ribonucleic acid (D) Polynucleotide

171. Apes differ from man in having
 (A) Arms shorter than legs (B) Legs shorter than arms
 (C) Length of arms and legs is similar (D) A tail
172. The disease transmitted through sexual contact is
 (A) Measles (B) Syphilis
 (C) Polio (D) Small pox
173. Hypersensitivity of tissue occurs in
 (A) Cancer (B) Malaria
 (C) Allergy (D) Small pox
174. The sporozoites of malarial parasites are stored in
 (A) Liver of man (B) Blood of man
 (C) Stomach of females anopheles (D) Salivary glands of female anopheles
175. The following plant has male and female reproductive parts in the same flower
 (A) Papaya (B) Datepalm
 (C) Cycas (D) Datura
176. Opium is derived from
 (A) Latex of *Papaver somniferum* (B) Seeds of *Papaver somniferum*
 (C) Seeds of *Coffea arabica* (D) Leaves of datura
177. *Penicillium* was first isolated from
 (A) *Penicillium nigricans* (B) *Penicillium chrysogenum*
 (C) *Penicillium notatum* (D) *Penicillium griseofulvum*
178. Which of the following is an implant?
 (A) Blood diasyser (B) Heart valve
 (C) Artificial limbs (D) Oxygenator
179. Chemical nature of jute fibre is
 (A) Lignin (B) Cellulose
 (C) Pectin (D) Suberin
180. The conversion of molecular nitrogen to ammonia is known as
 (A) Nitrification (B) Denitrification
 (C) Ammonification (D) Nitrogen fixation
181. Cocaine is a powerful stimulant of
 (A) Heart beat (B) Central nervous system
 (C) Muscles (D) Breathing
182. Diagnosis of typhoid is done by
 (A) ESR (B) ELISA test
 (C) DLC (D) WIDAL test
183. Scientific study of human population is called
 (A) Demography (B) Geography
 (C) Anthropology (D) Biogeography
184. Vinegar is obtained due to biological activity of
 (A) Acetobactor (B) Lactobacillus
 (C) Nostoc (D) Anabaena
185. The following disease involves change in chromosome number
 (A) Colour blindness (B) Haemophilia
 (C) Down's syndrome (D) Jaundice
186. Ringworm disease is caused by
 (A) Annelid (B) Helminthes
 (C) A fungus (D) A bacterium

187. The open type of circulatory system is found in
 (A) Nereis (B) Octopus
 (C) Prawn (D) Frog
188. The process of translation is
 (A) Ribosome synthesis (B) Protein synthesis
 (C) DNA synthesis (D) RNA synthesis
189. Dengue is transmitted by
 (A) Culex (B) Male anopheles
 (C) Aedes (D) Female anopheles
190. Young of cockroach is called
 (A) Ephyra (B) Nymph
 (C) Maggot (D) Juvenile
191. Number of mitotic divisions required to produce 128 cells from a single cell is
 (A) 7 (B) 14
 (C) 16 (D) 32
192. Distance between two adjacent nitrogen bases of DNA is
 (A) 2.4 \AA (B) 3.4 \AA
 (C) 24 \AA (D) 34 \AA
193. In addition to the nucleus, DNA also occurs in
 (A) Mitochondria (B) Lysosome
 (C) Ribosome (D) Golgi apparatus
194. First photosynthetic organisms to develop on earth were
 (A) Bacteria (B) Diatoms
 (C) Cyanobacteria (D) Green algae
195. The vector for causing sleeping sickness in man is
 (A) House fly (B) Tse-Tse fly
 (C) Butterfly (D) Mosquito
196. Chromosomes are stained with
 (A) Saffranine (B) Acetocarmine
 (C) Schiff's reagent (D) Ethanol
197. The universal recipient blood group is
 (A) A (B) AB
 (C) O (D) B
198. Arsenic pollutant in drinking water causes
 (A) Liver and lung diseases (B) Paralysis
 (C) Kidney diseases (D) Cancer
199. In the colony of *Apis indica*, the one formed by parthenogenesis is
 (A) Queen (B) Worker
 (C) Drone (D) Both B and C
200. The pollutant responsible for chromosomal mutations in man is
 (A) Lead (B) Manganese
 (C) Arsenic (D) Mercury

Sr. No.	Question
1.	Among the following, the most stable complex is (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$ (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
2.	Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$? (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
3.	In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is: (A) ABO_3 (B) A_3BO (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
4.	On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process? (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
5.	K_{H} value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is: (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde
6.	The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is: (A) 3F (B) 4F (C) 6F (D) 5F
7.	The positive value of the standard electrode potential of Ag^+/Ag indicates that: (A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple (C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base
8.	Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to: (A) A decrease in surface area (B) A decrease in ΔH for the reaction (C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.
9.	Which of the following statements is not correct? (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease (B) The instantaneous rate a reaction is same at any time during the reaction (C) For a zero order reaction the concentration of reactants remains changed with passage of time (D) The rate of a reaction decreases with increase in concentration of reactant (s)

10. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K) (B) CH_4 (190K)
 (C) SO_2 (630K) (D) CO_2 (304K)
11. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
 ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 iii. When $1/n=0$, the adsorption is directly proportional to pressure.
 iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii (B) ii and iv
 (C) i and iii (D) all are false
12. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
 ii. ΔG^0 for the overall reaction is negative
 iii. E^0 for the overall reaction is positive
 iv. E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
 (C) ii and iii (D) iii and iv
13. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
 (C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}
14. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3 (B) PH_3
 (C) AsH_3 (D) SbH_3
15. Consider the reactions,
- i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
- (A) N_2O , NO (B) NO_2 , NO_2
 (C) N_2 , N_2O (D) NO_2 , NO
16. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1 (B) 2
 (C) 3 (D) 5
17. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
18. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
19. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene

20. Which of the following undergoes nucleophilic substitution exclusively by S_N^1 mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
21. The number of possible stereoisomers for $CH_3CH=CHCH_2CH(Br)CH_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
22. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
23. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
24. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula C_3H_6O and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
25. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
26. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
 (A) CH_3COOH (B) $(CH_3)_2CHCOOH$
 (C) $CH_3CH_2CH_2COOH$ (D) $(CH_3)_3CCOOH$
27. $C_2H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{P/Br_2} Y \xrightarrow[NH_3]{(excess)} Z$
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) Ethanamine
28. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-SO_3H$ (B) $-OH$
 (C) $-F$ (D) $-Br$
29. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
30. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
31. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
32. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
33. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic

34. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
35. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s=+1/2$ (B) $n=4, l=3, m=-4, s=-1/2$
 (C) $n=4, l=3, m=+1, s=+1/2$ (D) $n=3, l=2, m=-2, s=+1/2$
36. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
37. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
38. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
39. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
40. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
41. If the bond dissociation energies of XY, X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f\text{H}$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
42. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
43. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
44. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
45. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
46. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$

47. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
48. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
49. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) Cis-2-Butene
 (C) Trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
50. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
51. Which of the following cells in plants show totipotency
 (A) Xylem vessels (B) Sieve tubes
 (C) Meristem (D) Cork cells
52. Father of taxonomy is
 (A) John Ray (B) Linnaeus
 (C) Aristotle (D) Lamark
53. Which of the following has more characters in common
 (A) Species (B) Genus
 (C) Class (D) Division
54. Riccia is a liverwort as it
 (A) produces liver diseases (B) is present in liver
 (C) cures liver diseases (D) is like a flat lobed thallus
55. Gymnosperms are characterized by
 (A) Large leaves (B) Ciliated sperms
 (C) Naked ovules (D) Scale leaves
56. A root parasite is
 (A) *Cuscuta* (B) *Striga*
 (C) *Brassica* (D) *Ioranthus*
57. Roots that grow from any part of the plant body other than the radicles are
 (A) Adventitious roots (B) Tap roots
 (C) Modified roots (D) Aerial roots
58. Parallel venation is a characteristic of
 (A) Parasitic plants (B) Xerophytic plants
 (C) Legumes (D) Grasses
59. A bisexual flower which never opens in its life span is called
 (A) Cleistogamus (B) Heterogamus
 (C) Homogamus (D) Dichogamus
60. Quiescent centre is located in
 (A) Shoot apex (B) Root apex
 (C) Leaf apex (D) Bud apex
61. Casparian strips occur in the cells of
 (A) Epidermis (B) Exodermis
 (C) Endodermis (D) Hypodermis

62. Vascular bundles are absent in
 (A) Monocots (B) Dicots
 (C) Gymnosperms (D) Pteridophytes
63. Aerenchyma is derived from
 (A) Parenchyma (B) Sclerenchyma
 (C) Phloem (D) Xylem
64. Vascular bundle having cambium is
 (A) closed (B) open
 (C) conjoint (D) collateral
65. What do you eat in coconut
 (A) Embryo (B) Mesocarp
 (C) Entire seed (D) Fruit wall
66. Phyllode is a modification of
 (A) Flower (B) Bud
 (C) Root (D) Petiole
67. Fingermillet is
 (A) *Eleusine* (B) *Setaria*
 (C) *Pennisetum* (D) *Sorghum*
68. Microsporophyll of *Cycas* is equivalent to----- of angiosperms
 (A) Sepal (B) Stamen
 (C) Ovary (D) Ovule
69. Jackfruit is an example of
 (A) Multiple fruit (B) Aggregate fruit
 (C) Simple fruit (D) None of these
70. Anther wall in angiosperms contain how many wall layers
 (A) 3 (B) 4
 (C) 5 (D) 6
71. If an endosperm cell of angiosperm has 36 chromosomes, the root cell should have
 (A) 18 (B) 16
 (C) 4 (D) 24
72. Amino acid synthetase enzyme is activated by
 (A) Mg (B) Cu
 (C) Zn (D) Fe
73. Number of net gain ATP in aerobic respiration is
 (A) 2 (B) 42
 (C) 38 (D) 41
74. One glucose molecule partially oxidized in anaerobic respiration produces
 (A) 30 ATPs (B) 38 ATPs
 (C) 2 ATPs (D) 15 ATPs
75. In forest ecosystem green plants are
 (A) Primary consumers (B) Primary producers
 (C) Decomposers (D) None of these
76. The largest cell in the embryo sac is
 (A) Central cell (B) Egg
 (C) Synergids (D) None of these
77. Double membrane is absent in
 (A) Mitochondria (B) Chloroplast
 (C) Peroxisome (D) Golgi body

78. DNA content is doubled in ----- stage of cell division
 (A) Prophase (B) Metaphase
 (C) G₁ phase (D) S- phase
79. A group of individuals of different species is called
 (A) Population (B) Community
 (C) Biome (D) None of these
80. Purines are
 (A) Adenine and Guanine (B) Guanine and Cytosine
 (C) Thymine and Cytocine (D) Adenine and Thymine
81. The pigment which is absent in chloroplast is
 (A) Chlorophyll 'a' (B) Chlorophyll 'b'
 (C) Xanthophyll (D) Anthocyanine
82. Rate of transpiration is measured by
 (A) Manometer (B) Potometer
 (C) Auxanometer (D) None of these
83. The site of primary photochemical reaction is
 (A) Stroma (B) Grana
 (C) Periplast cavity (D) Inner layer
84. Father of green revolution in India is
 (A) N. Borlaug (B) K.C. Mehta
 (C) M.S. Swaminathan (D) None of these
85. Plants which grow in shade are
 (A) Sciophytes (B) Heliophytes
 (C) Halophytes (D) Psamophytes
86. The amount of living material in different trophic levels is called
 (A) Standing crop (B) Standing state
 (C) Dry weight (D) Biomass
87. In pond ecosystem pyramid of number is always
 (A) Straight (B) Linear
 (C) Upright (D) Inverted
88. Vegetation dominated by shrubs with few tall trees is called
 (A) Serule (B) Marsh
 (C) Grassland (D) Forest
89. Total energy produced during photosynthesis is called
 (A) Total biomass (B) Net biomass
 (C) Net primary production (D) Gross primary production
90. Secondary producers of the ecosystem are
 (A) Green plants (B) Primary consumers
 (C) Top consumers (D) None of these
91. The chemical knives of DNA are
 (A) Ligases (B) Polymerases
 (C) Endonucleases (D) Transcriptases
92. The Indian variety of rice patented by an American company is
 (A) IR 8 (B) Jaya
 (C) Sona masoori (D) Basmati


93. Pusa Komal is a variety of
 (A) Cowpea (B) Wheat
 (C) Brassica (D) Chilli
94. The stalk of the ovule that attaches it to the placenta in angiosperms is
 (A) Pedicel (B) Funiculus
 (C) Integument (D) Hilum
95. Vallisneria usually favours
 (A) Zoophily (B) Entomophily
 (C) Hydrophily (D) Anemophily
96. An example of single cell protein is
 (A) Spirulina (B) Volvox
 (C) Spirogyra (D) Chlamydomonas
97. Which forest is named as the “Lungs of the planet”?
 (A) Western ghats (B) Eastern ghats
 (C) Amazon rain forest (D) Sahara desert
98. The earth summit held at Rio de Janeiro was in the year
 (A) 1986 (B) 1902
 (C) 1992 (D) 1996
99. Lignified cell wall occurs in
 (A) Epidermal cells (B) Cambial cells
 (C) Phloem cells (D) Xylem cells
100. A slide of TS dicot stem shows
 (A) Scattered vascular bundles (B) Vascular bundles arranged in a ring
 (C) Radial vascular bundles (D) Closed vascular bundles
101. Once formed, red blood cells normally have an average life span of
 (A) 30 days (B) 60 days
 (C) 90 days (D) 120 days
102. Heparin, an anticoagulant is manufactured by
 (A) Plasma cells (B) Mast cells
 (C) Lymphocytes (D) Blood platelets
103. Function of long bones in mammals is to
 (A) Provide support only (B) Provide support and production of RBC only
 (C) Provide support and production of WBC only (D) Provide support and production of RBC and WBC
104. Binocular vision is seen in
 (A) Man (B) Rabbit
 (C) Rat (D) Guinea pig
105. Spermatogenesis is influenced by
 (A) Testosterone (B) Luteinizing hormone
 (C) FSH (D) All of these
106. The type of respiration found in man is
 (A) Cutaneous (B) Subcutaneous
 (C) Pulmonary (D) Diffusion
107. What happens if RBCs are put in a hypertonic solution
 (A) They will contract and loose water (B) They will swell up and burst
 (C) They will show clumping (D) None of these

108. In man, urea is formed in the
 (A) Body tissues (B) Kidney
 (C) Liver (D) Spleen
109. Which of the following stood erect first
 (A) Java man (B) Peking man
 (C) Australopithecus (D) Cro-Magnon man
110. The first autotrophs on the earth were
 (A) Viruses (B) Bacteria
 (C) Green algae (D) Blue green algae
111. The 'Use and disuse' principle of evolution was proposed by
 (A) Lamarck (B) Weisman
 (C) Hugo de Vries (D) Charles Darwin
112. The following is an example of inborn error in metabolism
 (A) Spina bifida (B) Phenylketonuria
 (C) Phocomelia (D) Mongolism
113. Identical twins develop from
 (A) One ovum and two sperms (B) Two ova and one sperm
 (C) Two ova and two sperms (D) None of these
114. The chromosomes are best studied at the following stage of mitosis
 (A) Prophase (B) Metaphase
 (C) Anaphase (D) Telophase
115. A monosomic individual can be mathematically represented as
 (A) $2n-2$ (B) $2n+1$
 (C) $2n-1$ (D) $2n-4$
116. In a fruit fly, a white eyed XXY female is mated to a red eyed XY male. The female progeny would be
 (A) All red eyed (B) All white eyed
 (C) Mainly red eyed with a few white eyed (D) Mainly white eyed with a few red eyed
117. One of the following is a sex linked trait in humans
 (A) Curly hairs (B) Sickle cell anemia
 (C) Colour blindness (D) Down's syndrome
118. First experimental evidence for triplet code was given by
 (A) Nirenberg (B) H.G. Khorana
 (C) Watson (D) F.H.C. Crick
119. Protein coat virus is known as
 (A) Capsid (B) Capsomere
 (C) Virion (D) Viroid
120. Chemically a gene is
 (A) Nucleoprotein (B) Polypeptide
 (C) Ribonucleic acid (D) Polynucleotide
121. Apes differ from man in having
 (A) Arms shorter than legs (B) Legs shorter than arms
 (C) Length of arms and legs is similar (D) A tail
122. The disease transmitted through sexual contact is
 (A) Measles (B) Syphilis
 (C) Polio (D) Small pox

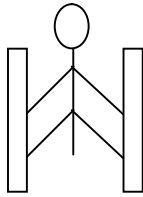
123. Hypersensitivity of tissue occurs in
 (A) Cancer (B) Malaria
 (C) Allergy (D) Small pox
124. The sporozoites of malarial parasites are stored in
 (A) Liver of man (B) Blood of man
 (C) Stomach of females anopheles (D) Salivary glands of female anopheles
125. The following plant has male and female reproductive parts in the same flower
 (A) Papaya (B) Datepalm
 (C) Cycas (D) Datura
126. Opium is derived from
 (A) Latex of *Papaver somniferum* (B) Seeds of *Papaver somniferum*
 (C) Seeds of *Coffea arabica* (D) Leaves of datura
127. *Penicillium* was first isolated from
 (A) *Penicillium nigricans* (B) *Penicillium chrysogenum*
 (C) *Penicillium notatum* (D) *Penicillium griseofulvum*
128. Which of the following is an implant?
 (A) Blood diasyser (B) Heart valve
 (C) Artificial limbs (D) Oxygenator
129. Chemical nature of jute fibre is
 (A) Lignin (B) Cellulose
 (C) Pectin (D) Suberin
130. The conversion of molecular nitrogen to ammonia is known as
 (A) Nitrification (B) Denitrification
 (C) Ammonification (D) Nitrogen fixation
131. Cocaine is a powerful stimulant of
 (A) Heart beat (B) Central nervous system
 (C) Muscles (D) Breathing
132. Daignosis of typhoid is done by
 (A) ESR (B) ELISA test
 (C) DLC (D) WIDAL test
133. Scientific study of human population is called
 (A) Demography (B) Geography
 (C) Anthropology (D) Biogeography
134. Vinegar is obtained due to biological activity of
 (A) Acetobactor (B) Lactobacillus
 (C) Nostoc (D) Anabaena
135. The following disease involves change in chromosome number
 (A) Colour blindness (B) Haemophilia
 (C) Down's syndrome (D) Jaundice
136. Ringworm disease is caused by
 (A) Annelid (B) Helminthes
 (C) A fungus (D) A bacterium
137. The open type of circulatory system is found in
 (A) Nereis (B) Octopus
 (C) Prawn (D) Frog
138. The process of translation is
 (A) Ribosome synthesis (B) Protein synthesis
 (C) DNA synthesis (D) RNA synthesis

139. Dengue is transmitted by
 (A) Culex (B) Male anopheles
 (C) Aedes (D) Female anopheles
140. Young of cockroach is called
 (A) Ephyras (B) Nymph
 (C) Maggot (D) Juvenile
141. Number of mitotic divisions required to produce 128 cells from a single cell is
 (A) 7 (B) 14
 (C) 16 (D) 32
142. Distance between two adjacent nitrogen bases of DNA is
 (A) 2.4 \AA (B) 3.4 \AA
 (C) 24 \AA (D) 34 \AA
143. In addition to the nucleus, DNA also occurs in
 (A) Mitochondria (B) Lysosome
 (C) Ribosome (D) Golgi apparatus
144. First photosynthetic organisms to develop on earth were
 (A) Bacteria (B) Diatoms
 (C) Cyanobacteria (D) Green algae
145. The vector for causing sleeping sickness in man is
 (A) House fly (B) Tse-Tse fly
 (C) Butterfly (D) Mosquito
146. Chromosomes are stained with
 (A) Saffranine (B) Acetocarmine
 (C) Schiff's reagent (D) Ethanol
147. The universal recipient blood group is
 (A) A (B) AB
 (C) O (D) B
148. Arsenic pollutant in drinking water causes
 (A) Liver and lung diseases (B) Paralysis
 (C) Kidney diseases (D) Cancer
149. In the colony of *Apis indica*, the one formed by parthenogenesis is
 (A) Queen (B) Worker
 (C) Drone (D) Both B and C
150. The pollutant responsible for chromosomal mutations in man is
 (A) Lead (B) Manganese
 (C) Arsenic (D) Mercury
151. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
152. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
153. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$

154. A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

155.  The force on 16 kg is
 (A) 140N (B) 120N
 (C) 100N (D) 80N

156. A man of mass 40 kg is at rest between the walls. If coeff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



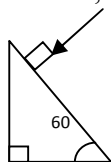
- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N
157. 

Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$
158. Gravitational force between two bodies is F. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$
159. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) $75/2 \text{ kg}$
160. g at a depth of 1600 km inside the earth in m/s^2 is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
161. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
162. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60

163. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
164. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
165. If the velocity of C.M of a rolling body is V, then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) 2V (D) $V/\sqrt{2}$
166. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
167. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
168. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
169. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
170. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g=10\text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4\text{ cm}^2$ (D) $2 \times 10^{10}\text{ cm}^2$
171. When kerosene and coconut oil of coeff. of viscosity 0.002 and 0.0154 Ns/m^2 are followed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
172. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
173. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only one is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
174. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases

175. The efficiency of Carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
176. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) 7.5×10^{-7} Wb (B) 1.6×10^{-7} Wb
 (C) 3×10^{-7} Wb (D) 1.5×10^{-7} Wb
177. The instantaneous value of current in an AC circuit is $I = 2 \sin(100\pi t + \pi/3)$ A. At what first time the current will be maximum?
 (A) 1/100 s (B) 1/200 s
 (C) 1/500 s (D) 1 s
178. What in electric system represents force in mechanical system?
 (A) L (B) I
 (C) 1/C (D) q
179. A capacitor of 1 μ F is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30 J (B) 40 J
 (C) 50 J (D) 60 J
180. An electromagnetic wave is travelling in vacuum with a speed of 3×10^8 m/s. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8$ m/s (B) 1.5×10^8 m/s
 (C) 2×10^8 m/s (D) No change
181. Trace the path of ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75
182. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maximum and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
183. In Young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
184. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67
185. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
 (A) 1.227 \AA (B) 12.27 \AA
 (C) 122.7 \AA (D) 1227 \AA

186. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?

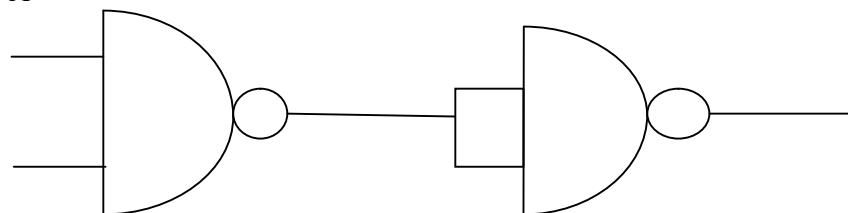
- (A) infinity (B) zero
(C) radio wave (D) X ray

187. Which among the following series gives visible light?

- (A) Lyman (B) Balmer
(C) Bracket (D) None

188. Identify the logic operation performed by this circuit

A



B

- (A) AND (B) OR
(C) NAND (D) NOR

189. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} m^{-3}$.

- (A) $4.54 \times 10^9 m^{-3}$ (B) $4.95 \times 10^{22} m^{-3}$
(C) $1.5 \times 10^{16} m^{-3}$ (D) $5 \times 10^{28} m^{-3}$

190. Two charges $+5\mu C$ and $-5\mu C$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

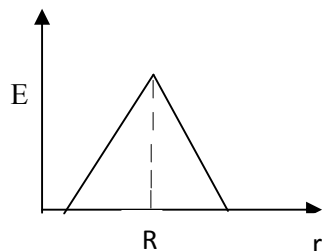
- (A) $4.5 \times 10^5 N/C$ (B) $4.5 \times 10^5 NC$
(C) $4.5 \times 10^{-5} N/C$ (D) $4.5 \times 10^{-5} NC$

191. If the Gaussian surface is so chosen that there are some charges inside and some outside than the electric field is due to

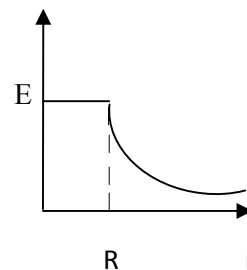
- (A) Only inside charges (B) Only outside charges
(C) All the charges (D) Cannot determine

192. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

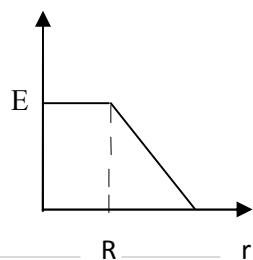
(A)



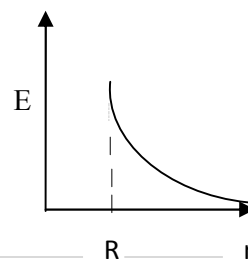
(B)



(C)



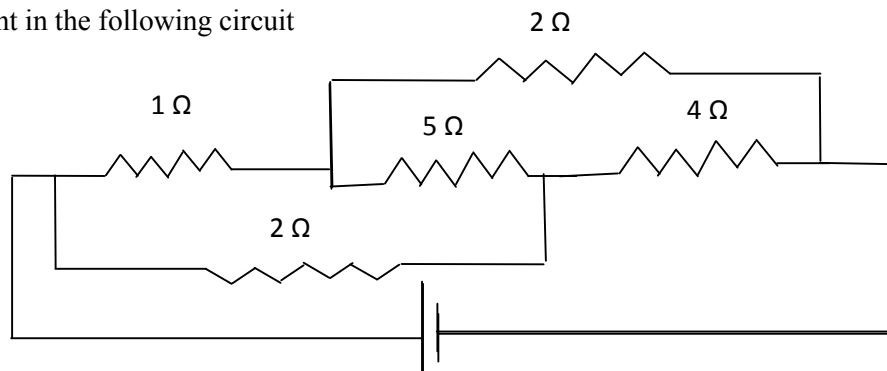
(D)



193. Net capacitance of 3 identical capacitor in series is $1 \mu F$. What is the net capacitance in μF if connected in parallel?
 (A) 3 (B) 6
 (C) 9 (D) 12
194. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.
 (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s
195. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be
 (A) 0.5 (B) 1
 (C) 2 (D) 3

196.

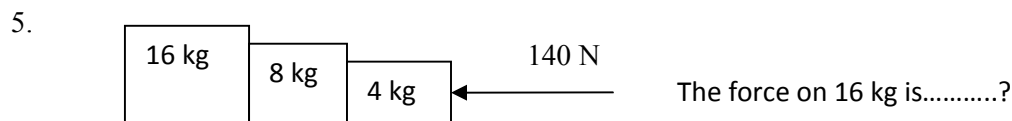
Find current in the following circuit



- (A) 1A (B) 2A
 (C) 3A (D) 4A
197. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
 (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
198. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
 (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
199. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
 (A) 1H (B) 2H
 (C) 3H (D) 4H
200. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
 (A) 500 (B) 800
 (C) 900 (D) 1000

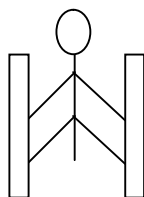
Sr. No.	Question
---------	----------

- While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
- What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
- A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
- A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

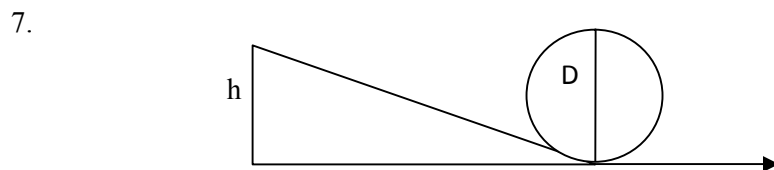


- (A) 140N (B) 120N
 (C) 100N (D) 80N

- A man of mass 40 kg is at rest between the walls. If co eff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N



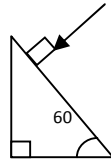
Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$

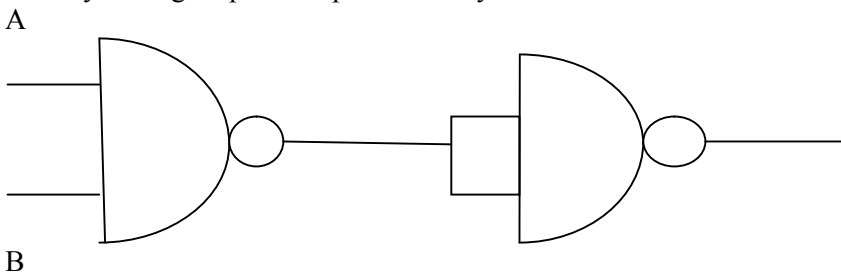
8. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$
9. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) $75/2$ kg
10. g at a depth of 1600 km inside the earth in m/s^2 is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
11. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
12. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
13. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
14. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
15. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2} V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
16. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
17. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
18. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
19. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant

20. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
21. When kerosene and coconut oil of co eff. of viscosity 0.002 and 0.0154 Ns/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
22. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
23. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only 1 is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
24. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
25. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
26. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
27. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time, the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s
28. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) q
29. A capacitor of $1 \mu\text{F}$ is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30J (B) 40J
 (C) 50J (D) 60J
30. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change

31. Trace the path of a ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.

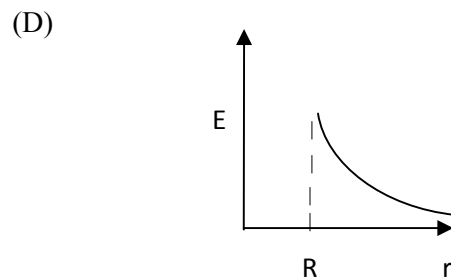
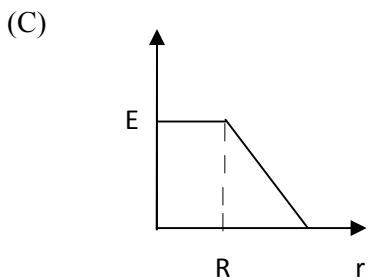
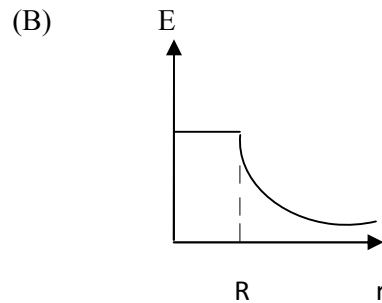
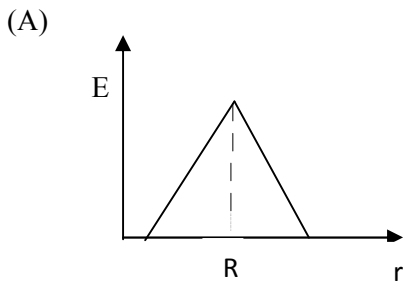


- (A) 30
(B) 45
(C) 60
(D) 75
32. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
(A) 8:1
(B) 64:1
(C) 9:7
(D) 81:49
33. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
(A) 1 mm
(B) 1.5 mm
(C) 2 mm
(D) 2.5 mm
34. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
(A) 37
(B) 47
(C) 57
(D) 67
35. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
(A) 1.227 \AA
(B) 12.27 \AA
(C) 122.7 \AA
(D) 1227 \AA
36. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
(A) infinity
(B) zero
(C) radio wave
(D) X ray
37. Which among the following series gives visible light?
(A) Lyman
(B) Balmer
(C) Brackett
(D) None of these
38. Identify the logic operation performed by this circuit



- (A) AND
(B) OR
(C) NAND
(D) NOR

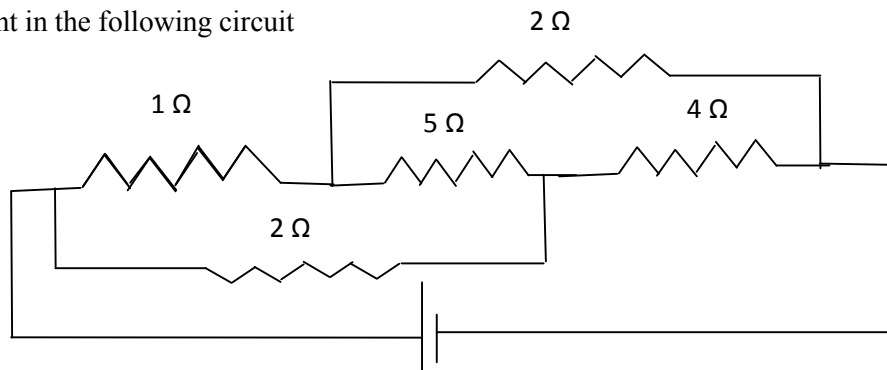
39. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{m}^{-3}$.
- (A) $4.54 \times 10^9 \text{m}^{-3}$ (B) $4.95 \times 10^{22} \text{m}^{-3}$
 (C) $1.5 \times 10^{16} \text{m}^{-3}$ (D) $5 \times 10^{28} \text{m}^{-3}$
40. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
- (A) $4.5 \times 10^5 \text{N/C}$ (B) $4.5 \times 10^5 \text{NC}$
 (C) $4.5 \times 10^{-5} \text{N/C}$ (D) $4.5 \times 10^{-5} \text{NC}$
41. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to
- (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine
42. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R



43. Net capacitance of 3 identical capacitor in series is $1\mu\text{F}$. What is the net capacitance in μF if connected in parallel?
- (A) 3 (B) 6
 (C) 9 (D) 12
44. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.
- (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s
45. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be
- (A) 0.5 (B) 1
 (C) 2 (D) 3

46.

Find current in the following circuit



- (A) 1A
(B) 2A
(C) 3A
(D) 4A
47. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
(A) $\mu_0 I / 2^{3/2} r$
(B) $\mu_0 2I / 2^{3/2} r$
(C) $\mu_0 I / 4\pi r$
(D) Cannot be determined
48. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
(A) 19N
(B) 18 N
(C) 16N
(D) 9.8N
49. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
(A) 1H
(B) 2H
(C) 3H
(D) 4H
50. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
(A) 500
(B) 800
(C) 900
(D) 1000
51. Among the following, the most stable complex is
(A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$
(B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
(C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$
(D) $[\text{Fe}(\text{Cl})_6]^{3-}$
52. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
(A) C.N=3, O.N=+1
(B) C.N=4, O.N=+2
(C) C.N=6, O.N=+1
(D) C.N=6, O.N=+3
53. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
(A) ABO_3
(B) A_3BO
(C) AB_3O
(D) $\text{A}_3\text{B}_3\text{O}_3$

54. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law
- (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
- (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law
- (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
55. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon
- (B) formaldehyde < carbon dioxide < methane < argon
- (C) argon < carbon dioxide < methane < formaldehyde
- (D) argon < methane < carbon dioxide < formaldehyde
56. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F
- (B) 4F
- (C) 6F
- (D) 5F
57. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple
- (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
- (C) Ag can displace H_2 from acid
- (D) Ag can displace H_2 from base
58. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area
- (B) A decrease in ΔH for the reaction
- (C) A decrease in the fraction of particles possessing sufficient energy
- (D) The introduction of an alternative pathway with greater activation energy.
59. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
- (B) The instantaneous rate a reaction is same at any time during the reaction
- (C) For a zero order reaction the concentration of reactants remains changed with passage of time
- (D) The rate of a reaction decreases with increase in concentration of reactant (s)
60. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
- (B) CH_4 (190K)
- (C) SO_2 (630K)
- (D) CO_2 (304K)

61. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- When $1/n=0$, the adsorption is independent of pressure.
 - When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 - When $1/n=0$, the adsorption is directly proportional to pressure.
 - When $n=0$, plot of x/m vs p is a curve
- (A) i and ii (B) ii and iv
(C) i and iii (D) all are false
62. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- ΔG^0 for the overall reaction is positive
 - ΔG^0 for the overall reaction is negative
 - E^0 for the overall reaction is positive
 - E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
(C) ii and iii (D) iii and iv
63. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
(C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}
64. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3 (B) PH_3
(C) AsH_3 (D) SbH_3
65. Consider the reactions,
- $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 - $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
- Compounds X and Y are, respectively
- (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
(C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
66. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1 (B) 2
(C) 3 (D) 5
67. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
(C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
68. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
(C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
69. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
(C) Cis-Pent-2-ene (D) Trans-Pent-2-ene

70. Which of the following undergoes nucleophilic substitution exclusively by S_N^1 mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
71. The number of possible stereoisomers for $CH_3CH=CHCH_2CH(Br)CH_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
72. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
73. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
74. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula C_3H_6O and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
75. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
76. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
 (A) CH_3COOH (B) $(CH_3)_2CHCOOH$
 (C) $CH_3CH_2CH_2COOH$ (D) $(CH_3)_3CCOOH$
77. $C_2H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{P/Br_2} Y \xrightarrow[NH_3]{(excess)} Z$.
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
78. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-SO_3H$ (B) $-OH$
 (C) $-F$ (D) $-Br$
79. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
80. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
81. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
82. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi

83. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
84. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
85. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s = +1/2$ (B) $n=4, l=3, m=-4, s = -1/2$
 (C) $n=4, l=3, m=+1, s = +1/2$ (D) $n=3, l=2, m=-2, s = +1/2$
86. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
87. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
88. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
89. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
90. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
91. If the bond dissociation energies of XY , X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400KJmol^{-1} (B) 300KJmol^{-1}
 (C) 200KJmol^{-1} (D) 100KJmol^{-1}
92. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) $\text{Water} < \text{ether} < \text{ethanol}$ (B) $\text{Water} < \text{ethanol} < \text{ether}$
 (C) $\text{Ether} < \text{ethanol} < \text{water}$ (D) $\text{Ethanol} < \text{ether} < \text{water}$
93. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
94. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
95. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 (D) 30 cm^3 of the solution contains one gas at STP

mole of H_2O_2

96. The correct sequence of covalent character is represented by:
(A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
(C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
97. Which of the following is known as pyrene?
(A) CCl_4 (B) CS_2
(C) S_2Cl_2 (D) Solid CO_2
98. The most stable carbocation amongst the following is:
(A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
(C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
99. The molecule that will have dipole moment is:
(A) 2,2-Dimethylpropane (B) cis-2-Butene
(C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
100. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
(A) 2-Methylpentane (B) 2,2-Dimethylbutane
(C) 2,3-Dimethylbutane (D) n-Hexane
101. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number
(A) 601 (B) 600
(C) 603 (D) 602
102. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes remain empty is
(A) 5 (B) 21
(C) 3^8 (D) ${}^8\text{C}_3$
103. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is
(A) 40 (B) 60
(C) 80 (D) 100
104. Number of divisors of the form $4n+2$ ($n \geq 0$) of the integer 240 is
(A) 4 (B) 8
(C) 10 (D) 3
105. 6 men and 4 women are to be seated in a row so that no two women sit together. The number of ways they can be seated is
(A) 604800 (B) 17280
(C) 120960 (D) 518400
106. If the cube roots of unity are $1, \omega, \omega^2$, then the roots of the equation $(x-1)^3 + 8 = 0$ are
(A) $-1, -1 + 2\omega, -1 - 2\omega^2$ (B) $-1, -1, -1$
(C) $-1, 1-2\omega, 1-2\omega^2$ (D) $-1, 1+2\omega, 1+2\omega^2$
107. If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then $\arg(z_1) - \arg(z_2)$ is equal to
(A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$
(C) 0 (D) 1

108. If $\arg(z) < 0$, then $\arg(-z) - \arg(z) =$
 (A) π (B) $-\pi$
 (C) $-\pi/2$ (D) $\pi/2$
109. If ω is an imaginary cube root of unity, then $(1+\omega-\omega^2)^7$ equals
 (A) 128ω (B) -128ω
 (C) $128\omega^2$ (D) $-128\omega^2$
110. The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order if and only if
 (A) $z_1 + z_4 = z_2 + z_3$ (B) $z_1 + z_3 = z_2 + z_4$
 (C) $z_1 + z_2 = z_3 + z_4$ (D) None of these
111. Let $R = \{(3,3) (6,6) (9,9) (12,12), (6,12) (3,9) (3,12), (3,6)\}$ be in a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
 (A) Reflexive and transitive (B) Reflexive only
 (C) An equivalence relation (D) Reflexive and symmetric only
112. If a real valued function $f(x)$ satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$, where 'a' is a given constant and $f(0) = 1$, then $f(2a-x)$ is equal to
 (A) $-f(x)$ (B) $f(x)$
 (C) $f(x) + f(a-x)$ (D) $f(-x)$
113. If the graph of the function $f(x)$ is symmetrical about the line $x=2$, then
 (A) $f(x+2) = f(x-2)$ (B) $f(2+x) = f(2-x)$
 (C) $f(x) = f(-x)$ (D) $f(x) = -f(-x)$
114. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \sin x$ is
 (A) into (B) onto
 (C) one-one (D) many-one
115. In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is
 (A) At least 30 (B) At most 20
 (C) Exactly 25 (D) None of these
116. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is
 (A) 1 (B) 0
 (C) 3 (D) 2
117. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals
 (A) -2 (B) 3
 (C) 2 (D) 1
118. If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then the roots are
 (A) 0, 1 (B) $-1, 1$
 (C) 0, -1 (D) $-1, 2$
119. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is/are
 (A) 2 (B) 4
 (C) 1 (D) 3
120. If $x^2 + 2ax + 10 - 3a > 0$ for every real value of x, then
 (A) $a > 5$ (B) $a < -5$
 (C) $-5 < a < 2$ (D) $2 < a < 5$

121. The angle between two diagonals of a cube is
 (A) 45° (B) 60°
 (C) 90° (D) $\tan^{-1}2\sqrt{2}$
122. If the angle between two vectors $\vec{i} + \vec{k}$ and $\vec{i} - \vec{j} + a\vec{k}$ is $\pi/3$, then the value of a is
 (A) 2 (B) 4
 (C) -2 (D) 0
123. The scalar $\vec{A} \cdot (\vec{B} + \vec{C}) \times (\vec{A} + \vec{B} + \vec{C})$ equals
 (A) 0 (B) $[\vec{A} \vec{B} \vec{C}] + [\vec{B} \vec{C} \vec{A}]$
 (C) $[\vec{A} \vec{B} \vec{C}]$ (D) None of these
124. The points with position vectors $60\hat{i} + 3\hat{j}, 40\hat{i} - 8\hat{j}, a\hat{i} - 52\hat{j}$ are collinear if
 (A) $a = -40$ (B) $a = 40$
 (C) $a = 20$ (D) None of these
125. The number of vectors of unit length perpendicular to vectors $\vec{a} = (0, 1, 1)$ and $\vec{b} = (1, 1, 0)$ is
 (A) one (B) two
 (C) three (D) infinite
126. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is
 (A) 0° (B) 90°
 (C) 45° (D) 30°
127. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is
 (A) $3/2$ (B) $5/2$
 (C) $7/2$ (D) $9/2$
128. The method of least squares dictates that we choose regression line where the sum of the square of deviations of the points from the line is:
 (A) Maximum (B) Minimum
 (C) Zero (D) Positive
129. If the value of any regression coefficient is zero, then two variables are:
 (A) Qualitative (B) Correlated
 (C) Dependent (D) Independent
130. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called:
 (A) Correlation (B) Regression
 (C) Residual (D) Slope
131. If $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, then $A^3 =$
 (A) A (B) 2A
 (C) 3A (D) 4A
132. The value of $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ is equal to
 (A) $1+x+y+z$ (B) $x+y+z$
 (C) xyz (D) $xyz+xy+xz+yz$
133. If $A^2 - A + I = 0$, then the inverse of A is
 (A) A (B) $A-I$
 (C) $I-A$ (D) I

134. The number of bijective functions from a set A to itself when A contains 106 elements is
 (A) 106 (B) 106^3
 (C) $106!$ (D) 2^{106}
135. The value of $\begin{vmatrix} 11 & 12 & 13 \\ 12 & 13 & 14 \\ 13 & 14 & 15 \end{vmatrix}$ is
 (A) 1 (B) 0
 (C) -1 (D) 67
136. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is
 (A) 2 (B) 2.57
 (C) 3 (D) 3.75
137. The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is
 (A) $\sqrt{\frac{52}{7}}$ (B) $\frac{52}{7}$
 (C) $\sqrt{6}$ (D) 6
138. Let a, b, c, d, e be the observations with mean m and standard deviation s. The standard deviation of the observations a+k, b+k, c+k, d+k, e+k is
 (A) ks (B) s
 (C) s+k (D) s/k
139. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is
 (A) 2.5 (B) 1
 (C) 1.5 (D) 0
140. Consider the first 10 positive integers. If we multiply each number by -1 and then add 1 to each number, the variance of the numbers so obtained is
 (A) 8.25 (B) 6.50
 (C) 3.87 (D) 2.87
141. For a linear programming equations, convex set of equations is included in the region of
 (A) Feasible solutions (B) Disposed solutions
 (C) Profit solutions (D) Loss solutions
142. Infeasibility means that the number of solutions to the linear programming models that satisfies all constraints is
 (A) at least 1 (B) 0
 (C) An infinite number (D) At least 2
143. A constraint that does not affect the feasible region is a
 (A) Non-negativity constraint (B) Redundant constraint
 (C) Standard constraint (D) Slack constraint

144. Consider the following LPP. Maximize $3x_1 + 8x_2$ subject to $2x_1 + 5x_2 \leq 10$, $6x_1 + x_2 \leq 6$, $x_1, x_2 \geq 0$. The optimal value of the function is
- (A) 0 (B) 3
(C) $\frac{111}{7}$ (D) 16
145. For linear inequalities, solution set for a group of inequalities is classified as
- (A) Concave set (B) Convex set
(C) Loss set (D) Profit set
146. Which of the following is unary operations?
- (A) Addition (B) Multiplication
(C) Square root (D) None of these
147. If * is a binary operation in A then
- (A) A is closed under * (B) A is not closed under *
(C) A is not closed under + (D) A is closed under -
148. Which of the following statements is not correct ?
- (A) $\text{Log}_{10} 10 = 1$ (B) $\text{Log} (2 + 3) = \text{log} (2 \times 3)$
(C) $\text{Log}_{10} 1 = 0$ (D) $\text{Log} (1+2+3) = \text{log} 1 + \text{log} 2 + \text{log} 3$
149. If $\log (a/b) + \log (b/a) = \log (a+b)$, then
- (A) $a+b=1$ (B) $a-b=1$
(C) $a=b$ (D) $a^2-b^2=1$
150. The value of e is
- (A) 0 (B) 1
(C) 2.718 (D) 2.14
151. $1 + \sin x + \sin^2 x + \dots$ up to $\infty = 4 + 2\sqrt{3}$, $0 < x < \Pi$ and $x \neq \frac{\pi}{2}$ then $x =$
- (A) $\frac{\pi}{6}, \frac{\pi}{3}$ (B) $\frac{\pi}{3}, 5\frac{\pi}{6}$
(C) $2\frac{\pi}{3}, \frac{\pi}{6}$ (D) $\frac{\pi}{3}, 2\frac{\pi}{3}$
152. A cow is tied to a post by a rope. The cow moves along the circular path always keeping the rope tight. If it describes 44 meters, when it has traced out 72° at the centre, the length of the rope is
- (A) 35 meters (B) 22 meters
(C) 56 meters (D) 45 meters
153. If $f(x) = \int_{-1}^x |t| dt$, for any $x \geq 0$, $f(x) =$
- (A) $\frac{1}{2}(1 - x^2)$ (B) $1 - x^2$
(C) $\frac{1}{2}(1 + x^2)$ (D) $1 + x^2$

154. The total of number of terms in the expansion of $(x + y)^{100} + (x - y)^{100}$ after simplification is
 (A) 50 (B) 51
 (C) 202 (D) 100
155. The maximum value of $\frac{\log x}{x}$ in $(2, \infty)$ is
 (A) 1 (B) $\frac{2}{e}$
 (C) e (D) $\frac{1}{e}$
156. The series $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \dots$ up to n terms is equal to
 (A) $\frac{n}{4n + 6}$ (B) $\frac{1}{6n + 4}$
 (C) $\frac{n}{6n + 4}$ (D) $\frac{1}{3n + 7}$
157. $\lim_{x \rightarrow 1} \frac{\tan(x^2 - 1)}{x - 1}$ equals
 (A) 2 (B) $\frac{1}{2}$
 (C) -2 (D) $-\frac{1}{2}$
158. If $x^m y^n = (x + y)^{m+n}$ then $\frac{dy}{dx}$ is equal to
 (A) $\frac{x + y}{xy}$ (B) xy
 (C) 0 (D) $\frac{y}{x}$
159. If $y = e^{\sin^{-1}(t^2 - 1)}$ and $x = e^{\sec^{-1}(\frac{1}{t^2 - 1})}$ then $\frac{dy}{dx}$ is equal to
 (A) $\frac{x}{y}$ (B) $-\frac{y}{x}$
 (C) $\frac{y}{x}$ (D) $-\frac{x}{y}$
160. Find the sum of 1st n terms of the series $\frac{1^2}{1} + \frac{1^2 + 2^2}{1 + 2} + \frac{1^2 + 2^2 + 3^2}{1 + 2 + 3} + \dots$
 (A) $\frac{n + 2}{3}$ (B) $\frac{n(n + 2)}{6}$
 (C) $\frac{n(n - 2)}{3}$ (D) $\frac{n(n - 2)}{6}$
161. The value of $\tan \frac{\pi}{8}$ is equal to
 (A) $\frac{1}{2}$ (B) $\sqrt{2} + 1$
 (C) $\frac{1}{\sqrt{2} + 1}$ (D) $1 - \sqrt{2}$

162. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$ is
 (A) $\frac{1}{y} + \frac{1}{x} = c$ (B) $\log x \cdot \log y = c$
 (C) $xy = c$ (D) $x + y = c$
163. If $PA = \frac{1}{3}, PB = \frac{1}{4}, P(A \cup B) = \frac{5}{12}$, then $P(A/B) =$
 (A) $\frac{25}{16}$ (B) $\frac{5}{4}$
 (C) $\frac{16}{25}$ (D) $\frac{4}{3}$
164. If $(a - 2)x^2 + 9y^2 = 4$ represents rectangular hyperbola then a equals
 (A) 0 (B) 2
 (C) 9 (D) None of these
165. If $\sum n = 55$, then the value of $\sum n^2$ is equal to
 (A) 385 (B) 506
 (C) 1115 (D) 3025
166. The 11th term in expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is
 (A) $\frac{999}{x}$ (B) $\frac{1001}{x}$
 (C) 1 (D) $\frac{x}{1001}$
167. $\int_0^{\frac{\pi}{2}} \frac{\sin^{1000} x \, dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to
 (A) 1000 (B) 1
 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
168. $\int e^x x^5 \, dx$ is
 (A) $e^x[x^5 + 5x^4 + 20x^3 + 60x^2 + 120x + 120] + C$ (B) $e^x[x^5 - 5x^4 - 20x^3 - 60x^2 - 120x - 120] + C$
 (C) $e^x[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120] + C$ (D) $e^x[x^5 + 5x^4 + 20x^3 - 60x^2 - 120x + 120] + C$
169. $\int \frac{\sec x}{\sec x + \tan x} \, dx$ is equal to
 (A) $\tan x - \sec x + C$. (B) $\log(1 + \sec x) + C$.
 (C) $\sec x + \tan x + C$. (D) $\log \sin x + \log \cos x + C$.
170. If $f(x) = be^{ax} + ae^{bx}$, then $f''(0) =$
 (A) 0 (B) 2ab
 (C) $ab(a + b)$ (D) ab
171. The length of the latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is
 (A) $\frac{4}{3}$ (B) 7
 (C) 12 (D) $\frac{3}{4}$

172. The principal value of $\sin^{-1} \tan\left(-\frac{5\pi}{4}\right)$ is
- (A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$
 (C) $\frac{\pi}{2}$ (D) $-\frac{\pi}{2}$
173. If $y = e^{m \sin^{-1}x}$, then $\frac{d^2y}{dx^2}$ at $x = 0$ is
- (A) m (B) m^2
 (C) $-m^2$ (D) $2m$
174. If $y = \sin(2 \sin^{-1}x)$, then it satisfies the differential equation
- (A) $(1 - x^2)y_2 - xy_1 + 4y = 0.$ (B) $(1 + x^2)y_2 - xy_1 + 4y = 0.$
 (C) $(1 - x^2)y_2 - xy_1 + y = 0.$ (D) $(1 + x^2)y_2 - xy_1 + 4y = 0.$
175. The value of $\cos\left[2 \tan^{-1} \frac{1+x}{1-x} + \sin^{-1} \frac{1-x^2}{1+x^2}\right]$ is
- (A) $\sqrt{2}$ (B) 1
 (C) 0 (D) -1
176. The equation of the circle which touches the x-axis and whose centre is (1,2), is
- (A) $x^2 + y^2 - 2x + 4y + 1 = 0.$ (B) $x^2 + y^2 - 2x - 4y + 1 = 0.$
 (C) $x^2 + y^2 + 2x + 4y + 1 = 0.$ (D) $x^2 + y^2 + 4x + 2y + 1 = 0.$
177. The differential equation $y \frac{dy}{dx} + x = c$ represents
- (A) A family of hyperbolas (B) A family of circles whose centres are on the y-axis.
 (C) A family of parabolas (D) A family of circles whose centres are on the x-axis.
178. A stone is thrown vertically upwards and the height x ft reached by the stone in t seconds is given by, $x + 80t - 16t^2$. The stone reaches the maximum height in
- (A) 2s (B) 2.5s
 (C) 3s (D) 1.5s
179. The area of the region bounded by $y = 2x - x^2$ and the $x - axis$ is
- (A) $\frac{8}{3}$ sq. units (B) $\frac{4}{3}$ sq. units
 (C) $\frac{7}{3}$ sq. units (D) $\frac{2}{3}$ sq. units
180. If $f(x) = \begin{cases} 2a - x, & -a < x < a \\ 3x - 2a, & a \leq x \end{cases}$ then which of the following is true
- (A) $f(x)$ is discontinuous at $x = a.$ (B) $f(x)$ is not differentiable at $x = a.$
 (C) $f(x)$ is differentiable at $x \geq a.$ (D) $f(x)$ is continuous at all $x < a.$
181. A die is tossed thrice. If getting an even number is considered as success, the variance of the probability distribution is
- (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{1}{4}$ (D) $\frac{2}{3}$

182. The coordinates of the foot of the perpendicular drawn from the point (3,4) on the line $2x + y - 7 = 0$ is
 (A) $\left(\frac{9}{5}, \frac{17}{5}\right)$ (B) (1, 5)
 (C) (-5, 1) (D) (1, -5)
183. The point (5, -7) lies outside the circle
 (A) $x^2 + y^2 - 8x = 0$ (B) $x^2 + y^2 - 5x + 7y = 0$
 (C) $x^2 + y^2 - 5x + 7y - 1 = 0$ (D) $x^2 + y^2 - 8x + 7y - 2 = 0$
184. If $\tan 15^\circ = 2 - \sqrt{3}$, then $2 \tan 1095^\circ + \cot 975^\circ + \tan (-195^\circ) =$
 (A) $2 + \sqrt{3}$ (B) $4 + 2\sqrt{3}$
 (C) $4 - 2\sqrt{3}$ (D) $2 - \sqrt{3}$
185. The number of circles touching the lines $x = 0$, $y = a$ and $y = b$ is
 (A) One (B) Two
 (C) Four (D) Infinite
186. The order and degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}} = \frac{d^2y}{dx^2}$ are respectively,
 (A) 1, 5 (B) 2, 1
 (C) 2, 5 (D) 2, 3
187. $x^{2n} - y^{2n}$ is divisible by
 (A) $x - y$ (B) $y - x$
 (C) $x + y$ (D) None of these
188. Mr. X has a 75% chance of attending the annual meet. Miss Y has an 80% chance, if Mr. X also attends. Otherwise she has a 50% chance of attending. If I go to the meet and see Miss Y there, then the probability that Mr. X is also there, is
 (A) $\frac{24}{29}$ (B) $\frac{25}{29}$
 (C) $\frac{26}{29}$ (D) $\frac{27}{29}$
189. $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x} + \sqrt{4-x}} dx$
 (A) 0 (B) 1
 (C) 3 (D) 2
190. $\lim_{x \rightarrow 0} \frac{a^{\sin x} - 1}{b^{\sin x} - 1}$
 (A) $\frac{\log a}{\log b}$ (B) $\log\left(\frac{a}{b}\right)$
 (C) 1 (D) 0
191. The value of $\frac{C_1}{2} + \frac{C_3}{4} + \frac{C_5}{6} + \dots$ where $C_1, C_3, C_5 \dots$ are the binomial coefficients of order n , is
 (A) $\frac{2^{n+1} - 1}{n + 1}$ (B) $\frac{2^n - 1}{n + 1}$
 (C) $\frac{2^{n+1}}{n + 1}$ (D) $\frac{2^{n+1} + 1}{n + 1}$

192. The value of $\binom{n}{r} + 2 \cdot \binom{n}{r-1} + \binom{n}{r-2}$, where $\binom{n}{k}$ denotes the binomial coefficient of order n , is
- (A) $\binom{n}{r}$ (B) $\binom{n+1}{r}$
 (C) $\binom{n+2}{r}$ (D) None of these
193. Which one of the following is possible?
- (A) $\cos \theta = \frac{7}{3}$ (B) $\sin \theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$
 (C) $\sec \theta = \frac{4}{5}$ (D) $\tan \theta = 45$
194. In the expansion of $(x^2 - \frac{1}{3x})^9$ the term independent of x is
- (A) T_7 (B) T_6
 (C) T_8 (D) T_9
195. If $x = e^{y+e^{y+\dots\infty}}$, $x > 0$, then $\frac{dy}{dx}$ is
- (A) $\frac{x}{1+x}$ (B) $\frac{1}{x}$
 (C) $\frac{1-x}{x}$ (D) $\frac{x}{1+x}$
196. $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$ is
- (A) $\tan\left(\frac{x}{2}\right) + C$ (B) $e^x \sin x + C$
 (C) $e^x \tan\left(\frac{x}{2}\right) + C$ (D) $e^x + C$
197. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at
- (A) -2 (B) 1.5
 (C) 4 (D) 1
198. If the arithmetic mean of two positive numbers a and b ($a > b$) is twice their G.M., then $a:b$ is
- (A) $6 + \sqrt{7} : 6 - \sqrt{7}$ (B) $2 + \sqrt{3} : 2 - \sqrt{3}$
 (C) $5 + \sqrt{6} : 5 - \sqrt{6}$ (D) None of these
199. $\lim_{x \rightarrow 0} x \sin(e^{1/x})$ is equal to
- (A) 0 (B) 1
 (C) $\frac{e}{2}$ (D) Does not exist
200. Differential coefficient of e^{x^2} with respect to $\log x^2$ is
- (A) e^{x^2} (B) xe^{x^2}
 (C) $x^2 e^{x^2}$ (D) $2x^2 e^{x^2}$

Sr. No.	Question
1.	<p>Among the following, the most stable complex is</p> <p>(A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$ (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$</p>
2.	<p>Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?</p> <p>(A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3</p>
3.	<p>In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:</p> <p>(A) ABO_3 (B) A_3BO (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$</p>
4.	<p>On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?</p> <p>(A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law</p>
5.	<p>K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:</p> <p>(A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde</p>
6.	<p>The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:</p> <p>(A) 3F (B) 4F (C) 6F (D) 5F</p>
7.	<p>The positive value of the standard electrode potential of Ag^+/Ag indicates that:</p> <p>(A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple (C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base</p>
8.	<p>Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:</p> <p>(A) A decrease in surface area (B) A decrease in ΔH for the reaction (C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.</p>

9. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
- (B) The instantaneous rate a reaction is same at any time during the reaction
- (C) For a zero order reaction the concentration of reactants remains changed with passage of time
- (D) The rate of a reaction decreases with increase in concentration of reactant (s)
10. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
- (B) CH_4 (190K)
- (C) SO_2 (630K)
- (D) CO_2 (304K)
11. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
- ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
- iii. When $1/n=0$, the adsorption is directly proportional to pressure.
- iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
- (B) ii and iv
- (C) i and iii
- (D) all are false
12. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
- ii. ΔG^0 for the overall reaction is negative
- iii. E^0 for the overall reaction is positive
- iv. E^0 for the overall reaction is negative
- (A) i and iv
- (B) i and iii
- (C) ii and iii
- (D) iii and iv
13. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^-
- (B) ClO_3^- and ICl_4^-
- (C) XeO_3^{2-} and PCl_3
- (D) ClO_3^- and SO_3^{2-}
14. Which of the following hydrides is the strongest reducing agent?
- (A) NH_3
- (B) PH_3
- (C) AsH_3
- (D) SbH_3
15. Consider the reactions,
- i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
- ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn} (\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
- Compounds X and Y are, respectively
- (A) N_2O , NO
- (B) NO_2 , NO_2
- (C) N_2 , N_2O
- (D) NO_2 , NO
16. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
- (A) 1
- (B) 2
- (C) 3
- (D) 5
17. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
- (A) CrSO_4
- (B) $\text{Cr}_2(\text{SO}_4)_3$
- (C) CrO_4^{2-}
- (D) $\text{Cr}_2(\text{SO}_3)_3$

18. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
19. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
- (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
20. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
- (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
21. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
- (A) 8 (B) 2
 (C) 4 (D) 6
22. 2-Methoxy-2-methylpropane on heating with HI produces:
- (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
23. The least acidic compound among the following is:
- (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
24. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
- (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
25. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
- (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
26. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
- (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
27. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$.
- In the above sequence, Z is:
- (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
28. The attachment of which of the following group at para position in aniline will raise the K_b value?
- (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
29. Which of the following is an example of globular protein?
- (A) myosin (B) collagen
 (C) keratin (D) Haemoglobin

30. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
31. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
32. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
33. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
34. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
35. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s = +1/2$ (B) $n=4, l=3, m=-4, s = -1/2$
 (C) $n=4, l=3, m=+1, s = +1/2$ (D) $n=3, l=2, m=-2, s = +1/2$
36. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
37. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
38. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
39. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
40. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
41. If the bond dissociation energies of XY, X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
42. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) $\text{Water} < \text{ether} < \text{ethanol}$ (B) $\text{Water} < \text{ethanol} < \text{ether}$
 (C) $\text{Ether} < \text{ethanol} < \text{water}$ (D) $\text{Ethanol} < \text{ether} < \text{water}$

43. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[H^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
44. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $MnO_4^{2-} \rightarrow MnO_4^-$ (B) $MnO_4^- \rightarrow Mn^{2+}$
 (C) $MnO_4^- \rightarrow MnO_2$ (D) $CrO_4^{2-} \rightarrow Cr^{3+}$
45. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
46. The correct sequence of covalent character is represented by:
 (A) $LiCl < NaCl < BeCl_2$ (B) $BeCl_2 < LiCl < NaCl$
 (C) $NaCl < LiCl < BeCl_2$ (D) $BeCl_2 < NaCl < LiCl$
47. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
48. The most stable carbocation amongst the following is:
 (A) $(CH_3)_2CH^+$ (B) Ph_3C^+
 (C) $CH_3CH_2^+$ (D) $CH_2=CH-CH_2^+$
49. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) cis-2-Butene
 (C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
50. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
51. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number
 (A) 601 (B) 600
 (C) 603 (D) 602
52. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes remain empty is
 (A) 5 (B) 21
 (C) 3^8 (D) 8C_3
53. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is
 (A) 40 (B) 60
 (C) 80 (D) 100
54. Number of divisors of the form $4n+2$ ($n \geq 0$) of the integer 240 is
 (A) 4 (B) 8
 (C) 10 (D) 3

55. 6 men and 4 women are to be seated in a row so that no two women sit together. The number of ways they can be seated is
 (A) 604800 (B) 17280
 (C) 120960 (D) 518400
56. If the cube roots of unity are $1, \omega, \omega^3$, then the roots of the equation $(x-1)^3 + 8 = 0$ are
 (A) $-1, -1 + 2\omega, -1 - 2\omega^2$ (B) $-1, -1, -1$
 (C) $-1, 1-2\omega, 1-2\omega^2$ (D) $-1, 1+2\omega, 1+2\omega^2$
57. If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then $\arg(z_1) - \arg(z_2)$ is equal to
 (A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$
 (C) 0 (D) 1
58. If $\arg(z) < 0$, then $\arg(-z) - \arg(z) =$
 (A) π (B) $-\pi$
 (C) $-\pi/2$ (D) $\pi/2$
59. If ω is an imaginary cube root of unity, then $(1+\omega-\omega^2)^7$ equals
 (A) 128ω (B) -128ω
 (C) $128\omega^2$ (D) $-128\omega^2$
60. The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order if and only if
 (A) $z_1 + z_4 = z_2 + z_3$ (B) $z_1 + z_3 = z_2 + z_4$
 (C) $z_1 + z_2 = z_3 + z_4$ (D) None of these
61. Let $R = \{(3,3) (6,6) (9,9) (12,12), (6,12) (3,9) (3,12), (3,6)\}$ be in a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
 (A) Reflexive and transitive (B) Reflexive only
 (C) An equivalence relation (D) Reflexive and symmetric only
62. If a real valued function $f(x)$ satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$, where 'a' is a given constant and $f(0) = 1$, then $f(2a-x)$ is equal to
 (A) $-f(x)$ (B) $f(x)$
 (C) $f(x) + f(a-x)$ (D) $f(-x)$
63. If the graph of the function $f(x)$ is symmetrical about the line $x=2$, then
 (A) $f(x+2) = f(x-2)$ (B) $f(2+x) = f(2-x)$
 (C) $f(x) = f(-x)$ (D) $f(x) = -f(-x)$
64. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \sin x$ is
 (A) into (B) onto
 (C) one-one (D) many-one
65. In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is
 (A) At least 30 (B) At most 20
 (C) Exactly 25 (D) None of these
66. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is
 (A) 1 (B) 0
 (C) 3 (D) 2

67. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals
 (A) -2 (B) 3
 (C) 2 (D) 1
68. If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then the roots are
 (A) $0, 1$ (B) $-1, 1$
 (C) $0, -1$ (D) $-1, 2$
69. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is/are
 (A) 2 (B) 4
 (C) 1 (D) 3
70. If $x^2 + 2ax + 10 - 3a > 0$ for every real value of x , then
 (A) $a > 5$ (B) $a < -5$
 (C) $-5 < a < 2$ (D) $2 < a < 5$
71. The angle between two diagonals of a cube is
 (A) 45° (B) 60°
 (C) 90° (D) $\tan^{-1}2\sqrt{2}$
72. If the angle between two vectors $\vec{i} + \vec{k}$ and $\vec{i} - \vec{j} + a\vec{k}$ is $\pi/3$, then the value of a is
 (A) 2 (B) 4
 (C) -2 (D) 0
73. The scalar $\vec{A} \cdot (\vec{B} + \vec{C}) \times (\vec{A} + \vec{B} + \vec{C})$ equals
 (A) 0 (B) $[\vec{A} \vec{B} \vec{C}] + [\vec{B} \vec{C} \vec{A}]$
 (C) $[\vec{A} \vec{B} \vec{C}]$ (D) None of these
74. The points with position vectors $60\hat{i} + 3\hat{j}, 40\hat{i} - 8\hat{j}, a\hat{i} - 52\hat{j}$ are collinear if
 (A) $a = -40$ (B) $a = 40$
 (C) $a = 20$ (D) None of these
75. The number of vectors of unit length perpendicular to vectors $\vec{a} = (0, 1, 1)$ and $\vec{b} = (1, 1, 0)$ is
 (A) one (B) two
 (C) three (D) infinite
76. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is
 (A) 0° (B) 90°
 (C) 45° (D) 30°
77. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is
 (A) $3/2$ (B) $5/2$
 (C) $7/2$ (D) $9/2$
78. The method of least squares dictates that we choose regression line where the sum of the square of deviations of the points from the line is:
 (A) Maximum (B) Minimum
 (C) Zero (D) Positive
79. If the value of any regression coefficient is zero, then two variables are:
 (A) Qualitative (B) Correlated
 (C) Dependent (D) Independent
80. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called:
 (A) Correlation (B) Regression
 (C) Residual (D) Slope

81. If $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, then $A^3 =$
- (A) A (B) $2A$
 (C) $3A$ (D) $4A$
82. The value of $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ is equal to
- (A) $1+x+y+z$ (B) $x+y+z$
 (C) xyz (D) $xyz+xy+xz+yz$
83. If $A^2 - A + I = 0$, then the inverse of A is
- (A) A (B) $A-I$
 (C) $I-A$ (D) I
84. The number of bijective functions from a set A to itself when A contains 106 elements is
- (A) 106 (B) 106^3
 (C) $106!$ (D) 2^{106}
85. The value of $\begin{vmatrix} 11 & 12 & 13 \\ 12 & 13 & 14 \\ 13 & 14 & 15 \end{vmatrix}$ is
- (A) 1 (B) 0
 (C) -1 (D) 67
86. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is
- (A) 2 (B) 2.57
 (C) 3 (D) 3.75
87. The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is
- (A) $\sqrt{\frac{52}{7}}$ (B) $\frac{52}{7}$
 (C) $\sqrt{6}$ (D) 6
88. Let a, b, c, d, e be the observations with mean m and standard deviation s . The standard deviation of the observations $a+k, b+k, c+k, d+k, e+k$ is
- (A) ks (B) s
 (C) $s+k$ (D) s/k
89. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is
- (A) 2.5 (B) 1
 (C) 1.5 (D) 0
90. Consider the first 10 positive integers. If we multiply each number by -1 and then add 1 to each number, the variance of the numbers so obtained is
- (A) 8.25 (B) 6.50
 (C) 3.87 (D) 2.87

91. For a linear programming equations, convex set of equations is included in the region of
 (A) Feasible solutions (B) Disposed solutions
 (C) Profit solutions (D) Loss solutions
92. Infeasibility means that the number of solutions to the linear programming models that satisfies all constraints is
 (A) at least 1 (B) 0
 (C) An infinite number (D) At least 2
93. A constraint that does not affect the feasible region is a
 (A) Non-negativity constraint (B) Redundant constraint
 (C) Standard constraint (D) Slack constraint
94. Consider the following LPP. Maximize $3x_1 + 8x_2$ subject to $2x_1 + 5x_2 \leq 10$, $6x_1 + x_2 \leq 6$, $x_1, x_2 \geq 0$. The optimal value of the function is
 (A) 0 (B) 3
 (C) $\frac{111}{7}$ (D) 16
95. For linear inequalities, solution set for a group of inequalities is classified as
 (A) Concave set (B) Convex set
 (C) Loss set (D) Profit set
96. Which of the following is unary operations?
 (A) Addition (B) Multiplication
 (C) Square root (D) None of these
97. If * is a binary operation in A then
 (A) A is closed under * (B) A is not closed under *
 (C) A is not closed under + (D) A is closed under -
98. Which of the following statements is not correct ?
 (A) $\log_{10} 10 = 1$ (B) $\log (2 + 3) = \log (2 \times 3)$
 (C) $\log_{10} 1 = 0$ (D) $\log (1+2+3) = \log 1 + \log 2 + \log 3$
99. If $\log (a/b) + \log (b/a) = \log (a+b)$, then
 (A) $a+b=1$ (B) $a-b=1$
 (C) $a=b$ (D) $a^2 - b^2=1$
100. The value of e is
 (A) 0 (B) 1
 (C) 2.718 (D) 2.14
101. $1 + \sin x + \sin^2 x + \dots$ up to $\infty = 4 + 2\sqrt{3}$, $0 < x < \Pi$ and $x \neq \frac{\pi}{2}$ then $x =$
 (A) $\frac{\pi}{6}, \frac{\pi}{3}$ (B) $\frac{\pi}{3}, 5\frac{\pi}{6}$
 (C) $2\frac{\pi}{3}, \frac{\pi}{6}$ (D) $\frac{\pi}{3}, 2\frac{\pi}{3}$
102. A cow is tied to a post by a rope. The cow moves along the circular path always keeping the rope tight. If it describes 44 meters, when it has traced out 72° at the centre, the length of the rope is
 (A) 35 meters (B) 22 meters
 (C) 56 meters (D) 45 meters

103. If $f(x) = \int_{-1}^x |t| dt$, for any $x \geq 0$, $f(x) =$
- (A) $\frac{1}{2}(1 - x^2)$ (B) $1 - x^2$
 (C) $\frac{1}{2}(1 + x^2)$ (D) $1 + x^2$
104. The total of number of terms in the expansion of $(x + y)^{100} + (x - y)^{100}$ after simplification is
- (A) 50 (B) 51
 (C) 202 (D) 100
105. The maximum value of $\frac{\log x}{x}$ in $(2, \infty)$ is
- (A) 1 (B) $\frac{2}{e}$
 (C) e (D) $\frac{1}{e}$
106. The series $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \dots$ up to n terms is equal to
- (A) $\frac{n}{4n + 6}$ (B) $\frac{1}{6n + 4}$
 (C) $\frac{n}{6n + 4}$ (D) $\frac{1}{3n + 7}$
107. $\lim_{x \rightarrow 1} \frac{\tan(x^2 - 1)}{x - 1}$ equals
- (A) 2 (B) $\frac{1}{2}$
 (C) -2 (D) $-\frac{1}{2}$
108. If $x^m y^n = (x + y)^{m+n}$ then $\frac{dy}{dx}$ is equal to
- (A) $\frac{x + y}{xy}$ (B) xy
 (C) 0 (D) $\frac{y}{x}$
109. If $y = e^{\sin^{-1}(t^2 - 1)}$ and $x = e^{\sec^{-1}(\frac{1}{t^2 - 1})}$ then $\frac{dy}{dx}$ is equal to
- (A) $\frac{x}{y}$ (B) $-\frac{y}{x}$
 (C) $\frac{y}{x}$ (D) $-\frac{x}{y}$
110. Find the sum of 1st n terms of the series $\frac{1^2}{1} + \frac{1^2 + 2^2}{1 + 2} + \frac{1^2 + 2^2 + 3^2}{1 + 2 + 3} + \dots$
- (A) $\frac{n + 2}{3}$ (B) $\frac{n(n + 2)}{6}$
 (C) $\frac{n(n - 2)}{3}$ (D) $\frac{n(n - 2)}{6}$

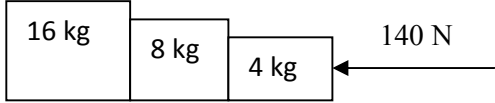
111. The value of $\tan \frac{\pi}{8}$ is equal to
 (A) $\frac{1}{2}$ (B) $\sqrt{2} + 1$
 (C) $\frac{1}{\sqrt{2} + 1}$ (D) $1 - \sqrt{2}$
112. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$ is
 (A) $\frac{1}{y} + \frac{1}{x} = c$ (B) $\log x \cdot \log y = c$
 (C) $xy = c$ (D) $x + y = c$
113. If $PA = \frac{1}{3}, PB = \frac{1}{4}, P(A \cup B) = \frac{5}{12}$, then $P(A/B) =$
 (A) $\frac{25}{16}$ (B) $\frac{5}{4}$
 (C) $\frac{16}{25}$ (D) $\frac{2}{3}$
114. If $(a - 2)x^2 + 9y^2 = 4$ represents rectangular hyperbola then a equals
 (A) 0 (B) 2
 (C) 9 (D) None of these
115. If $\sum n = 55$, then the value of $\sum n^2$ is equal to
 (A) 385 (B) 506
 (C) 1115 (D) 3025
116. The 11th term in expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is
 (A) $\frac{999}{x}$ (B) $\frac{1001}{x}$
 (C) 1 (D) $\frac{x}{1001}$
117. $\int_0^{\frac{\pi}{2}} \frac{\sin^{1000} x \, dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to
 (A) 1000 (B) 1
 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
118. $\int e^x x^5 \, dx$ is
 (A) $e^x[x^5 + 5x^4 + 20x^3 + 60x^2 + 120x + 120] + C$ (B) $e^x[x^5 - 5x^4 - 20x^3 - 60x^2 - 120x - 120] + C$
 (C) $e^x[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120] + C$ (D) $e^x[x^5 + 5x^4 + 20x^3 - 60x^2 - 120x + 120] + C$
119. $\int \frac{\sec x}{\sec x + \tan x} \, dx$ is equal to
 (A) $\tan x - \sec x + C.$ (B) $\log(1 + \sec x) + C.$
 (C) $\sec x + \tan x + C.$ (D) $\log \sin x + \log \cos x + C.$
120. If $f(x) = be^{ax} + ae^{bx}$, then $f''(0) =$
 (A) 0 (B) 2ab
 (C) $ab(a + b)$ (D) Ab

121. The length of the latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is
 (A) $\frac{4}{3}$ (B) 7
 (C) 12 (D) $\frac{3}{4}$
122. The principal value of $\sin^{-1} \tan\left(-\frac{5\pi}{4}\right)$ is
 (A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$
 (C) $\frac{\pi}{2}$ (D) $-\frac{\pi}{2}$
123. If $y = e^{m \sin^{-1} x}$, then $\frac{d^2 y}{dx^2}$ at $x = 0$ is
 (A) m (B) m^2
 (C) $-m^2$ (D) $2m$
124. If $y = \sin(2 \sin^{-1} x)$, then it satisfies the differential equation
 (A) $(1 - x^2)y_2 - xy_1 + 4y = 0$. (B) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
 (C) $(1 - x^2)y_2 - xy_1 + y = 0$. (D) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
125. The value of $\cos\left[2 \tan^{-1} \frac{1+x}{1-x} + \sin^{-1} \frac{1-x^2}{1+x^2}\right]$ is
 (A) $\sqrt{2}$ (B) 1
 (C) 0 (D) -1
126. The equation of the circle which touches the x-axis and whose centre is (1,2), is
 (A) $x^2 + y^2 - 2x + 4y + 1 = 0$. (B) $x^2 + y^2 - 2x - 4y + 1 = 0$.
 (C) $x^2 + y^2 + 2x + 4y + 1 = 0$. (D) $x^2 + y^2 + 4x + 2y + 1 = 0$.
127. The differential equation $y \frac{dy}{dx} + x = c$ represents
 (A) A family of hyperbolas (B) A family of circles whose centres are on the y-axis.
 (C) A family of parabolas (D) A family of circles whose centres are on the x-axis.
128. A stone is thrown vertically upwards and the height x ft reached by the stone in t seconds is given by, $x + 80t - 16t^2$. The stone reaches the maximum height in
 (A) 2s (B) 2.5s
 (C) 3s (D) 1.5s
129. The area of the region bounded by $y = 2x - x^2$ and the x -axis is
 (A) $\frac{8}{3}$ sq. units (B) $\frac{4}{3}$ sq. units
 (C) $\frac{7}{3}$ sq. units (D) $\frac{2}{3}$ sq. units
130. If $f(x) = \begin{cases} 2a - x, & -a < x < a \\ 3x - 2a, & a \leq x \end{cases}$ then which of the following is true
 (A) $f(x)$ is discontinuous at $x = a$. (B) $f(x)$ is not differentiable at $x = a$.
 (C) $f(x)$ is differentiable at $x \geq a$. (D) $f(x)$ is continuous at all $x < a$.

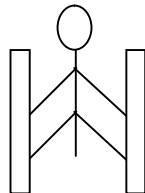
131. A die is tossed thrice. If getting an even number is considered as success, the variance of the probability distribution is
- (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{1}{4}$ (D) $\frac{2}{3}$
132. The coordinates of the foot of the perpendicular drawn from the point (3,4) on the line $2x + y - 7 = 0$ is
- (A) $\left(\frac{9}{5}, \frac{17}{5}\right)$ (B) (1, 5)
 (C) (-5, 1) (D) (1, -5)
133. The point (5, -7) lies outside the circle
- (A) $x^2 + y^2 - 8x = 0$ (B) $x^2 + y^2 - 5x + 7y = 0$
 (C) $x^2 + y^2 - 5x + 7y - 1 = 0$ (D) $x^2 + y^2 - 8x + 7y - 2 = 0$
134. If $\tan 15^\circ = 2 - \sqrt{3}$, then $2 \tan 1095^\circ + \cot 975^\circ + \tan (-195^\circ) =$
- (A) $2 + \sqrt{3}$ (B) $4 + 2\sqrt{3}$
 (C) $4 - 2\sqrt{3}$ (D) $2 - \sqrt{3}$
135. The number of circles touching the lines $x = 0$, $y = a$ and $y = b$ is
- (A) One (B) Two
 (C) Four (D) Infinite
136. The order and degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}} = \frac{d^2y}{dx^2}$ are respectively,
- (A) 1, 5 (B) 2, 1
 (C) 2, 5 (D) 2, 3
137. $x^{2n} - y^{2n}$ is divisible by
- (A) $x - y$ (B) $y - x$
 (C) $x + y$ (D) None of these
138. Mr. X has a 75% chance of attending the annual meet. Miss Y has an 80% chance, if Mr. X also attends. Otherwise she has a 50% chance of attending. If I go to the meet and see Miss Y there, then the probability that Mr. X is also there, is
- (A) $\frac{24}{29}$ (B) $\frac{25}{29}$
 (C) $\frac{26}{29}$ (D) $\frac{27}{29}$
139. $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x} + \sqrt{4-x}} dx$
- (A) 0 (B) 1
 (C) 3 (D) 2
140. $\lim_{x \rightarrow 0} \frac{a^{\sin x} - 1}{b^{\sin x} - 1}$
- (A) $\frac{\log a}{\log b}$ (B) $\log\left(\frac{a}{b}\right)$
 (C) 1 (D) 0

141. The value of $\frac{C_1}{2} + \frac{C_3}{4} + \frac{C_5}{6} + \dots$ where $C_1, C_3, C_5 \dots$ are the binomial coefficients of order n , is
- (A) $\frac{2^{n+1} - 1}{n + 1}$ (B) $\frac{2^n - 1}{n + 1}$
 (C) $\frac{2^{n+1}}{n + 1}$ (D) $\frac{2^{n+1} + 1}{n + 1}$
142. The value of $\binom{n}{r} + 2 \cdot \binom{n}{r-1} + \binom{n}{r-2}$, where $\binom{n}{k}$ denotes the binomial coefficient of order n , is
- (A) $\binom{n}{r}$ (B) $\binom{n+1}{r}$
 (C) $\binom{n+2}{r}$ (D) None of these
143. Which one of the following is possible?
- (A) $\cos \theta = \frac{7}{3}$ (B) $\sin \theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$
 (C) $\sec \theta = \frac{4}{5}$ (D) $\tan \theta = 45$
144. In the expansion of $(x^2 - \frac{1}{3x})^9$ the term independent of x is
- (A) T_7 (B) T_6
 (C) T_8 (D) T_9
145. If $x = e^{y+e^{y+\dots}}$, $x > 0$, then $\frac{dy}{dx}$ is
- (A) $\frac{x}{1+x}$ (B) $\frac{1}{x}$
 (C) $\frac{1-x}{x}$ (D) $\frac{x}{1+x}$
146. $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$ is
- (A) $\tan\left(\frac{x}{2}\right) + C$ (B) $e^x \sin x + C$
 (C) $e^x \tan\left(\frac{x}{2}\right) + C$ (D) $e^x + C$
147. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at
- (A) -2 (B) 1.5
 (C) 4 (D) 1
148. If the arithmetic mean of two positive numbers a and b ($a > b$) is twice their G.M., then $a:b$ is
- (A) $6 + \sqrt{7} : 6 - \sqrt{7}$ (B) $2 + \sqrt{3} : 2 - \sqrt{3}$
 (C) $5 + \sqrt{6} : 5 - \sqrt{6}$ (D) None of these
149. $\lim_{x \rightarrow 0} x \sin(e^{1/x})$ is equal to
- (A) 0 (B) 1
 (C) $\frac{e}{2}$ (D) Does not exist
150. Differential coefficient of e^{x^2} with respect to $\log x^2$ is
- (A) e^{x^2} (B) xe^{x^2}
 (C) $x^2 e^{x^2}$ (D) $2x^2 e^{x^2}$

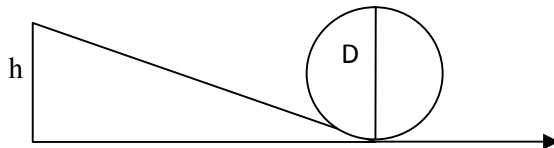
151. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
152. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
153. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20m/s to 10m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
154. A spacecraft of mass 2000kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000

155.  The force on 16 kg is.....?
 (A) 140N (B) 120N
 (C) 100N (D) 80N

156. A man of mass 40 kg is at rest between the walls. If co eff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



- (A) 100 N (B) 250 N
 (C) 80 N (D) 50 N
- 157.



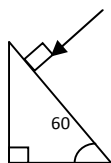
Find minimum height in terms of D to complete the loop

- (A) $7D/4$ (B) $9D/4$
 (C) $5D/4$ (D) $3D/4$
158. Gravitational force between two bodies is F. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
 (A) $F/9$ (B) $3F$
 (C) F (D) $F/3$

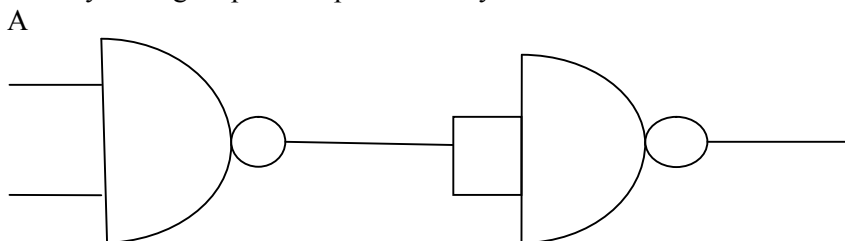
159. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
 (A) infinity (B) 150kg
 (C) zero (D) 75/2 kg
160. g at a depth of 1600 km inside the earth in m/s/s is
 (A) 6.65 (B) 7.35
 (C) 8.65 (D) 4.35
161. A block of mass $19M$ is suspended by a string of length $1m$. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
 (A) 140 (B) $20\sqrt{19.6}$
 (C) $20\sqrt{9.8}$ (D) 20
162. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
 (A) 20 (B) 62.5
 (C) 23 (D) 60
163. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
 (A) 2600W (B) 250W
 (C) 325W (D) 2500W
164. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
165. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2}V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
166. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
167. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10\text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
168. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
169. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant

170. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
171. When kerosene and coconut oil of co eff. of viscosity 0.002 and 0.0154 Ns/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
172. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
173. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only 1 is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
174. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
175. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C
176. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{ Wb}$ (B) $1.6 \times 10^{-7} \text{ Wb}$
 (C) $3 \times 10^{-7} \text{ Wb}$ (D) $1.5 \times 10^{-7} \text{ Wb}$
177. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time, the current will be maximum?
 (A) $1/100 \text{ s}$ (B) $1/200 \text{ s}$
 (C) $1/500 \text{ s}$ (D) 1 s
178. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) $1/C$ (D) q
179. A capacitor of $1 \mu\text{F}$ is charged with 0.01 C of electricity. How much energy is stored in it?
 (A) 30J (B) 40J
 (C) 50J (D) 60J
180. An electromagnetic wave is travelling in vacuum with a speed of $3 \times 10^8 \text{ m/s}$. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{ m/s}$ (B) $1.5 \times 10^8 \text{ m/s}$
 (C) $2 \times 10^8 \text{ m/s}$ (D) No change

181. Trace the path of a ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30
(B) 45
(C) 60
(D) 75
182. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
(A) 8:1
(B) 64:1
(C) 9:7
(D) 81:49
183. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
(A) 1 mm
(B) 1.5 mm
(C) 2 mm
(D) 2.5 mm
184. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
(A) 37
(B) 47
(C) 57
(D) 67
185. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
(A) 1.227 \AA
(B) 12.27 \AA
(C) 122.7 \AA
(D) 1227 \AA
186. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
(A) infinity
(B) zero
(C) radio wave
(D) X ray
187. Which among the following series gives visible light?
(A) Lyman
(B) Balmer
(C) Brackett
(D) None of these
188. Identify the logic operation performed by this circuit



- B
- (A) AND
(B) OR
(C) NAND
(D) NOR

189. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$.

- (A) $4.54 \times 10^9 \text{ m}^{-3}$ (B) $4.95 \times 10^{22} \text{ m}^{-3}$
 (C) $1.5 \times 10^{16} \text{ m}^{-3}$ (D) $5 \times 10^{28} \text{ m}^{-3}$

190. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

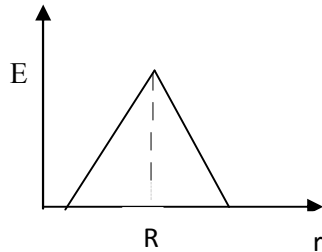
- (A) $4.5 \times 10^5 \text{ N/C}$ (B) $4.5 \times 10^5 \text{ NC}$
 (C) $4.5 \times 10^{-5} \text{ N/C}$ (D) $4.5 \times 10^{-5} \text{ NC}$

191. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to

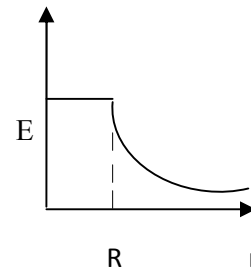
- (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine

192. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

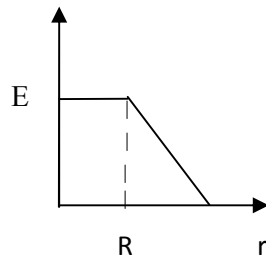
(A)



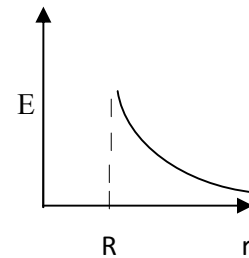
(B)



(C)



(D)



193. Net capacitance of 3 identical capacitor in series is $1\mu\text{F}$. What is the net capacitance in μF if connected in parallel?

- (A) 3 (B) 6
 (C) 9 (D) 12

194. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.

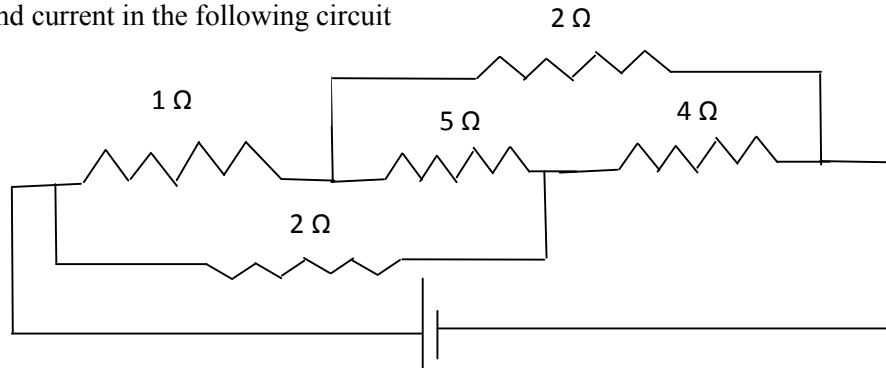
- (A) 2s (B) 1s
 (C) 0.5s (D) 0.25s

195. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

- (A) 0.5 (B) 1
 (C) 2 (D) 3

196.

Find current in the following circuit



- | | |
|--------|--------|
| (A) 1A | (B) 2A |
| (C) 3A | (D) 4A |

197. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.

- | | |
|---------------------------|----------------------------|
| (A) $\mu_0 I / 2^{3/2} r$ | (B) $\mu_0 2I / 2^{3/2} r$ |
| (C) $\mu_0 I / 4\pi r$ | (D) Cannot be determined |

198. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8 . If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:

- | | |
|-------------------|--------------------|
| (A) 19 N | (B) 18 N |
| (C) 16 N | (D) 9.8 N |

199. Current in a circuit falls steadily from 2 A to 0 A in 10 ms . Calculate L if emf induced is 200 V .

- | | |
|------------------|------------------|
| (A) 1 H | (B) 2 H |
| (C) 3 H | (D) 4 H |

200. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?

- | | |
|-----------|------------|
| (A) 500 | (B) 800 |
| (C) 900 | (D) 1000 |

Sr. No.	Question
---------	----------

1. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number
 (A) 601 (B) 600
 (C) 603 (D) 602
2. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes remain empty is
 (A) 5 (B) 21
 (C) 3^8 (D) 8C_3
3. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is
 (A) 40 (B) 60
 (C) 80 (D) 100
4. Number of divisors of the form $4n+2$ ($n \geq 0$) of the integer 240 is
 (A) 4 (B) 8
 (C) 10 (D) 3
5. 6 men and 4 women are to be seated in a row so that no two women sit together. The number of ways they can be seated is
 (A) 604800 (B) 17280
 (C) 120960 (D) 518400
6. If the cube roots of unity are $1, \omega, \omega^3$, then the roots of the equation $(x-1)^3 + 8 = 0$ are
 (A) $-1, -1 + 2\omega, -1 - 2\omega^2$ (B) $-1, -1, -1$
 (C) $-1, 1-2\omega, 1-2\omega^2$ (D) $-1, 1+2\omega, 1+2\omega^2$
7. If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then $\arg(z_1) - \arg(z_2)$ is equal to
 (A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$
 (C) 0 (D) 1
8. If $\arg(z) < 0$, then $\arg(-z) - \arg(z) =$
 (A) π (B) $-\pi$
 (C) $-\pi/2$ (D) $\pi/2$
9. If ω is an imaginary cube root of unity, then $(1+\omega-\omega^2)^7$ equals
 (A) 128ω (B) -128ω
 (C) $128\omega^2$ (D) $-128\omega^2$
10. The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order if and only if
 (A) $z_1 + z_4 = z_2 + z_3$ (B) $z_1 + z_3 = z_2 + z_4$
 (C) $z_1 + z_2 = z_3 + z_4$ (D) None of these
11. Let $R = \{(3,3) (6,6) (9,9) (12,12), (6,12) (3,9) (3,12), (3,6)\}$ be in a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
 (A) Reflexive and transitive (B) Reflexive only
 (C) An equivalence relation (D) Reflexive and symmetric only

12. If a real valued function $f(x)$ satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$, where 'a' is a given constant and $f(0) = 1$, then $f(2a-x)$ is equal to
 (A) $-f(x)$ (B) $f(x)$
 (C) $f(x) + f(a-x)$ (D) $f(-x)$
13. If the graph of the function $f(x)$ is symmetrical about the line $x=2$, then
 (A) $f(x+2) = f(x-2)$ (B) $f(2+x) = f(2-x)$
 (C) $f(x) = f(-x)$ (D) $f(x) = -f(-x)$
14. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \sin x$ is
 (A) into (B) onto
 (C) one-one (D) many-one
15. In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is
 (A) At least 30 (B) At most 20
 (C) Exactly 25 (D) None of these
16. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is
 (A) 1 (B) 0
 (C) 3 (D) 2
17. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals
 (A) -2 (B) 3
 (C) 2 (D) 1
18. If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then the roots are
 (A) 0, 1 (B) $-1, 1$
 (C) 0, -1 (D) $-1, 2$
19. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is/are
 (A) 2 (B) 4
 (C) 1 (D) 3
20. If $x^2 + 2ax + 10 - 3a > 0$ for every real value of x , then
 (A) $a > 5$ (B) $a < -5$
 (C) $-5 < a < 2$ (D) $2 < a < 5$
21. The angle between two diagonals of a cube is
 (A) 45° (B) 60°
 (C) 90° (D) $\tan^{-1}2\sqrt{2}$
22. If the angle between two vectors $\vec{i} + \vec{k}$ and $\vec{i} - \vec{j} + a\vec{k}$ is $\pi/3$, then the value of a is
 (A) 2 (B) 4
 (C) -2 (D) 0
23. The scalar $\vec{A} \cdot (\vec{B} + \vec{C}) \times (\vec{A} + \vec{B} + \vec{C})$ equals
 (A) 0 (B) $[\vec{A} \vec{B} \vec{C}] + [\vec{B} \vec{C} \vec{A}]$
 (C) $[\vec{A} \vec{B} \vec{C}]$ (D) None of these
24. The points with position vectors $60\hat{i} + 3\hat{j}$, $40\hat{i} - 8\hat{j}$, $a\hat{i} - 52\hat{j}$ are collinear if
 (A) $a = -40$ (B) $a = 40$
 (C) $a = 20$ (D) None of these

25. The number of vectors of unit length perpendicular to vectors $\vec{a} = (0, 1, 1)$ and $\vec{b} = (1, 1, 0)$ is
 (A) one (B) two
 (C) three (D) infinite
26. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is
 (A) 0° (B) 90°
 (C) 45° (D) 30°
27. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is
 (A) $3/2$ (B) $5/2$
 (C) $7/2$ (D) $9/2$
28. The method of least squares dictates that we choose regression line where the sum of the square of deviations of the points from the line is:
 (A) Maximum (B) Minimum
 (C) Zero (D) Positive
29. If the value of any regression coefficient is zero, then two variables are:
 (A) Qualitative (B) Correlated
 (C) Dependent (D) Independent
30. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called:
 (A) Correlation (B) Regression
 (C) Residual (D) Slope
31. If $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, then $A^3 =$
 (A) A (B) $2A$
 (C) $3A$ (D) $4A$
32. The value of $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ is equal to
 (A) $1+x+y+z$ (B) $x+y+z$
 (C) xyz (D) $xyz+xy+xz+yz$
33. If $A^2 - A + I = 0$, then the inverse of A is
 (A) A (B) $A-I$
 (C) $I-A$ (D) I
34. The number of bijective functions from a set A to itself when A contains 106 elements is
 (A) 106 (B) 106^3
 (C) $106!$ (D) 2^{106}
35. The value of $\begin{vmatrix} 11 & 12 & 13 \\ 12 & 13 & 14 \\ 13 & 14 & 15 \end{vmatrix}$ is
 (A) 1 (B) 0
 (C) -1 (D) 67
36. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is
 (A) 2 (B) 2.57
 (C) 3 (D) 3.75

37. The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is
 (A) $\sqrt{\frac{52}{7}}$ (B) $\frac{52}{7}$
 (C) $\sqrt{6}$ (D) 6
38. Let a, b, c, d, e be the observations with mean m and standard deviation s. The standard deviation of the observations a+k, b+k, c+k, d+k, e+k is
 (A) ks (B) s
 (C) s+k (D) s/k
39. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is
 (A) 2.5 (B) 1
 (C) 1.5 (D) 0
40. Consider the first 10 positive integers. If we multiply each number by -1 and then add 1 to each number, the variance of the numbers so obtained is
 (A) 8.25 (B) 6.50
 (C) 3.87 (D) 2.87
41. For a linear programming equations, convex set of equations is included in the region of
 (A) Feasible solutions (B) Disposed solutions
 (C) Profit solutions (D) Loss solutions
42. Infeasibility means that the number of solutions to the linear programming models that satisfies all constraints is
 (A) at least 1 (B) 0
 (C) An infinite number (D) At least 2
43. A constraint that does not affect the feasible region is a
 (A) Non-negativity constraint (B) Redundant constraint
 (C) Standard constraint (D) Slack constraint
44. Consider the following LPP. Maximize $3x_1 + 8x_2$ subject to $2x_1 + 5x_2 \leq 10$, $6x_1 + x_2 \leq 6$, $x_1, x_2 \geq 0$. The optimal value of the function is
 (A) 0 (B) 3
 (C) $\frac{111}{7}$ (D) 16
45. For linear inequalities, solution set for a group of inequalities is classified as
 (A) Concave set (B) Convex set
 (C) Loss set (D) Profit set
46. Which of the following is unary operations?
 (A) Addition (B) Multiplication
 (C) Square root (D) None of these
47. If * is a binary operation in A then
 (A) A is closed under * (B) A is not closed under *
 (C) A is not closed under + (D) A is closed under -

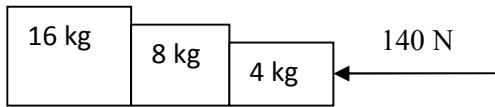
48. Which of the following statements is not correct ?
 (A) $\text{Log}_{10} 10 = 1$ (B) $\text{Log} (2 + 3) = \log (2 \times 3)$
 (C) $\text{Log}_{10} 1 = 0$ (D) $\text{Log} (1+2+3) = \log 1 + \log 2 + \log 3$
49. If $\log (a/b) + \log (b/a) = \log (a+b)$, then
 (A) $a+b=1$ (B) $a-b=1$
 (C) $a=b$ (D) $a^2 - b^2 = 1$
50. The value of e is
 (A) 0 (B) 1
 (C) 2.718 (D) 2.14
51. $1 + \sin x + \sin^2 x + \dots$ up to $\infty = 4 + 2\sqrt{3}$, $0 < x < \Pi$ and $x \neq \frac{\pi}{2}$ then $x =$
 (A) $\frac{\pi}{6}, \frac{\pi}{3}$ (B) $\frac{\pi}{3}, 5\frac{\pi}{6}$
 (C) $2\frac{\pi}{3}, \frac{\pi}{6}$ (D) $\frac{\pi}{3}, 2\frac{\pi}{3}$
52. A cow is tied to a post by a rope. The cow moves along the circular path always keeping the rope tight. If it describes 44 meters, when it has traced out 72° at the centre, the length of the rope is
 (A) 35 meters (B) 22 meters
 (C) 56 meters (D) 45 meters
53. If $f(x) = \int_{-1}^x |t| dt$, for any $x \geq 0$, $f(x) =$
 (A) $\frac{1}{2}(1 - x^2)$ (B) $1 - x^2$
 (C) $\frac{1}{2}(1 + x^2)$ (D) $1 + x^2$
54. The total of number of terms in the expansion of $(x + y)^{100} + (x - y)^{100}$ after simplification is
 (A) 50 (B) 51
 (C) 202 (D) 100
55. The maximum value of $\frac{\log x}{x}$ in $(2, \infty)$ is
 (A) 1 (B) $\frac{2}{e}$
 (C) e (D) $\frac{1}{e}$
56. The series $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \dots$ up to n terms is equal to
 (A) $\frac{n}{4n + 6}$ (B) $\frac{1}{6n + 4}$
 (C) $\frac{n}{6n + 4}$ (D) $\frac{1}{3n + 7}$
57. $\lim_{x \rightarrow 1} \frac{\tan(x^2 - 1)}{x - 1}$ equals
 (A) 2 (B) $\frac{1}{2}$
 (C) -2 (D) $-\frac{1}{2}$

58. If $x^m y^n = (x + y)^{m+n}$ then $\frac{dy}{dx}$ is equal to
 (A) $\frac{x+y}{xy}$ (B) xy
 (C) 0 (D) $\frac{y}{x}$
59. If $y = e^{\sin^{-1}(t^2-1)}$ and $x = e^{\sec^{-1}(\frac{1}{t^2-1})}$ then $\frac{dy}{dx}$ is equal to
 (A) $\frac{x}{y}$ (B) $-\frac{y}{x}$
 (C) $\frac{y}{x}$ (D) $-\frac{x}{y}$
60. Find the sum of 1st n terms of the series $\frac{1^2}{1} + \frac{1^2 + 2^2}{1+2} + \frac{1^2 + 2^2 + 3^2}{1+2+3} + \dots$
 (A) $\frac{n+2}{3}$ (B) $\frac{n(n+2)}{3}$
 (C) $\frac{n(n-2)}{3}$ (D) $\frac{n(n-2)}{6}$
61. The value of $\tan \frac{\pi}{8}$ is equal to
 (A) $\frac{1}{2}$ (B) $\sqrt{2} + 1$
 (C) $\frac{1}{\sqrt{2} + 1}$ (D) $1 - \sqrt{2}$
62. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$ is
 (A) $\frac{1}{y} + \frac{1}{x} = c$ (B) $\log x \cdot \log y = c$
 (C) $xy = c$ (D) $x + y = c$
63. If $PA = \frac{1}{3}, PB = \frac{1}{4}, P(A \cup B) = \frac{5}{12}$, then $P(A/B) =$
 (A) $\frac{25}{16}$ (B) $\frac{5}{4}$
 (C) $\frac{16}{25}$ (D) $\frac{4}{3}$
64. If $(a-2)x^2 + 9y^2 = 4$ represents rectangular hyperbola then a equals
 (A) 0 (B) 2
 (C) 9 (D) None of these
65. If $\sum n = 55$, then the value of $\sum n^2$ is equal to
 (A) 385 (B) 506
 (C) 1115 (D) 3025

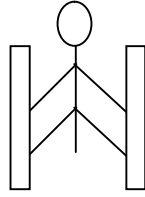
66. The 11th term in expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is
- (A) $\frac{999}{x}$ (B) $\frac{1001}{x}$
 (C) 1 (D) $\frac{x}{1001}$
67. $\int_0^{\frac{\pi}{2}} \frac{\sin^{1000} x \, dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to
- (A) 1000 (B) 1
 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
68. $\int e^x x^5 \, dx$ is
- (A) $e^x[x^5 + 5x^4 + 20x^3 + 60x^2 + 120x + 120] + C$ (B) $e^x[x^5 - 5x^4 - 20x^3 - 60x^2 - 120x - 120] + C$
 (C) $e^x[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120] + C$ (D) $e^x[x^5 + 5x^4 + 20x^3 - 60x^2 - 120x + 120] + C$
69. $\int \frac{\sec x}{\sec x + \tan x} \, dx$ is equal to
- (A) $\tan x - \sec x + C$. (B) $\log(1 + \sec x) + C$.
 (C) $\sec x + \tan x + C$. (D) $\log \sin x + \log \cos x + C$.
70. If $f(x) + be^{ax} + ae^{bx}$, then $f''(0) =$
- (A) 0 (B) 2ab
 (C) $ab(a + b)$ (D) ab
71. The length of the latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is
- (A) $\frac{4}{3}$ (B) 7
 (C) 12 (D) $\frac{3}{4}$
72. The principal value of $\sin^{-1} \tan\left(-\frac{5\pi}{4}\right)$ is
- (A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$
 (C) $\frac{\pi}{2}$ (D) $-\frac{\pi}{2}$
73. If $y = e^{m \sin^{-1} x}$, then $\frac{d^2 y}{dx^2}$ at $x = 0$ is
- (A) m (B) m^2
 (C) $-m^2$ (D) $2m$
74. If $y = \sin(2 \sin^{-1} x)$, then it satisfies the differential equation
- (A) $(1 - x^2)y_2 - xy_1 + 4y = 0$. (B) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
 (C) $(1 - x^2)y_2 - xy_1 + y = 0$. (D) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
75. The value of $\cos\left[2 \tan^{-1} \frac{1+x}{1-x} + \sin^{-1} \frac{1-x^2}{1+x^2}\right]$ is
- (A) $\sqrt{2}$ (B) 1
 (C) 0 (D) -1

76. The equation of the circle which touches the x-axis and whose centre is (1,2), is
 (A) $x^2 + y^2 - 2x + 4y + 1 = 0$. (B) $x^2 + y^2 - 2x - 4y + 1 = 0$.
 (C) $x^2 + y^2 + 2x + 4y + 1 = 0$. (D) $x^2 + y^2 + 4x + 2y + 1 = 0$.
77. The differential equation $y \frac{dy}{dx} + x = c$ represents
 (A) A family of hyperbolas (B) A family of circles whose centres are on the y-axis.
 (C) A family of parabolas (D) A family of circles whose centres are on the x-axis.
78. A stone is thrown vertically upwards and the height x ft reached by the stone in t seconds is given by, $x + 80t - 16t^2$. The stone reaches the maximum height in
 (A) 2s (B) 2.5s
 (C) 3s (D) 1.5s
79. The area of the region bounded by $y = 2x - x^2$ and the $x - axis$ is
 (A) $\frac{8}{3}$ sq. units (B) $\frac{4}{3}$ sq. units
 (C) $\frac{7}{3}$ sq. units (D) $\frac{2}{3}$ sq. units
80. If $f(x) = \begin{cases} 2a - x, & -a < x < a \\ 3x - 2a, & a \leq x \end{cases}$ then which of the following is true
 (A) $f(x)$ is discontinuous at $x = a$. (B) $f(x)$ is not differentiable at $x = a$.
 (C) $f(x)$ is differentiable at $x \geq a$. (D) $f(x)$ is continuous at all $x < a$.
81. A die is tossed thrice. If getting an even number is considered as success, the variance of the probability distribution is
 (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{1}{4}$ (D) $\frac{2}{3}$
82. The coordinates of the foot of the perpendicular drawn from the point (3,4) on the line $2x + y - 7 = 0$ is
 (A) $(\frac{9}{5}, \frac{17}{5})$ (B) (1, 5)
 (C) (-5, 1) (D) (1, -5)
83. The point (5, -7) lies outside the circle
 (A) $x^2 + y^2 - 8x = 0$ (B) $x^2 + y^2 - 5x + 7y = 0$
 (C) $x^2 + y^2 - 5x + 7y - 1 = 0$ (D) $x^2 + y^2 - 8x + 7y - 2 = 0$
84. If $\tan 15^\circ = 2 - \sqrt{3}$, then $2 \tan 1095^\circ + \cot 975^\circ + \tan (-195^\circ) =$
 (A) $2 + \sqrt{3}$ (B) $4 + 2\sqrt{3}$
 (C) $4 - 2\sqrt{3}$ (D) $2 - \sqrt{3}$
85. The number of circles touching the lines $x = 0$, $y = a$ and $y = b$ is
 (A) One (B) Two
 (C) Four (D) Infinite
86. The order and degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}} = \frac{d^2y}{dx^2}$ are respectively,
 (A) 1, 5 (B) 2, 1
 (C) 2, 5 (D) 2, 3

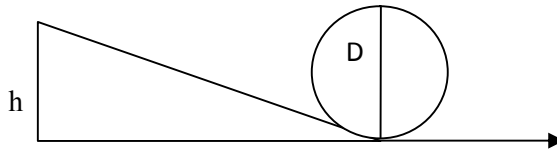
87. $x^{2n} - y^{2n}$ is divisible by
 (A) $x - y$ (B) $y - x$
 (C) $x + y$ (D) None of these
88. Mr. X has a 75% chance of attending the annual meet. Miss Y has an 80% chance, if Mr. X also attends. Otherwise she has a 50% chance of attending. If I go to the meet and see Miss Y there, then the probability that Mr. X is also there, is
 (A) $\frac{24}{29}$ (B) $\frac{25}{29}$
 (C) $\frac{26}{29}$ (D) $\frac{27}{29}$
89. $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x} + \sqrt{4-x}} dx$
 (A) 0 (B) 1
 (C) 3 (D) 2
90. $\lim_{x \rightarrow 0} \frac{a^{\sin x} - 1}{b^{\sin x} - 1}$
 (A) $\frac{\log a}{\log b}$ (B) $\log\left(\frac{a}{b}\right)$
 (C) 1 (D) 0
91. The value of $\frac{C_1}{2} + \frac{C_3}{4} + \frac{C_5}{6} + \dots$ where $C_1, C_3, C_5 \dots$ are the binomial coefficients of order n , is
 (A) $\frac{2^{n+1} - 1}{n + 1}$ (B) $\frac{2^n - 1}{n + 1}$
 (C) $\frac{2^{n+1}}{n + 1}$ (D) $\frac{2^{n+1} + 1}{n + 1}$
92. The value of $\binom{n}{r} + 2 \cdot \binom{n}{r-1} + \binom{n}{r-2}$, where $\binom{n}{k}$ denotes the binomial coefficient of order n , is
 (A) $\binom{n}{r}$ (B) $\binom{n+1}{r}$
 (C) $\binom{n+2}{r}$ (D) None of these
93. Which one of the following is possible?
 (A) $\cos \theta = \frac{7}{3}$ (B) $\sin \theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$
 (C) $\sec \theta = \frac{4}{5}$ (D) $\tan \theta = 45$
94. In the expansion of $\left(x^2 - \frac{1}{3x}\right)^9$ the term independent of x is
 (A) T_7 (B) T_6
 (C) T_8 (D) T_9
95. If $x = e^{y+e^{y+\dots\infty}}$, $x > 0$, then $\frac{dy}{dx}$ is
 (A) $\frac{x}{1+x}$ (B) $\frac{1}{x}$
 (C) $\frac{1-x}{x}$ (D) $\frac{x}{1+x}$

96. $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$ is
 (A) $\tan\left(\frac{x}{2}\right) + C$ (B) $e^x \sin x + C$
 (C) $e^x \tan\left(\frac{x}{2}\right) + C$ (D) $e^x + C$
97. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at
 (A) -2 (B) 1.5
 (C) 4 (D) 1
98. If the arithmetic mean of two positive numbers a and b ($a > b$) is twice their G.M., then $a:b$ is
 (A) $6 + \sqrt{7} : 6 - \sqrt{7}$ (B) $2 + \sqrt{3} : 2 - \sqrt{3}$
 (C) $5 + \sqrt{6} : 5 - \sqrt{6}$ (D) None of these
99. $\lim_{x \rightarrow 0} x \sin(e^{1/x})$ is equal to
 (A) 0 (B) 1
 (C) $\frac{e}{2}$ (D) Does not exist
100. Differential coefficient of e^{x^2} with respect to $\log x^2$ is
 (A) e^{x^2} (B) xe^{x^2}
 (C) $x^2 e^{x^2}$ (D) $2x^2 e^{x^2}$
101. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
102. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
103. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20 m/s to 10 m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
104. A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000
105.  The force on 16 kg is.....?
 (A) 140 N (B) 120 N
 (C) 100 N (D) 80 N

106. A man of mass 40 kg is at rest between the walls. If co eff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)



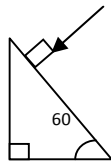
- (A) 100 N (B) 250 N
(C) 80 N (D) 50 N
- 107.



- Find minimum height in terms of D to complete the loop
- (A) $7D/4$ (B) $9D/4$
(C) $5D/4$ (D) $3D/4$
108. Gravitational force between two bodies is F . The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
- (A) $F/9$ (B) $3F$
(C) F (D) $F/3$
109. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
- (A) infinity (B) 150kg
(C) zero (D) $75/2 \text{ kg}$
110. g at a depth of 1600 km inside the earth in m/s^2 is
- (A) 6.65 (B) 7.35
(C) 8.65 (D) 4.35
111. A block of mass $19M$ is suspended by a string of length 1m . A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
- (A) 140 (B) $20\sqrt{19.6}$
(C) $20\sqrt{9.8}$ (D) 20
112. A rubber ball falls from a height of 4m and rebounds to 1.5m . The % loss of energy during the impact is
- (A) 20 (B) 62.5
(C) 23 (D) 60
113. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s . The extra power required to maintain the belt in motion is
- (A) 2600W (B) 250W
(C) 325W (D) 2500W

114. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
 (A) $ML^2/3$ (B) $ML^2/6$
 (C) $ML^2/9$ (D) $ML^2/12$
115. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2} V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
116. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
117. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g=10 \text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
118. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
119. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
120. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
121. When kerosene and coconut oil of co eff. of viscosity 0.002 and 0.0154 N s/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
122. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
123. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only 1 is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
124. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
125. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C

126. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{Wb}$ (B) $1.6 \times 10^{-7} \text{Wb}$
 (C) $3 \times 10^{-7} \text{Wb}$ (D) $1.5 \times 10^{-7} \text{Wb}$
127. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time, the current will be maximum?
 (A) 1/100 s (B) 1/200 s
 (C) 1/500 s (D) 1 s
128. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) 1/C (D) q
129. A capacitor of 1 μF is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30J (B) 40J
 (C) 50J (D) 60J
130. An electromagnetic wave is travelling in vacuum with a speed of 3×10^8 m/s. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{m/s}$ (B) $1.5 \times 10^8 \text{m/s}$
 (C) $2 \times 10^8 \text{m/s}$ (D) No change
131. Trace the path of a ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75

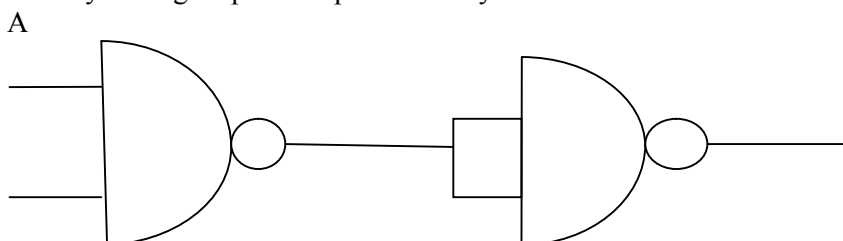
132. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
133. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
134. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67

135. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.
- (A) 1.227\AA (B) 12.27\AA
 (C) 122.7\AA (D) 1227\AA

136. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?
- (A) infinity (B) zero
 (C) radio wave (D) X ray

137. Which among the following series gives visible light?
- (A) Lyman (B) Balmer
 (C) Brackett (D) None of these

138. Identify the logic operation performed by this circuit



- B
- (A) AND (B) OR
 (C) NAND (D) NOR

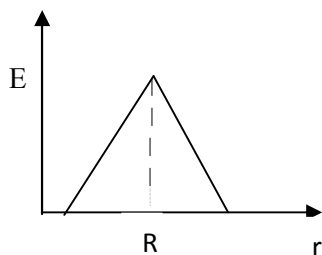
139. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{m}^{-3}$.
- (A) $4.54 \times 10^9 \text{m}^{-3}$ (B) $4.95 \times 10^{22} \text{m}^{-3}$
 (C) $1.5 \times 10^{16} \text{m}^{-3}$ (D) $5 \times 10^{28} \text{m}^{-3}$

140. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.
- (A) $4.5 \times 10^5 \text{N/C}$ (B) $4.5 \times 10^5 \text{NC}$
 (C) $4.5 \times 10^{-5} \text{N/C}$ (D) $4.5 \times 10^{-5} \text{NC}$

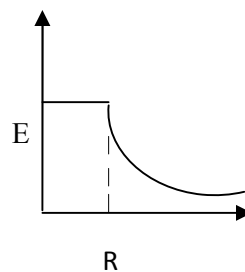
141. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to
- (A) Only inside charges (B) Only outside charges
 (C) All the charges (D) Cannot determine

142. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

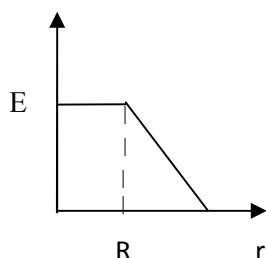
(A)



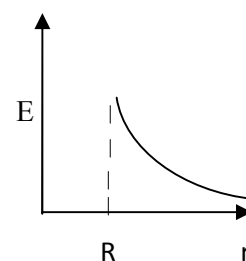
(B)



(C)



(D)



143. Net capacitance of 3 identical capacitor in series is $1\mu F$. What is the net capacitance in μF if connected in parallel?

(A) 3

(B) 6

(C) 9

(D) 12

144. An inductor of 5H carries a steady current of 2A. In what time if the current is made zero can a 40V self induced emf be produced in the inductor.

(A) 2s

(B) 1s

(C) 0.5s

(D) 0.25s

145. A cell of emf E and internal resistance r gives 0.5A with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

(A) 0.5

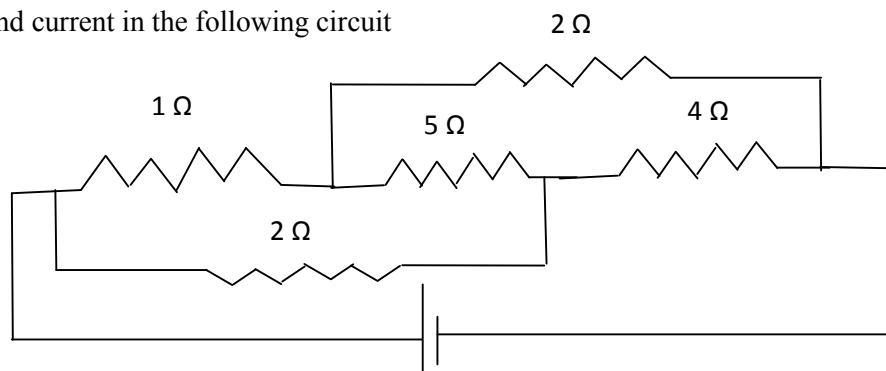
(B) 1

(C) 2

(D) 3

146.

Find current in the following circuit



(A) 1A

(B) 2A

(C) 3A

(D) 4A

147. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
148. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
149. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
150. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
151. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
152. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
153. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
154. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law

155. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon
 (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde
 (D) argon < methane < carbon dioxide < formaldehyde
156. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F
 (B) 4F
 (C) 6F
 (D) 5F
157. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple
 (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
 (C) Ag can displace H_2 from acid
 (D) Ag can displace H_2 from base
158. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area
 (B) A decrease in ΔH for the reaction
 (C) A decrease in the fraction of particles possessing sufficient energy
 (D) The introduction of an alternative pathway with greater activation energy.
159. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease
 (B) The instantaneous rate a reaction is same at any time during the reaction
 (C) For a zero order reaction the concentration of reactants remains changed with passage of time
 (D) The rate of a reaction decreases with increase in concentration of reactant (s)
160. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K)
 (B) CH_4 (190K)
 (C) SO_2 (630K)
 (D) CO_2 (304K)
161. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- i. When $1/n=0$, the adsorption is independent of pressure.
 ii. When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 iii. When $1/n=0$, the adsorption is directly proportional to pressure.
 iv. When $n=0$, plot of x/m vs p is a curve
- (A) i and ii
 (B) ii and iv
 (C) i and iii
 (D) all are false
162. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- i. ΔG^0 for the overall reaction is positive
 ii. ΔG^0 for the overall reaction is negative
 iii. E^0 for the overall reaction is positive
 iv. E^0 for the overall reaction is negative
- (A) i and iv
 (B) i and iii
 (C) ii and iii
 (D) iii and iv

163. Which of the following pairs of ions are isoelectronic and isostructural ?
 (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
 (C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}
164. Which of the following hydrides is the strongest reducing agent?
 (A) NH_3 (B) PH_3
 (C) AsH_3 (D) SbH_3
165. Consider the reactions,
 i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
 (A) N_2O , NO (B) NO_2 , NO_2
 (C) N_2 , N_2O (D) NO_2 , NO
166. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
 (A) 1 (B) 2
 (C) 3 (D) 5
167. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
 (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
168. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
 (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
169. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
 (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
170. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
171. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
172. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
173. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
174. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone

175. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$
176. The carboxylic acid that does not undergo Hell-Vohlard-Zelinsky reaction is:
 (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
177. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P/Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$.
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
178. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
179. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
180. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
181. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
182. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
183. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
184. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
185. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s = +1/2$ (B) $n=4, l=3, m=-4, s = -1/2$
 (C) $n=4, l=3, m=+1, s = +1/2$ (D) $n=3, l=2, m=-2, s = +1/2$
186. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
187. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2

188. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4
189. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
190. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
191. If the bond dissociation energies of XY , X_2 , Y_2 (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f\text{H}$ of XY is -200KJmol^{-1} , the bond dissociation energy of X_2 will be:
 (A) 400KJmol^{-1} (B) 300KJmol^{-1}
 (C) 200KJmol^{-1} (D) 100KJmol^{-1}
192. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C ? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
193. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
194. Which of the following species involves the transfer of $5N_A$ electrons per mole of it?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
195. 30-volume hydrogen peroxide means:
 (A) 30% H_2O_2 by volume (B) 30g of H_2O_2 solution containing 1g of it
 (C) 1 cm^3 of solution liberates 30 cm^3 of O_2 gas at STP (D) 30 cm^3 of the solution contains one mole of H_2O_2
196. The correct sequence of covalent character is represented by:
 (A) $\text{LiCl} < \text{NaCl} < \text{BeCl}_2$ (B) $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
 (C) $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ (D) $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
197. Which of the following is known as pyrene?
 (A) CCl_4 (B) CS_2
 (C) S_2Cl_2 (D) Solid CO_2
198. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
199. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) cis-2-Butene
 (C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
200. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane

Sr. No.	Question
---------	----------

1. $1 + \sin x + \sin^2 x + \dots$ up to $\infty = 4 + 2\sqrt{3}$, $0 < x < \Pi$ and $x \neq \frac{\pi}{2}$ then $x =$
 - (A) $\frac{\pi}{6}, \frac{\pi}{3}$
 - (B) $\frac{\pi}{3}, 5\frac{\pi}{6}$
 - (C) $2\frac{\pi}{3}, \frac{\pi}{6}$
 - (D) $\frac{\pi}{3}, 2\frac{\pi}{3}$

2. A cow is tied to a post by a rope. The cow moves along the circular path always keeping the rope tight. If it describes 44 meters, when it has traced out 72° at the centre, the length of the rope is
 - (A) 35 meters
 - (B) 22 meters
 - (C) 56 meters
 - (D) 45 meters

3. If $f(x) = \int_{-1}^x |t| dt$, for any $x \geq 0$, $f(x) =$
 - (A) $\frac{1}{2}(1 - x^2)$
 - (B) $1 - x^2$
 - (C) $\frac{1}{2}(1 + x^2)$
 - (D) $1 + x^2$

4. The total of number of terms in the expansion of $(x + y)^{100} + (x - y)^{100}$ after simplification is
 - (A) 50
 - (B) 51
 - (C) 202
 - (D) 100

5. The maximum value of $\frac{\log x}{x}$ in $(2, \infty)$ is
 - (A) 1
 - (B) $\frac{2}{e}$
 - (C) e
 - (D) $\frac{1}{e}$

6. The series $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \dots$ up to n terms is equal to
 - (A) $\frac{n}{4n + 6}$
 - (B) $\frac{1}{6n + 4}$
 - (C) $\frac{n}{6n + 4}$
 - (D) $\frac{1}{3n + 7}$

7. $\lim_{x \rightarrow 1} \frac{\tan(x^2 - 1)}{x - 1}$ equals
 - (A) 2
 - (B) $\frac{1}{2}$
 - (C) -2
 - (D) $-\frac{1}{2}$

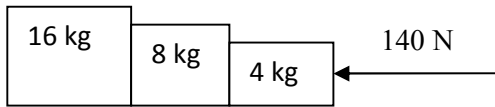
8. If $x^m y^n = (x + y)^{m+n}$ then $\frac{dy}{dx}$ is equal to
 - (A) $\frac{x + y}{xy}$
 - (B) xy
 - (C) 0
 - (D) $\frac{y}{x}$

9. If $y = e^{\sin^{-1}(t^2-1)}$ and $x = e^{\sec^{-1}(\frac{1}{t^2-1})}$ then $\frac{dy}{dx}$ is equal to
 (A) $\frac{x}{y}$ (B) $-\frac{y}{x}$
 (C) $\frac{y}{x}$ (D) $-\frac{x}{y}$
10. Find the sum of 1st n terms of the series $\frac{1^2}{1} + \frac{1^2 + 2^2}{1+2} + \frac{1^2 + 2^2 + 3^2}{1+2+3} + \dots$
 (A) $\frac{n+2}{3}$ (B) $\frac{n(n+2)}{6}$
 (C) $\frac{n(n-2)}{3}$ (D) $\frac{n(n-2)}{6}$
11. The value of $\tan \frac{\pi}{8}$ is equal to
 (A) $\frac{1}{2}$ (B) $\sqrt{2} + 1$
 (C) $\frac{1}{\sqrt{2} + 1}$ (D) $1 - \sqrt{2}$
12. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$ is
 (A) $\frac{1}{y} + \frac{1}{x} = c$ (B) $\log x \cdot \log y = c$
 (C) $xy = c$ (D) $x + y = c$
13. If $PA = \frac{1}{3}$, $PB = \frac{1}{4}$, $P(A \cup B) = \frac{5}{12}$, then $P(A/B) =$
 (A) $\frac{25}{16}$ (B) $\frac{5}{4}$
 (C) $\frac{16}{25}$ (D) $\frac{2}{3}$
14. If $(a-2)x^2 + 9y^2 = 4$ represents rectangular hyperbola then a equals
 (A) 0 (B) 2
 (C) 9 (D) None of these
15. If $\sum n = 55$, then the value of $\sum n^2$ is equal to
 (A) 385 (B) 506
 (C) 1115 (D) 3025
16. The 11th term in expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is
 (A) $\frac{999}{x}$ (B) $\frac{1001}{x}$
 (C) 1 (D) $\frac{x}{1001}$

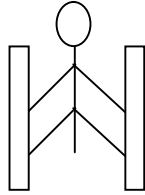
17. $\int_0^{\frac{\pi}{2}} \frac{\sin^{1000} x \, dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to
 (A) 1000 (B) 1
 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
18. $\int e^x x^5 \, dx$ is
 (A) $e^x[x^5 + 5x^4 + 20x^3 + 60x^2 + 120x + 120] + C$ (B) $e^x[x^5 - 5x^4 - 20x^3 - 60x^2 - 120x - 120] + C$
 (C) $e^x[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120] + C$ (D) $e^x[x^5 + 5x^4 + 20x^3 - 60x^2 - 120x + 120] + C$
19. $\int \frac{\sec x}{\sec x + \tan x} \, dx$ is equal to
 (A) $\tan x - \sec x + C$. (B) $\log(1 + \sec x) + C$.
 (C) $\sec x + \tan x + C$. (D) $\log \sin x + \log \cos x + C$.
20. If $f(x) + be^{ax} + ae^{bx}$, then $f''(0) =$
 (A) 0 (B) 2ab
 (C) $ab(a + b)$ (D) ab
21. The length of the latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is
 (A) $\frac{4}{3}$ (B) 7
 (C) 12 (D) $\frac{3}{4}$
22. The principal value of $\sin^{-1} \tan\left(-\frac{5\pi}{4}\right)$ is
 (A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$
 (C) $\frac{\pi}{2}$ (D) $-\frac{\pi}{2}$
23. If $y = e^{m \sin^{-1} x}$, then $\frac{d^2 y}{dx^2}$ at $x = 0$ is
 (A) m (B) m^2
 (C) $-m^2$ (D) $2m$
24. If $y = \sin(2 \sin^{-1} x)$, then it satisfies the differential equation
 (A) $(1 - x^2)y_2 - xy_1 + 4y = 0$. (B) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
 (C) $(1 - x^2)y_2 - xy_1 + y = 0$. (D) $(1 + x^2)y_2 - xy_1 + 4y = 0$.
25. The value of $\cos\left[2 \tan^{-1} \frac{1+x}{1-x} + \sin^{-1} \frac{1-x^2}{1+x^2}\right]$ is
 (A) $\sqrt{2}$ (B) 1
 (C) 0 (D) -1
26. The equation of the circle which touches the x-axis and whose centre is (1,2), is
 (A) $x^2 + y^2 - 2x + 4y + 1 = 0$. (B) $x^2 + y^2 - 2x - 4y + 1 = 0$.
 (C) $x^2 + y^2 + 2x + 4y + 1 = 0$. (D) $x^2 + y^2 + 4x + 2y + 1 = 0$.

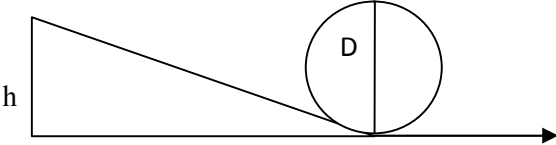
27. The differential equation $y \frac{dy}{dx} + x = c$ represents
- (A) A family of hyperbolas (B) A family of circles whose centres are on the y-axis.
 (C) A family of parabolas (D) A family of circles whose centres are on the x-axis.
28. A stone is thrown vertically upwards and the height x ft reached by the stone in t seconds is given by, $x + 80t - 16t^2$. The stone reaches the maximum height in
- (A) $2s$ (B) $2.5s$
 (C) $3s$ (D) $1.5s$
29. The area of the region bounded by $y = 2x - x^2$ and the $x - axis$ is
- (A) $\frac{8}{3}$ sq. units (B) $\frac{4}{3}$ sq. units
 (C) $\frac{7}{3}$ sq. units (D) $\frac{2}{3}$ sq. units
30. If $f(x) = \begin{cases} 2a - x, & -a < x < a \\ 3x - 2a, & a \leq x \end{cases}$ then which of the following is true
- (A) $f(x)$ is discontinuous at $x = a$. (B) $f(x)$ is not differentiable at $x = a$.
 (C) $f(x)$ is differentiable at $x \geq a$. (D) $f(x)$ is continuous at all $x < a$.
31. A die is tossed thrice. If getting an even number is considered as success, the variance of the probability distribution is
- (A) $\frac{3}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{1}{4}$ (D) $\frac{2}{3}$
32. The coordinates of the foot of the perpendicular drawn from the point $(3,4)$ on the line $2x + y - 7 = 0$ is
- (A) $(\frac{9}{5}, \frac{17}{5})$ (B) $(1, 5)$
 (C) $(-5, 1)$ (D) $(1, -5)$
33. The point $(5, -7)$ lies outside the circle
- (A) $x^2 + y^2 - 8x = 0$ (B) $x^2 + y^2 - 5x + 7y = 0$
 (C) $x^2 + y^2 - 5x + 7y - 1 = 0$ (D) $x^2 + y^2 - 8x + 7y - 2 = 0$
34. If $\tan 15^\circ = 2 - \sqrt{3}$, then $2 \tan 1095^\circ + \cot 975^\circ + \tan (-195^\circ) =$
- (A) $2 + \sqrt{3}$ (B) $4 + 2\sqrt{3}$
 (C) $4 - 2\sqrt{3}$ (D) $2 - \sqrt{3}$
35. The number of circles touching the lines $x = 0$, $y = a$ and $y = b$ is
- (A) One (B) Two
 (C) Four (D) Infinite
36. The order and degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}} = \frac{d^2y}{dx^2}$ are respectively,
- (A) 1, 5 (B) 2, 1
 (C) 2, 5 (D) 2, 3

37. $x^{2n} - y^{2n}$ is divisible by
 (A) $x - y$ (B) $y - x$
 (C) $x + y$ (D) None of these
38. Mr. X has a 75% chance of attending the annual meet. Miss Y has an 80% chance, if Mr. X also attends. Otherwise she has a 50% chance of attending. If I go to the meet and see Miss Y there, then the probability that Mr. X is also there, is
 (A) $\frac{24}{29}$ (B) $\frac{25}{29}$
 (C) $\frac{26}{29}$ (D) $\frac{27}{29}$
39. $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x} + \sqrt{4-x}} dx$
 (A) 0 (B) 1
 (C) 3 (D) 2
40. $\lim_{x \rightarrow 0} \frac{a^{\sin x} - 1}{b^{\sin x} - 1}$
 (A) $\frac{\log a}{\log b}$ (B) $\log\left(\frac{a}{b}\right)$
 (C) 1 (D) 0
41. The value of $\frac{C_1}{2} + \frac{C_3}{4} + \frac{C_5}{6} + \dots$ where $C_1, C_3, C_5 \dots$ are the binomial coefficients of order n , is
 (A) $\frac{2^{n+1} - 1}{n + 1}$ (B) $\frac{2^n - 1}{n + 1}$
 (C) $\frac{2^{n+1}}{n + 1}$ (D) $\frac{2^{n+1} + 1}{n + 1}$
42. The value of $\binom{n}{r} + 2 \cdot \binom{n}{r-1} + \binom{n}{r-2}$, where $\binom{n}{k}$ denotes the binomial coefficient of order n , is
 (A) $\binom{n}{r}$ (B) $\binom{n+1}{r}$
 (C) $\binom{n+2}{r}$ (D) None of these
43. Which one of the following is possible?
 (A) $\cos \theta = \frac{7}{3}$ (B) $\sin \theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$
 (C) $\sec \theta = \frac{4}{5}$ (D) $\tan \theta = 45$
44. In the expansion of $\left(x^2 - \frac{1}{3x}\right)^9$ the term independent of x is
 (A) T_7 (B) T_6
 (C) T_8 (D) T_9
45. If $x = e^{y+e^{y+\dots}}$, $x > 0$, then $\frac{dy}{dx}$ is
 (A) $\frac{x}{1+x}$ (B) $\frac{1}{x}$
 (C) $\frac{1-x}{x}$ (D) $\frac{x}{1+x}$

46. $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$ is
 (A) $\tan\left(\frac{x}{2}\right) + C$ (B) $e^x \sin x + C$
 (C) $e^x \tan\left(\frac{x}{2}\right) + C$ (D) $e^x + C$
47. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at
 (A) -2 (B) 1.5
 (C) 4 (D) 1
48. If the arithmetic mean of two positive numbers a and b ($a > b$) is twice their G.M., then $a:b$ is
 (A) $6 + \sqrt{7} : 6 - \sqrt{7}$ (B) $2 + \sqrt{3} : 2 - \sqrt{3}$
 (C) $5 + \sqrt{6} : 5 - \sqrt{6}$ (D) None of these
49. $\lim_{x \rightarrow 0} x \sin(e^{1/x})$ is equal to
 (A) 0 (B) 1
 (C) $\frac{e}{2}$ (D) Does not exist
50. Differential coefficient of e^{x^2} with respect to $\log x^2$ is
 (A) e^{x^2} (B) xe^{x^2}
 (C) $x^2 e^{x^2}$ (D) $2x^2 e^{x^2}$
51. While walking on smooth surface one should take small steps to ensure
 (A) Large friction (B) Small friction
 (C) Larger normal force (D) Smaller normal force
52. What happens to a vehicle travelling in an unbanked curved path if the friction between the road and tires suddenly disappears
 (A) Moves along tangent (B) Moves radially in
 (C) Moves radially out (D) Moves along the curve
53. A ball of mass 0.2 kg strikes an obstacle and moves at 60° to its initial direction. If its speed changes from 20 m/s to 10 m/s the magnitude of impulse received by the ball is -----Ns
 (A) $2\sqrt{7}$ (B) $2\sqrt{3}$
 (C) $2\sqrt{5}$ (D) $3\sqrt{2}$
54. A spacecraft of mass 2000 kg moving with 600 m/s suddenly explodes into two pieces. One piece of mass 500 kg is stationary. The velocity of other part in m/s is
 (A) 600 (B) 800
 (C) 1500 (D) 1000
55.  The force on 16 kg is.....?
 (A) 140 N (B) 120 N
 (C) 100 N (D) 80 N

56. A man of mass 40 kg is at rest between the walls. If co eff. of friction between man and wall is 0.8, find the normal reaction exerted by wall on man (take $g = 10 \text{ m/s}^2$)

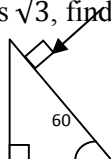


- (A) 100 N (B) 250 N
(C) 80 N (D) 50 N
57. 
- Find minimum height in terms of D to complete the loop
- (A) $7D/4$ (B) $9D/4$
(C) $5D/4$ (D) $3D/4$
58. Gravitational force between two bodies is F. The space around the mass is now filled with a liquid of specific gravity 3. The gravitational force will be
- (A) $F/9$ (B) $3F$
(C) F (D) $F/3$
59. A man weighs 75 kg on the surface of earth. His weight on the geostationary satellite is
- (A) infinity (B) 150kg
(C) zero (D) $75/2 \text{ kg}$
60. g at a depth of 1600 km inside the earth in m/s^2 is
- (A) 6.65 (B) 7.35
(C) 8.65 (D) 4.35
61. A block of mass $19M$ is suspended by a string of length 1m. A bullet of mass M hits it and gets embedded in it. If the block completes the vertical circle the velocity of bullet in m/s is
- (A) 140 (B) $20\sqrt{19.6}$
(C) $20\sqrt{9.8}$ (D) 20
62. A rubber ball falls from a height of 4m and rebounds to 1.5m. The % loss of energy during the impact is
- (A) 20 (B) 62.5
(C) 23 (D) 60
63. 25 kg of sand is deposited each second on a conveyor belt moving at 10m/s. The extra power required to maintain the belt in motion is
- (A) 2600W (B) 250W
(C) 325W (D) 2500W
64. A uniform rod of mass M and length L standing vertically on a horizontal floor falls without slipping at the bottom. The moment of inertia will be
- (A) $ML^2/3$ (B) $ML^2/6$
(C) $ML^2/9$ (D) $ML^2/12$

65. If the velocity of C.M of a rolling body is V , then velocity of highest point in the body will be
 (A) $\sqrt{2} V$ (B) V
 (C) $2V$ (D) $V/\sqrt{2}$
66. The angular momentum of two rotating bodies are equal. If the ratio of their M.I is 1:4, the ratio of their rotational K.E is
 (A) 1:2 (B) 2:1
 (C) 1:4 (D) 4:1
67. The level of water in a tank is 5m. A hole 1 cm^2 is made at the bottom. The rate of leakage in m^3/s is (take $g = 10 \text{ m/s}^2$)
 (A) 10^{-3} (B) 10^{-4}
 (C) 10 (D) 10^{-2}
68. Two blocks A and B float in water. A floats with $1/4^{\text{th}}$ of its volume immersed and B floats with $3/5^{\text{th}}$ of its volume immersed. The ratio of their densities is
 (A) 5:12 (B) 12:5
 (C) 3:20 (D) 20:3
69. The terminal velocity of a spherical ball of lead of radius R is V while falling through a viscous liquid varies with R such that
 (A) V/R is constant (B) VR is constant
 (C) V is constant (D) V/R^2 is constant
70. A hydraulic press uses a piston of 100 cm^2 to exert a force of 10^7 dynes on water. The area of the other piston that supports a mass of 2000 kg is (take $g = 10 \text{ m/s}^2$)
 (A) 100 cm^2 (B) 10^9 cm^2
 (C) $2 \times 10^4 \text{ cm}^2$ (D) $2 \times 10^{10} \text{ cm}^2$
71. When kerosene and coconut oil of co eff. of viscosity 0.002 and 0.0154 Ns/m^2 are allowed through the same pipe, under same pressure difference and same time collects 1 lit of coconut oil. The volume of kerosene that flows is
 (A) 5.5 lit (B) 6.6 lit
 (C) 7.7 lit (D) 8.8 lit
72. There is a circular hole in metal plate. When the plate is heated the radius of the hole becomes
 (A) increased (B) decreased
 (C) unchanged (D) depends on metal
73. Specific heat of a substance depends on 1. Nature of substance. 2. Mass of substance. 3. Heat given to substance
 (A) Only 1 is correct (B) Both 1 and 2 are correct
 (C) All are correct (D) Only 1 and 3 are correct
74. In a give process $dW=0$, dq is <0 then for a gas
 (A) Temperature increases (B) Volume decreases
 (C) Pressure increases (D) Pressure decreases
75. The efficiency of carnot engine depends on
 (A) Working substance (B) Sink temperature
 (C) Source temperature (D) Both B and C

76. A 200 turn coil of self inductance 30 mH carries a current of 5 mA. Find the magnetic flux linked with each turn of coil.
 (A) $7.5 \times 10^{-7} \text{Wb}$ (B) $1.6 \times 10^{-7} \text{Wb}$
 (C) $3 \times 10^{-7} \text{Wb}$ (D) $1.5 \times 10^{-7} \text{Wb}$
77. The instantaneous value of current in an AC circuit is $I = 2 \sin (100 \pi t + \pi/3)$ A. At what first time, the current will be maximum?
 (A) 1/100 s (B) 1/200 s
 (C) 1/500 s (D) 1 s
78. What in electric system represents force in mechanical system ?
 (A) L (B) I
 (C) 1/C (D) q
79. A capacitor of 1 μF is charged with 0.01C of electricity. How much energy is stored in it?
 (A) 30J (B) 40J
 (C) 50J (D) 60J
80. An electromagnetic wave is travelling in vacuum with a speed of 3×10^8 m/s. Find the velocity in a medium having relative electric and magnetic permeability 2 and 1, respectively.
 (A) $3/\sqrt{2} \times 10^8 \text{m/s}$ (B) $1.5 \times 10^8 \text{m/s}$
 (C) $2 \times 10^8 \text{m/s}$ (D) No change

81. Trace the path of a ray of light passing through a glass prism as shown in the figure. If the refractive index of glass is $\sqrt{3}$, find out the value of angle of emergence from prism.



- (A) 30 (B) 45
 (C) 60 (D) 75
82. Light wave from two coherent sources of intensities in ratio 64:1 produces interference. Calculate the ratio of maxima and minima of the interference pattern.
 (A) 8:1 (B) 64:1
 (C) 9:7 (D) 81:49
83. In young's experiment, the width of the fringes obtained with light of wavelength 6000 \AA is 2 mm. What will be the fringe width, if the entire apparatus is immersed in a liquid of refractive index 1.33?
 (A) 1 mm (B) 1.5 mm
 (C) 2 mm (D) 2.5 mm
84. Unpolarised light is incident on plane glass surface. What should be the angle of incidence in degrees, so that the reflected and refracted rays are perpendicular to each other?
 (A) 37 (B) 47
 (C) 57 (D) 67

85. Determine the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 V.

- (A) 1.227\AA (B) 12.27\AA
(C) 122.7\AA (D) 1227\AA

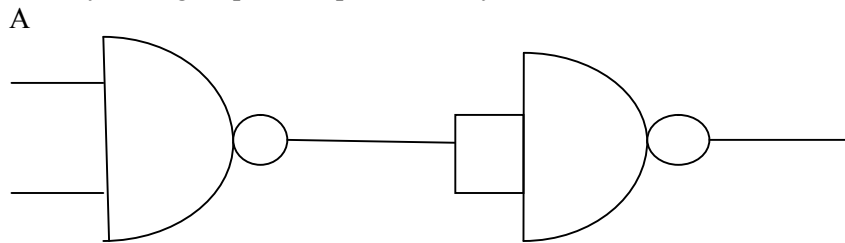
86. A particle with rest mass m_0 is moving with velocity c . What is the de-Broglie wavelength associated with it?

- (A) infinity (B) zero
(C) radio wave (D) X ray

87. Which among the following series gives visible light?

- (A) Lyman (B) Balmer
(C) Brackett (D) None of these

88. Identify the logic operation performed by this circuit



- B
(A) AND (B) OR
(C) NAND (D) NOR

89. The number of silicon atoms per m^3 is 5×10^{28} . This is doped simultaneously with 5×10^{22} atoms per m^3 of arsenic and 5×10^{20} atoms per m^3 of indium. Calculate the number of holes, given that $n_i = 1.5 \times 10^{16} \text{m}^{-3}$.

- (A) $4.54 \times 10^9 \text{m}^{-3}$ (B) $4.95 \times 10^{22} \text{m}^{-3}$
(C) $1.5 \times 10^{16} \text{m}^{-3}$ (D) $5 \times 10^{28} \text{m}^{-3}$

90. Two charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed 5 mm apart. Determine E at a point 10 cm from centre on the positive charge side along the axial line.

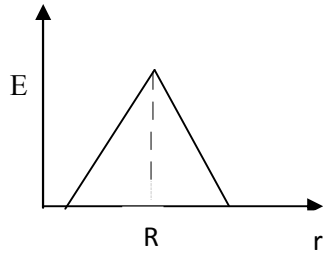
- (A) $4.5 \times 10^5 \text{N/C}$ (B) $4.5 \times 10^5 \text{NC}$
(C) $4.5 \times 10^{-5} \text{N/C}$ (D) $4.5 \times 10^{-5} \text{NC}$

91. If the Gaussian surface is so chosen that there are some charges inside and some outside then the electric field is due to

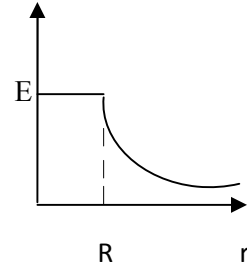
- (A) Only inside charges (B) Only outside charges
(C) All the charges (D) Cannot determine

92. The following is a diagram showing the variation of E with r from centre of uniformly charge spherical shell of radius R

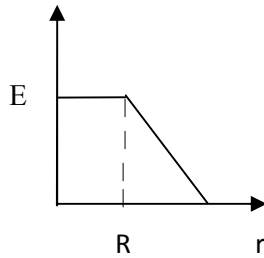
(A)



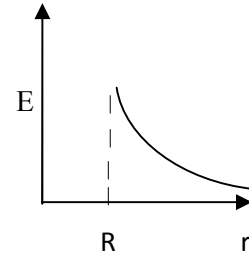
(B)



(C)



(D)



93. Net capacitance of 3 identical capacitor in series is $1\mu F$. What is the net capacitance in μF if connected in parallel?

(A) 3

(B) 6

(C) 9

(D) 12

94. An inductor of $5H$ carries a steady current of $2A$. In what time if the current is made zero can a $40V$ self induced emf be produced in the inductor.

(A) $2s$

(B) $1s$

(C) $0.5s$

(D) $0.25s$

95. A cell of emf E and internal resistance r gives $0.5A$ with $R=12$ ohms and 0.25 with $R = 25$ ohms. Its internal resistance in ohms will be

(A) 0.5

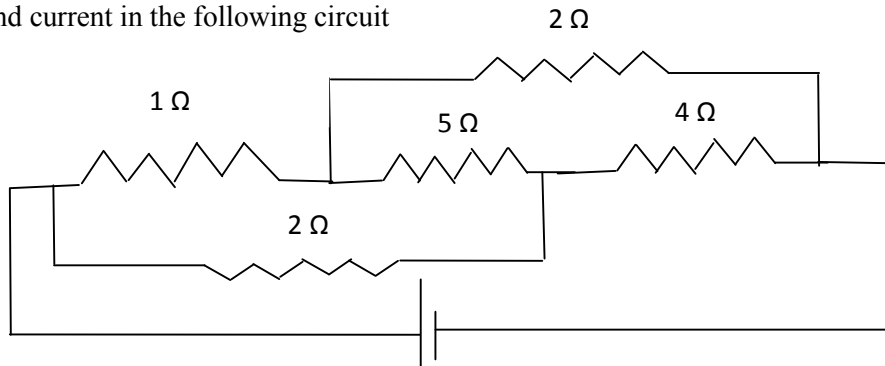
(B) 1

(C) 2

(D) 3

96.

Find current in the following circuit



(A) $1A$

(B) $2A$

(C) $3A$

(D) $4A$

97. Two identical circular loops P and Q of radius r are placed in parallel planes with same axis at a distance of $2r$. Find B at the midpoint of the axis between them if same current I flows through both loops.
- (A) $\mu_0 I / 2^{3/2} r$ (B) $\mu_0 2 I / 2^{3/2} r$
 (C) $\mu_0 I / 4\pi r$ (D) Cannot be determined
98. A block of mass 4 kg is kept on a rough horizontal surface. The coefficient of static friction is 0.8. If a force of 19 N is applied on the block parallel to the floor, then the force of friction between the block and floor is:
- (A) 19N (B) 18 N
 (C) 16N (D) 9.8N
99. Current in a circuit falls steadily from 2A to 0A in 10 ms. Calculate L if emf induced is 200V.
- (A) 1H (B) 2H
 (C) 3H (D) 4H
100. Self inductance of the air core inductor increases from 0.01 mH to 10 mH on introducing an iron core. What is the relative permeability of the core used?
- (A) 500 (B) 800
 (C) 900 (D) 1000
101. Among the following, the most stable complex is
- (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (D) $[\text{Fe}(\text{Cl})_6]^{3-}$
102. Which is the correct coordination number (C.N) and oxidation number (O.N) of the transition metal atom in $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$?
- (A) C.N=3, O.N=+1 (B) C.N=4, O.N=+2
 (C) C.N=6, O.N=+1 (D) C.N=6, O.N=+3
103. In a solid, oxide ions are arranged in ccp, cations A occupy one sixth of the tetrahedral voids and cation B occupy one third of the octahedral voids. The formula of the solid is:
- (A) ABO_3 (B) A_3BO
 (C) AB_3O (D) $\text{A}_3\text{B}_3\text{O}_3$
104. On mixing acetone to methanol some of the hydrogen bonds between methanol molecules break. Which of the following statements is correct about the above process?
- (A) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show positive deviation from Raoult's law
 (B) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show positive deviation from Raoult's law
 (C) At specific composition methanol acetone mixture will form minimum boiling azeotrope and show negative deviation from Raoult's law
 (D) At specific composition methanol acetone mixture will form maximum boiling azeotrope and show negative deviation from Raoult's law
105. K_H value for argon, carbon dioxide, formaldehyde and methane gases are 40.39, 1.67, 1.83×10^{-5} and 0.413, respectively. The correct arrangement of these gases in the order of their increasing solubility is:
- (A) formaldehyde < methane < carbon dioxide < argon (B) formaldehyde < carbon dioxide < methane < argon
 (C) argon < carbon dioxide < methane < formaldehyde (D) argon < methane < carbon dioxide < formaldehyde

106. The number of faradays of electricity required for electrolytic conversion of the mole of nitrobenzene to aniline is:
- (A) 3F (B) 4F
(C) 6F (D) 5F
107. The positive value of the standard electrode potential of Ag^+/Ag indicates that:
- (A) This redox couple is a stronger reducing agent than H^+/H_2 couple (B) This redox couple is a stronger oxidizing agent than H^+/H_2 couple
(C) Ag can displace H_2 from acid (D) Ag can displace H_2 from base
108. Milk is refrigerated in order to slow the rate of decomposition by bacterial action. The decrease in reaction rate is due to:
- (A) A decrease in surface area (B) A decrease in ΔH for the reaction
(C) A decrease in the fraction of particles possessing sufficient energy (D) The introduction of an alternative pathway with greater activation energy.
109. Which of the following statements is not correct?
- (A) The rate of a reaction decreases with passage of time as concentration of reactants decrease (B) The instantaneous rate a reaction is same at any time during the reaction
(C) For a zero order reaction the concentration of reactants remains changed with passage of time (D) The rate of a reaction decreases with increase in concentration of reactant (s)
110. Which of the following gases shows the lowest adsorption per gram of charcoal? The critical temperatures are given in parenthesis:
- (A) H_2 (33K) (B) CH_4 (190K)
(C) SO_2 (630K) (D) CO_2 (304K)
111. Freundlich adsorption isotherm is given by the expression $x/m = kp^{1/n}$. Which of the following statements are false?
- When $1/n=0$, the adsorption is independent of pressure.
 - When $n=0$, the plot of x/m vs p graph is a line parallel to x axis.
 - When $1/n=0$, the adsorption is directly proportional to pressure.
 - When $n=0$, plot of x/m vs p is a curve
- (A) i and ii (B) ii and iv
(C) i and iii (D) all are false
112. In the extraction of chlorine by electrolysis of an aqueous solution of sodium chloride, which of the following statements are true?
- ΔG^0 for the overall reaction is positive
 - ΔG^0 for the overall reaction is negative
 - E^0 for the overall reaction is positive
 - E^0 for the overall reaction is negative
- (A) i and iv (B) i and iii
(C) ii and iii (D) iii and iv
113. Which of the following pairs of ions are isoelectronic and isostructural ?
- (A) NO_2^+ and NO_3^- (B) ClO_3^- and ICl_4^-
(C) XeO_3^{2-} and PCl_3 (D) ClO_3^- and SO_3^{2-}

114. Which of the following hydrides is the strongest reducing agent?
 (A) NH_3 (B) PH_3
 (C) AsH_3 (D) SbH_3
115. Consider the reactions,
 i. $\text{Zn} + \text{Conc. HNO}_3 (\text{hot}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{X} + \text{H}_2\text{O}$
 ii. $\text{Zn} + \text{dil. HNO}_3 (\text{cold}) \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Y} + \text{H}_2\text{O}$
 Compounds X and Y are, respectively
 (A) $\text{N}_2\text{O}, \text{NO}$ (B) NO_2, NO_2
 (C) $\text{N}_2, \text{N}_2\text{O}$ (D) NO_2, NO
116. When KMnO_4 acts as an oxidizing agent in weakly alkaline medium, the oxidation number of manganese decreases by:
 (A) 1 (B) 2
 (C) 3 (D) 5
117. Acidified potassium dichromate solution turns green when Na_2SO_3 is added to it due to the formation of:
 (A) CrSO_4 (B) $\text{Cr}_2(\text{SO}_4)_3$
 (C) CrO_4^{2-} (D) $\text{Cr}_2(\text{SO}_3)_3$
118. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 , respectively. Which one of the following complexes will exhibit minimum paramagnetic behavior? (atomic numbers of Cr=24, Mn=25, Fe=26, Co=27)
 (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
119. When 2-Bromopentane is heated with potassium ethoxide in ethanol, the major product obtained is:
 (A) 2-Ethoxypentane (B) Pent-1-ene
 (C) Cis-Pent-2-ene (D) Trans-Pent-2-ene
120. Which of the following undergoes nucleophilic substitution exclusively by $\text{S}_\text{N}1$ mechanism?
 (A) Chloroethane (B) Isopropyl chloride
 (C) Chlorobenzene (D) Benzyl chloride
121. The number of possible stereoisomers for $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}(\text{Br})\text{CH}_3$ is:
 (A) 8 (B) 2
 (C) 4 (D) 6
122. 2-Methoxy-2-methylpropane on heating with HI produces:
 (A) Methanol and sec-propyl iodide (B) Methyl iodide and tert-butyl alcohol
 (C) Methyl iodide and isobutene (D) Methanol and tet-butyl iodide
123. The least acidic compound among the following is:
 (A) o-Nitrophenol (B) m-Nitrophenol
 (C) p-Nitrophenol (D) Phenol
124. An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula $\text{C}_3\text{H}_6\text{O}$ and a ketone. The ketone is:
 (A) 2-Butanone (B) 2-Pentanone
 (C) 3-Pentanone (D) Propanone
125. The increasing order of the rate of addition of HCN to the compounds i) Formaldehyde ii) Acetone iii) Acetophenone iv) benzophenone
 (A) $i < ii < iii < iv$ (B) $iv < ii < iii < i$
 (C) $iv < iii < ii < i$ (D) $iv < i < ii < iii$

126. The carboxylic acid that does not undergo Hell-Vohland-Zelinsky reaction is:
 (A) CH_3COOH (B) $(\text{CH}_3)_2\text{CHCOOH}$
 (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (D) $(\text{CH}_3)_3\text{CCOOH}$
127. $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{X} \xrightarrow{\text{P}/\text{Br}_2} \text{Y} \xrightarrow[\text{(excess)}]{\text{NH}_3} \text{Z}$.
 In the above sequence, Z is:
 (A) cyanoethane (B) ethanamide
 (C) methanamine (D) ethanamine
128. The attachment of which of the following group at para position in aniline will raise the K_b value?
 (A) $-\text{SO}_3\text{H}$ (B) $-\text{OH}$
 (C) $-\text{F}$ (D) $-\text{Br}$
129. Which of the following is an example of globular protein?
 (A) myosin (B) collagen
 (C) keratin (D) haemoglobin
130. Which one of the following is synthesized in our body by sun rays?
 (A) Vitamin D (B) Vitamin B
 (C) Vitamin K (D) Vitamin A
131. Caprolactum is the starting material for the synthesis of
 (A) Nylon-6 (B) Nylon6,6
 (C) Terylene (D) Nylon 10
132. The species which can serve as an initiator for cationic polymerization is
 (A) Lithium aluminium hydride (B) Nitric acid
 (C) Aluminium chloride (D) BuLi
133. Aspirin is an:
 (A) analgesic (B) antipyretic
 (C) antimalarial (D) Both analgesic and antipyretic
134. The equivalent mass of iron in the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ is:
 (A) Half of its atomic mass (B) One third of its atomic mass
 (C) Same as atomic mass (D) One fourth of its atomic mass
135. Which of the following sets of quantum numbers is correct for an electron in 4f subshell?
 (A) $n=4, l=3, m=4, s = +1/2$ (B) $n=4, l=3, m=-4, s = -1/2$
 (C) $n=4, l=3, m=+1, s = +1/2$ (D) $n=3, l=2, m=-2, s = +1/2$
136. The correct sequence of atomic radii is:
 (A) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (B) $\text{Al} > \text{Si} > \text{Na} > \text{Mg}$
 (C) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (D) $\text{Si} > \text{Al} > \text{Na} > \text{Mg}$
137. In which of the following, the bond angle around the central atom is maximum?
 (A) NH_3 (B) NH_4^+
 (C) PCl_3 (D) SCl_2
138. Which of the following molecule does not exist
 (A) NF_3 (B) NF_5
 (C) PF_5 (D) N_2H_4

139. If helium is allowed to expand in vacuum, it liberates heat because
 (A) It is an inert gas (B) It is an ideal gas
 (C) Its critical temp. is low (D) It is a light gas
140. i) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) + x \text{ KJ}$ ii) $\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + y \text{ KJ}$; For the given two reactions,
 (A) $x > y$ (B) $x < y$
 (C) $x = y$ (D) $x + y = 0$
141. If the bond dissociation energies of XY, X₂, Y₂ (all diatomic molecules) are in the ratio 1:1:0.5, respectively and $\Delta_f H$ of XY is -200 KJmol^{-1} , the bond dissociation energy of X₂ will be:
 (A) 400 KJmol^{-1} (B) 300 KJmol^{-1}
 (C) 200 KJmol^{-1} (D) 100 KJmol^{-1}
142. What will be the correct order of vapour pressure of water, ethanol and ether at 30°C? Given that among these compounds water has maximum boiling point and ether has minimum boiling point.
 (A) Water < ether < ethanol (B) Water < ethanol < ether
 (C) Ether < ethanol < water (D) Ethanol < ether < water
143. Which of the following will occur if a 0.1M solution of a weak acid is diluted to 0.01M at constant temperature?
 (A) $[\text{H}^+]$ will decrease to 0.001M (B) pH will decrease
 (C) Percentage ionization will increase (D) K_a will increase
144. Which of the following species involves the transfer of $5N_A$ electrons per mole of it ?
 (A) $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^-$ (B) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
 (C) $\text{MnO}_4^- \rightarrow \text{MnO}_2$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$
145. 30-volume hydrogen peroxide means:
 (A) 30% H₂O₂ by volume (B) 30g of H₂O₂ solution containing 1g of it
 (C) 1 cm³ of solution liberates 30 cm³ of O₂ gas at STP (D) 30 cm³ of the solution contains one mole of H₂O₂
146. The correct sequence of covalent character is represented by:
 (A) LiCl < NaCl < BeCl₂ (B) BeCl₂ < LiCl < NaCl
 (C) NaCl < LiCl < BeCl₂ (D) BeCl₂ < NaCl < LiCl
147. Which of the following is known as pyrene?
 (A) CCl₄ (B) CS₂
 (C) S₂Cl₂ (D) Solid CO₂
148. The most stable carbocation amongst the following is:
 (A) $(\text{CH}_3)_2\text{CH}^+$ (B) Ph_3C^+
 (C) CH_3CH_2^+ (D) $\text{CH}_2=\text{CH}-\text{CH}_2^+$
149. The molecule that will have dipole moment is:
 (A) 2,2-Dimethylpropane (B) cis-2-Butene
 (C) trans-2-Butene (D) 2,2,3,3-Tetramethylbutane
150. Of the five isomeric hexanes, the isomer which can give two monochlorinated compound is:
 (A) 2-Methylpentane (B) 2,2-Dimethylbutane
 (C) 2,3-Dimethylbutane (D) n-Hexane
151. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number
 (A) 601 (B) 600
 (C) 603 (D) 602

152. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes remain empty is
 (A) 5 (B) 21
 (C) 3^8 (D) 8C_3
153. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is
 (A) 40 (B) 60
 (C) 80 (D) 100
154. Number of divisors of the form $4n+2$ ($n \geq 0$) of the integer 240 is
 (A) 4 (B) 8
 (C) 10 (D) 3
155. 6 men and 4 women are to be seated in a row so that no two women sit together. The number of ways they can be seated is
 (A) 604800 (B) 17280
 (C) 120960 (D) 518400
156. If the cube roots of unity are $1, \omega, \omega^3$, then the roots of the equation $(x-1)^3 + 8 = 0$ are
 (A) $-1, -1 + 2\omega, -1 - 2\omega^2$ (B) $-1, -1, -1$
 (C) $-1, 1-2\omega, 1-2\omega^2$ (D) $-1, 1+2\omega, 1+2\omega^2$
157. If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then $\arg(z_1) - \arg(z_2)$ is equal to
 (A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$
 (C) 0 (D) 1
158. If $\arg(z) < 0$, then $\arg(-z) - \arg(z) =$
 (A) π (B) $-\pi$
 (C) $-\pi/2$ (D) $\pi/2$
159. If ω is an imaginary cube root of unity, then $(1+\omega-\omega^2)^7$ equals
 (A) 128ω (B) -128ω
 (C) $128\omega^2$ (D) $-128\omega^2$
160. The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order if and only if
 (A) $z_1 + z_4 = z_2 + z_3$ (B) $z_1 + z_3 = z_2 + z_4$
 (C) $z_1 + z_2 = z_3 + z_4$ (D) None of these
161. Let $R = \{(3,3) (6,6) (9,9) (12,12), (6,12) (3,9) (3,12), (3,6)\}$ be in a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
 (A) Reflexive and transitive (B) Reflexive only
 (C) An equivalence relation (D) Reflexive and symmetric only
162. If a real valued function $f(x)$ satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$, where 'a' is a given constant and $f(0) = 1$, then $f(2a-x)$ is equal to
 (A) $-f(x)$ (B) $f(x)$
 (C) $f(x) + f(a-x)$ (D) $f(-x)$

163. If the graph of the function $f(x)$ is symmetrical about the line $x=2$, then
 (A) $f(x+2) = f(x-2)$ (B) $f(2+x) = f(2-x)$
 (C) $f(x) = f(-x)$ (D) $f(x) = -f(-x)$
164. The function $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \sin x$ is
 (A) into (B) onto
 (C) one-one (D) many-one
165. In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is
 (A) At least 30 (B) At most 20
 (C) Exactly 25 (D) None of these
166. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is
 (A) 1 (B) 0
 (C) 3 (D) 2
167. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals
 (A) -2 (B) 3
 (C) 2 (D) 1
168. If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then the roots are
 (A) 0, 1 (B) $-1, 1$
 (C) 0, -1 (D) $-1, 2$
169. The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is/are
 (A) 2 (B) 4
 (C) 1 (D) 3
170. If $x^2 + 2ax + 10 - 3a > 0$ for every real value of x , then
 (A) $a > 5$ (B) $a < -5$
 (C) $-5 < a < 2$ (D) $2 < a < 5$
171. The angle between two diagonals of a cube is
 (A) 45° (B) 60°
 (C) 90° (D) $\tan^{-1}2\sqrt{2}$
172. If the angle between two vectors $\vec{i} + \vec{k}$ and $\vec{i} - \vec{j} + a\vec{k}$ is $\pi/3$, then the value of a is
 (A) 2 (B) 4
 (C) -2 (D) 0
173. The scalar $\vec{A} \cdot (\vec{B} + \vec{C}) \times (\vec{A} + \vec{B} + \vec{C})$ equals
 (A) 0 (B) $[\vec{A} \vec{B} \vec{C}] + [\vec{B} \vec{C} \vec{A}]$
 (C) $[\vec{A} \vec{B} \vec{C}]$ (D) None of these
174. The points with position vectors $60\hat{i} + 3\hat{j}, 40\hat{i} - 8\hat{j}, a\hat{i} - 52\hat{j}$ are collinear if
 (A) $a = -40$ (B) $a = 40$
 (C) $a = 20$ (D) None of these
175. The number of vectors of unit length perpendicular to vectors $\vec{a} = (0, 1, 1)$ and $\vec{b} = (1, 1, 0)$ is
 (A) one (B) two
 (C) three (D) Infinite
176. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is
 (A) 0° (B) 90°
 (C) 45° (D) 30°

177. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is
 (A) $3/2$ (B) $5/2$
 (C) $7/2$ (D) $9/2$
178. The method of least squares dictates that we choose regression line where the sum of the square of deviations of the points from the line is:
 (A) Maximum (B) Minimum
 (C) Zero (D) Positive
179. If the value of any regression coefficient is zero, then two variables are:
 (A) Qualitative (B) Correlated
 (C) Dependent (D) Independent
180. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called:
 (A) Correlation (B) Regression
 (C) Residual (D) Slope
181. If $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, then $A^3 =$
 (A) A (B) 2A
 (C) 3A (D) 4A
182. The value of $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$ is equal to
 (A) $1+x+y+z$ (B) $x+y+z$
 (C) xyz (D) $xyz+xy+xz+yz$
183. If $A^2 - A + I = 0$, then the inverse of A is
 (A) A (B) $A-I$
 (C) $I-A$ (D) I
184. The number of bijective functions from a set A to itself when A contains 106 elements is
 (A) 106 (B) 106^3
 (C) $106!$ (D) 2^{106}
185. The value of $\begin{vmatrix} 11 & 12 & 13 \\ 12 & 13 & 14 \\ 13 & 14 & 15 \end{vmatrix}$ is
 (A) 1 (B) 0
 (C) -1 (D) 67
186. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is
 (A) 2 (B) 2.57
 (C) 3 (D) 3.75
187. The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is
 (A) $\sqrt{\frac{52}{7}}$ (B) $\frac{52}{7}$
 (C) $\sqrt{6}$ (D) 6
188. Let a, b, c, d, e be the observations with mean m and standard deviation s. The standard deviation of the observations $a+k, b+k, c+k, d+k, e+k$ is
 (A) ks (B) s
 (C) $s+k$ (D) s/k

189. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is
 (A) 2.5 (B) 1
 (C) 1.5 (D) 0
190. Consider the first 10 positive integers. If we multiply each number by -1 and then add 1 to each number, the variance of the numbers so obtained is
 (A) 8.25 (B) 6.50
 (C) 3.87 (D) 2.87
191. For a linear programming equations, convex set of equations is included in the region of
 (A) Feasible solutions (B) Disposed solutions
 (C) Profit solutions (D) Loss solutions
192. Infeasibility means that the number of solutions to the linear programming models that satisfies all constraints is
 (A) at least 1 (B) 0
 (C) An infinite number (D) At least 2
193. A constraint that does not affect the feasible region is a
 (A) Non-negativity constraint (B) Redundant constraint
 (C) Standard constraint (D) Slack constraint
194. Consider the following LPP. Maximize $3x_1 + 8x_2$ subject to $2x_1 + 5x_2 \leq 10$, $6x_1 + x_2 \leq 6$, $x_1, x_2 \geq 0$. The optimal value of the function is
 (A) 0 (B) 3
 (C) $\frac{111}{7}$ (D) 16
195. For linear inequalities, solution set for a group of inequalities is classified as
 (A) Concave set (B) Convex set
 (C) Loss set (D) Profit set
196. Which of the following is unary operations?
 (A) Addition (B) Multiplication
 (C) Square root (D) None of these
197. If * is a binary operation in A then
 (A) A is closed under * (B) A is not closed under *
 (C) A is not closed under + (D) A is closed under -
198. Which of the following statements is not correct ?
 (A) $\log_{10} 10 = 1$ (B) $\log (2 + 3) = \log (2 \times 3)$
 (C) $\log_{10} 1 = 0$ (D) $\log (1+2+3) = \log 1 + \log 2 + \log 3$
199. If $\log (a/b) + \log (b/a) = \log (a+b)$, then
 (A) $a+b=1$ (B) $a-b=1$
 (C) $a=b$ (D) $a^2 - b^2=1$
200. The value of e is
 (A) 0 (B) 1
 (C) 2.718 (D) 2.14

PCB UG A- ANSWER KEY

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C	35.	A	69.	A	103	All	137	B	171	C
2.	B	36.	D	70.	D	104	B	138	A	172	D
3.	A	37.	C	71.	B	105	D	139	A	173	D
4.	D	38.	A	72.	B	106	B	140	A	174	A
5.	C	39.	D	73.	C	107	C	141	C	175	C
6.	B	40.	B	74.	D	108	C	142	D	176	D
7.	A	41.	C	75.	D	109	C	143	C	177	D
8.	D	42.	D	76.	A	110	B	144	D	178	B
9.	A	43.	A	77.	C	111	A	145	B	179	D
10.	B	44.	B	78.	B	112	B	146	All	180	A
11.	C	45.	C	79.	A/B	113	D	147	A	181	A
12.	D	46.	A	80.	C	114	A	148	A	182	C
13.	A	47.	C	81.	B	115	C	149	A	183	D
14.	B	48.	C	82.	D	116	D	150	D	184	B
15.	C	49.	D	83.	A	117	A	151	C	185	C
16.	D	50.	B	84.	A	118	A	152	D	186	A
17.	A	51.	D	85	C	119	D	153	A	187	B
18.	C	52.	B	86	C	120	C	154	A	188	B
19.	A	53.	D	87	C	121	C	155	C	189	All
20.	B	54.	A	88	B	122	A	156	C	190	A
21.	D	55.	D	89	C	123	A	157	B	191	All
22.	A	56.	C	90	B	124	All	158	C	192	B
23.	C	57.	A	91	A	125	D	159	B/D	193	C
24.	C	58.	C	92	B	126	A	160	A	194	B
25.	B	59.	C	93	A	127	B	161	All	195	C
26.	A	60.	D	94	C	128	C	162	A	196	C
27.	C	61.	A	95	B	129	C	163	D	197	A
28.	D	62.	B	96	B	130	A	164	D	198	B
29.	B	63.	D	97	B	131	C	165	All	199	B
30.	A	64.	B	98	D	132	D	166	C	200	C
31.	D	65.	C	99	C	133	B	167	B		
32.	B	66.	D	100	D	134	C	168	D		
33.	B	67.	C	101	C/B	135	A	169	D		
34.	C	68.	A	102	A	136	B	170	D		

PCB UG B- ANSWER KEY

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	D	35.	C	69.	D	103	A	137	B	171	D
2.	B	36.	C	70.	C	104	A	138	B	172	A
3.	D	37.	C	71.	C	105	C	139	All	173	C
4.	A	38.	B	72.	A	106	C	140	A	174	C
5.	D	39.	C	73.	A	107	B	141	All	175	B
6.	C	40.	B	74.	All	108	C	142	B	176	A
7.	A	41.	A	75.	D	109	B/D	143	C	177	C
8.	C	42.	B	76.	A	110	A	144	B	178	D
9.	C	43.	A	77.	B	111	All	145	C	179	B
10.	D	44.	C	78.	C	112	A	146	C	180	A
11.	A	45.	B	79.	C	113	D	147	A	181	D
12.	B	46.	B	80.	A	114	D	148	B	182	B
13.	D	47.	B	81.	C	115	All	149	B	183	B
14.	B	48.	D	82.	D	116	C	150	C	184	C
15.	C	49.	C	83.	B	117	B	151	C	185	A
16.	D	50.	D	84.	C	118	D	152	B	186	D
17.	C	51.	C/B	85.	A	119	D	153	A	187	C
18.	A	52.	A	86.	B	120	D	154	D	188	A
19.	A	53.	All	87.	B	121	C	155	C	189	D
20.	D	54.	B	88.	A	122	D	156	B	190	B
21.	B	55.	D	89.	A	123	D	157	A	191	C
22.	B	56.	B	90.	A	124	A	158	D	192	D
23.	C	57.	C	91.	C	125	C	159	A	193	A
24.	D	58.	C	92.	D	126	D	160	B	194	B
25.	D	59.	C	93.	C	127	D	161	C	195	C
26.	A	60.	B	94.	D	128	B	162	D	196	A
27.	C	61.	A	95.	B	129	D	163	A	197	C
28.	B	62.	B	96.	All	130	A	164	B	198	C
29.	A/B	63.	D	97.	A	131	A	165	C	199	D
30.	C	64.	A	98.	A	132	C	166	D	200	B
31.	B	65.	C	99.	A	133	D	167	A		
32.	D	66.	D	100.	D	134	B	168	C		
33.	A	67.	A	101.	C	135	C	169	A		
34.	A	68.	A	102.	D	136	A	170	B		

PCB UG C– ANSWER KEY

Q. No.	Ans	Q. No.	Ans	Q. No.	Ans	Q. No.	Ans	Q. No.	Ans	Q. No.	Ans
1.	C/B	35.	A	69.	D	103	A	137	C	171	B
2.	A	36.	B	70.	D	104	D	138	A	172	B
3.	All	37.	B	71.	C	105	C	139	D	173	C
4.	B	38.	A	72.	D	106	B	140	B	174	D
5.	D	39.	A	73.	D	107	A	141	C	175	D
6.	B	40.	A	74.	A	108	D	142	D	176	A
7.	C	41.	C	75.	C	109	A	143	A	177	C
8.	C	42.	D	76.	D	110	B	144	B	178	B
9.	C	43.	C	77.	D	111	C	145	C	179	A/B
10.	B	44.	D	78.	B	112	D	146	A	180	C
11.	A	45.	B	79.	D	113	A	147	C	181	B
12.	B	46.	All	80.	A	114	B	148	C	182	D
13.	D	47.	A	81.	A	115	C	149	D	183	A
14.	A	48.	A	82.	C	116	D	150	B	184	A
15.	C	49.	A	83.	D	117	A	151	D	185	C
16.	D	50.	D	84.	B	118	C	152	B	186	C
17.	A	51.	C	85.	C	119	A	153	D	187	C
18.	A	52.	D	86.	A	120	B	154	A	188	B
19.	D	53.	A	87.	B	121	D	155	D	189	C
20.	C	54.	A	88.	B	122	A	156	C	190	B
21.	C	55.	C	89.	All	123	C	157	A	191	A
22.	A	56.	C	90.	A	124	C	158	C	192	B
23.	A	57.	B	91.	All	125	B	159	C	193	A
24.	All	58.	C	92.	B	126	A	160	D	194	C
25.	D	59.	B/D	93.	C	127	C	161	A	195	B
26.	A	60.	A	94.	B	128	D	162	B	196	B
27.	B	61.	All	95.	C	129	B	163	D	197	B
28.	C	62.	A	96.	C	130	A	164	B	198	D
29.	C	63.	D	97.	A	131	D	165	C	199	C
30.	A	64.	D	98.	B	132	B	166	D	200	D
31.	C	65.	All	99.	B	133	B	167	C		
32.	D	66.	C	100.	C	134	C	168	A		
33.	B	67.	B	101.	C	135	A	169	A		
34.	C	68.	D	102.	B	136	D	170	D		

PCB UG D- ANSWER KEY

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C	35.	C	69.	A	103	D	137	C	171	C
2.	D	36.	A	70.	B	104	A	138	B	172	A
3.	A	37.	B	71.	D	105	D	139	C	173	A
4.	A	38.	B	72.	A	106	C	140	B	174	All
5.	C	39.	All	73.	C	107	A	141	A	175	D
6.	C	40.	A	74.	C	108	C	142	B	176	A
7.	B	41.	All	75.	B	109	C	143	A	177	B
8.	C	42.	B	76.	A	110	D	144	C	178	C
9.	B/D	43.	C	77.	C	111	A	145	B	179	C
10.	A	44.	B	78.	D	112	B	146	B	180	A
11.	All	45.	C	79.	B	113	D	147	B	181	C
12.	A	46.	C	80.	A	114	B	148	D	182	D
13.	D	47.	A	81.	D	115	C	149	C	183	B
14.	D	48.	B	82.	B	116	D	150	D	184	C
15.	All	49.	B	83.	B	117	C	151	C/B	185	A
16.	C	50.	C	84.	C	118	A	152	A	186	B
17.	B	51.	C	85.	A	119	A	153	All	187	B
18.	D	52.	B	86.	D	120	D	154	B	188	A
19.	D	53.	A	87.	C	121	B	155	D	189	A
20.	D	54.	D	88.	A	122	B	156	B	190	A
21.	C	55.	C	89.	D	123	C	157	C	191	C
22.	D	56.	B	90.	B	124	D	158	C	192	D
23.	D	57.	A	91.	C	125	D	159	C	193	C
24.	A	58.	D	92.	D	126	A	160	B	194	D
25.	C	59.	A	93.	A	127	C	161	A	195	B
26.	D	60.	B	94.	B	128	B	162	B	196	All
27.	D	61.	C	95.	C	129	A/B	163	D	197	A
28.	B	62.	D	96.	A	130	C	164	A	198	A
29.	D	63.	A	97.	C	131	B	165	C	199	A
30.	A	64.	B	98.	C	132	D	166	D	200	D
31.	A	65.	C	99.	D	133	A	167	A		
32.	C	66.	D	100.	B	134	A	168	A		
33.	D	67.	A	101.	D	135	C	169	D		
34.	B	68.	C	102.	B	136	C	170	C		

PCM UG A Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C/B	35.	A	69.	D	103	A	137	A	171	D
2.	A	36.	B	70.	D	104	A	138	B	172	D
3.	All	37.	B	71.	C	105	A	139	D	173	B
4.	B	38.	A	72.	D	106	C	140	A	174	A
5.	D	39.	A	73.	D	107	C	141	A	175	D
6.	B	40.	A	74.	A	108	A	142	B	176	B
7.	C	41.	C	75.	C	109	D	143	B	177	D
8.	C	42.	D	76.	D	110	B	144	D	178	B
9.	C	43.	C	77.	D	111	A	145	B	179	B
10.	B	44.	D	78.	B	112	A	146	A/B	180	B
11.	A	45.	B	79.	D	113	B	147	A	181	A
12.	B	46.	All	80.	A	114	D	148	B	182	A
13.	D	47.	A	81.	A	115	C	149	A	183	A
14.	A	48.	A	82.	C	116	A	150	C	184	C
15.	C	49.	A	83.	D	117	D	151	D	185	B
16.	D	50.	D	84.	B	118	C	152	A	186	D
17.	A	51.	C	85	C	119	B	153	C	187	C
18.	A	52.	D	86	A	120	C	154	B	188	A
19.	D	53.	A	87	B	121	D	155	D	189	B
20.	C	54.	A	88	B	122	D	156	C	190	All
21.	C	55.	C	89	All	123	A	157	A	191	B
22.	A	56.	C	90	A	124	A	158	D	192	C
23.	A	57.	B	91	All	125	B	159	B	193	D
24.	All	58.	C	92	B	126	B	160	B	194	All
25.	D	59.	B/D	93	C	127	C	161	C	195	C
26.	A	60.	A	94	B	128	B	162	C	196	C
27.	B	61.	All	95	C	129	D	163	D	197	B
28.	C	62.	A	96	C	130	B	164	D	198	B
29.	C	63.	D	97	A	131	All	165	A	199	A
30.	A	64.	D	98	B	132	D	166	All	200	C
31.	C	65.	All	99	B	133	C	167	D		
32.	D	66.	C	100	C	134	C	168	C		
33.	B	67.	B	101	A	135	B	169	A		
34.	C	68.	D	102	B	136	B	170	C		

PCM UG B Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C	35.	C	69.	B	103	C	137	C	171	C
2.	D	36.	A	70.	C	104	B	138	A	172	A
3.	A	37.	B	71.	D	105	D	139	B	173	A
4.	A	38.	B	72.	D	106	C	140	All	174	All
5.	C	39.	All	73.	A	107	A	141	B	175	D
6.	C	40.	A	74.	A	108	D	142	C	176	A
7.	B	41.	All	75.	B	109	B	143	D	177	B
8.	C	42.	B	76.	B	110	B	144	All	178	C
9.	B/D	43.	C	77.	C	111	C	145	C	179	C
10.	A	44.	B	78.	B	112	C	146	C	180	A
11.	All	45.	C	79.	D	113	D	147	B	181	C
12.	A	46.	C	80.	B	114	D	148	B	182	D
13.	D	47.	A	81.	All	115	A	149	A	183	B
14.	D	48.	B	82.	D	116	All	150	C	184	C
15.	All	49.	B	83.	C	117	D	151	C/B	185	A
16.	C	50.	C	84.	C	118	C	152	A	186	B
17.	B	51.	A	85.	B	119	A	153	All	187	B
18.	D	52.	B	86.	B	120	C	154	B	188	A
19.	D	53.	A	87.	A	121	D	155	D	189	A
20.	D	54.	A	88.	B	122	D	156	B	190	A
21.	C	55.	A	89.	D	123	B	157	C	191	C
22.	D	56.	C	90.	A	124	A	158	C	192	D
23.	D	57.	C	91.	A	125	D	159	C	193	C
24.	A	58.	A	92.	B	126	B	160	B	194	D
25.	C	59.	D	93.	B	127	D	161	A	195	B
26.	D	60.	B	94.	D	128	B	162	B	196	All
27.	D	61.	A	95.	B	129	B	163	D	197	A
28.	B	62.	A	96.	A/B	130	B	164	A	198	A
29.	D	63.	B	97.	A	131	A	165	C	199	A
30.	A	64.	D	98.	B	132	A	166	D	200	D
31.	A	65.	C	99.	A	133	A	167	A		
32.	C	66.	A	100.	C	134	C	168	A		
33.	D	67.	D	101.	D	135	B	169	D		
34.	B	68.	C	102.	A	136	D	170	C		

PCM UG C Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	A	35.	B	69.	A	103	All	137	B	171	C
2.	B	36.	B	70.	C	104	B	138	A	172	D
3.	A	37.	A	71.	D	105	D	139	A	173	D
4.	A	38.	B	72.	D	106	B	140	A	174	A
5.	A	39.	D	73.	B	107	C	141	C	175	C
6.	C	40.	A	74.	A	108	C	142	D	176	D
7.	C	41.	A	75.	D	109	C	143	C	177	D
8.	A	42.	B	76.	B	110	B	144	D	178	B
9.	D	43.	B	77.	D	111	A	145	B	179	D
10.	B	44.	D	78.	B	112	B	146	All	180	A
11.	A	45.	B	79.	B	113	D	147	A	181	A
12.	A	46.	A/B	80.	B	114	A	148	A	182	C
13.	B	47.	A	81.	A	115	C	149	A	183	D
14.	D	48.	B	82.	A	116	D	150	D	184	B
15.	C	49.	A	83.	A	117	A	151	C	185	C
16.	A	50.	C	84.	C	118	A	152	D	186	A
17.	D	51.	D	85	B	119	D	153	A	187	B
18.	C	52.	A	86	D	120	C	154	A	188	B
19.	B	53.	C	87	C	121	C	155	C	189	All
20.	C	54.	B	88	A	122	A	156	C	190	A
21.	D	55.	D	89	B	123	A	157	B	191	All
22.	D	56.	C	90	All	124	All	158	C	192	B
23.	A	57.	A	91	B	125	D	159	B/D	193	C
24.	A	58.	D	92	C	126	A	160	A	194	B
25.	B	59.	B	93	D	127	B	161	All	195	C
26.	B	60.	B	94	All	128	C	162	A	196	C
27.	C	61.	C	95	C	129	C	163	D	197	A
28.	B	62.	C	96	C	130	A	164	D	198	B
29.	D	63.	D	97	B	131	C	165	All	199	B
30.	B	64.	D	98	B	132	D	166	C	200	C
31.	All	65.	A	99	A	133	B	167	B		
32.	D	66.	All	100	C	134	C	168	D		
33.	C	67.	D	101	C/B	135	A	169	D		
34.	C	68.	C	102	A	136	B	170	D		

PCM UG D Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	D	35.	B	69.	D	103	A	137	B	171	D
2.	A	36.	D	70.	C	104	A	138	B	172	D
3.	C	37.	C	71.	C	105	C	139	All	173	A
4.	B	38.	A	72.	A	106	C	140	A	174	A
5.	D	39.	B	73.	A	107	B	141	All	175	B
6.	C	40	All	74.	All	108	C	142	B	176	B
7.	A	41.	B	75.	D	109	B/D	143	C	177	C
8.	D	42.	C	76.	A	110	A	144	B	178	B
9.	B	43.	D	77.	B	111	All	145	C	179	D
10.	B	44.	All	78.	C	112	A	146	C	180	B
11.	C	45.	C	79.	C	113	D	147	A	181	All
12.	C	46.	C	80.	A	114	D	148	B	182	D
13.	D	47.	B	81.	C	115	All	149	B	183	C
14.	D	48.	B	82.	D	116	C	150	C	184	C
15.	A	49.	A	83.	B	117	B	151	A	185	B
16.	All	50.	C	84.	C	118	D	152	B	186	B
17.	D	51.	C/B	85	A	119	D	153	A	187	A
18.	C	52.	A	86	B	120	D	154	A	188	B
19.	A	53.	All	87	B	121	C	155	A	189	D
20.	C	54.	B	88	A	122	D	156	C	190	A
21.	D	55.	D	89	A	123	D	157	C	191	A
22.	D	56.	B	90	A	124	A	158	A	192	B
23.	B	57.	C	91	C	125	C	159	D	193	B
24.	A	58.	C	92	D	126	D	160	B	194	D
25.	D	59.	C	93	C	127	D	161	A	195	B
26.	B	60.	B	94	D	128	B	162	A	196	A/B
27.	D	61.	A	95	B	129	D	163	B	197	A
28.	B	62.	B	96	All	130	A	164	D	198	B
29.	B	63.	D	97	A	131	A	165	C	199	A
30.	B	64.	A	98	A	132	C	166	A	200	C
31.	A	65.	C	99	A	133	D	167	D		
32.	A	66.	D	100	D	134	B	168	C		
33.	A	67.	A	101	C	135	C	169	B		
34.	C	68.	A	102	D	136	A	170	C		

PCA UG A Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C/B	35.	A	69.	D	103	C	137	A	171	A
2.	A	36.	B	70.	D	104	A	138	B	172	C
3.	All	37.	B	71.	C	105	B	139	A	173	A
4.	B	38.	A	72.	D	106	B	140	D	174	C
5.	D	39.	A	73.	D	107	A	141	D	175	B
6.	B	40.	A	74.	A	108	B	142	D	176	C
7.	C	41.	C	75.	C	109	B	143	B	177	B
8.	C	42.	D	76.	D	110	C	144	B	178	B
9.	C	43.	C	77.	D	111	A	145	C	179	C
10.	B	44.	D	78.	B	112	B	146	C	180	C
11.	A	45.	B	79.	D	113	B	147	C	181	A
12.	B	46.	All	80.	A	114	A	148	D	182	B
13.	D	47.	A	81.	A	115	D	149	D	183	D
14.	A	48.	A	82.	C	116	D	150	C	184	A
15.	C	49.	A	83.	D	117	C	151	B	185	C
16.	D	50.	D	84.	B	118	B	152	B	186	A
17.	A	51.	C	85	C	119	A	153	C	187	D
18.	A	52.	D	86	A	120	B	154	B	188	A
19.	D	53.	A	87	B	121	B	155	C	189	D
20.	C	54.	A	88	B	122	B	156	B	190	A
21.	C	55.	C	89	All	123	A	157	D	191	C
22.	A	56.	C	90	A	124	C	158	C	192	B
23.	A	57.	B	91	All	125	C	159	B	193	C
24.	All	58.	C	92	B	126	A	160	C	194	B
25.	D	59.	B/D	93	C	127	B	161	C	195	B
26.	A	60.	A	94	B	128	D	162	B	196	B/D
27.	B	61.	All	95	C	129	B	163	B	197	B
28.	C	62.	A	96	C	130	B	164	A	198	B
29.	C	63.	D	97	A	131	D	165	C	199	A
30.	A	64.	D	98	B	132	A	166	C	200	B
31.	C	65.	All	99	B	133	A	167	A		
32.	D	66.	C	100	C	134	B	168	B		
33.	B	67.	B	101	D	135	A	169	B		
34.	C	68.	D	102	C	136	C	170	D		

PCA UG B Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	C	35.	C	69.	A	103	C	137	D	171	C
2.	D	36.	A	70.	B	104	B	138	A	172	A
3.	A	37.	B	71.	B	105	C	139	D	173	A
4.	A	38.	B	72.	B	106	B	140	A	174	All
5.	C	39.	All	73.	A	107	D	141	C	175	D
6.	C	40.	A	74.	C	108	C	142	B	176	A
7.	B	41.	All	75.	C	109	B	143	C	177	B
8.	C	42.	B	76.	A	110	C	144	B	178	C
9.	B/D	43.	C	77.	B	111	C	145	B	179	C
10.	A	44.	B	78.	D	112	B	146	B/D	180	A
11.	All	45.	C	79.	B	113	B	147	B	181	C
12.	A	46.	C	80.	B	114	A	148	B	182	D
13.	D	47.	A	81.	D	115	C	149	A	183	B
14.	D	48.	B	82.	A	116	C	150	B	184	C
15.	All	49.	B	83.	A	117	A	151	C/B	185	A
16.	C	50.	C	84.	B	118	B	152	A	186	B
17.	B	51.	D	85.	A	119	B	153	All	187	B
18.	D	52.	C	86.	C	120	D	154	B	188	A
19.	D	53.	C	87.	A	121	A	155	D	189	A
20.	D	54.	A	88.	B	122	C	156	B	190	A
21.	C	55.	B	89.	A	123	A	157	C	191	C
22.	D	56.	B	90.	D	124	C	158	C	192	D
23.	D	57.	A	91.	D	125	B	159	C	193	C
24.	A	58.	B	92.	D	126	C	160	B	194	D
25.	C	59.	B	93.	B	127	B	161	A	195	B
26.	D	60.	C	94.	B	128	B	162	B	196	All
27.	D	61.	A	95.	C	129	C	163	D	197	A
28.	B	62.	B	96.	C	130	C	164	A	198	A
29.	D	63.	B	97.	C	131	A	165	C	199	A
30.	A	64.	A	98.	D	132	B	166	D	200	D
31.	A	65.	D	99.	D	133	D	167	A		
32.	C	66.	D	100.	C	134	A	168	A		
33.	D	67.	C	101.	B	135	C	169	D		
34.	B	68.	B	102.	B	136	A	170	C		

PCA UG C Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	D	35.	A	69.	B	103	All	137	B	171	C
2.	C	36.	C	70.	D	104	B	138	A	172	D
3.	C	37.	A	71.	A	105	D	139	A	173	D
4.	A	38.	B	72.	C	106	B	140	A	174	A
5.	B	39.	A	73.	A	107	C	141	C	175	C
6.	B	40.	D	74.	C	108	C	142	D	176	D
7.	A	41.	D	75.	B	109	C	143	C	177	D
8.	B	42.	D	76.	C	110	B	144	D	178	B
9.	B	43.	B	77.	B	111	A	145	B	179	D
10.	C	44.	B	78.	B	112	B	146	All	180	A
11.	A	45.	C	79.	C	113	D	147	A	181	A
12.	B	46.	C	80.	C	114	A	148	A	182	C
13.	B	47.	C	81.	A	115	C	149	A	183	D
14.	A	48.	D	82.	B	116	D	150	D	184	B
15.	D	49.	D	83.	D	117	A	151	C	185	C
16.	D	50.	C	84.	A	118	A	152	D	186	A
17.	C	51.	B	85	C	119	D	153	A	187	B
18.	B	52.	B	86	A	120	C	154	A	188	B
19.	A	53.	C	87	D	121	C	155	C	189	All
20.	B	54.	B	88	A	122	A	156	C	190	A
21.	B	55.	C	89	D	123	A	157	B	191	All
22.	B	56.	B	90	A	124	All	158	C	192	B
23.	A	57.	D	91	C	125	D	159	B/D	193	C
24.	C	58.	C	92	B	126	A	160	A	194	B
25.	C	59.	B	93	C	127	B	161	All	195	C
26.	A	60.	C	94	B	128	C	162	A	196	C
27.	B	61.	C	95	B	129	C	163	D	197	A
28.	D	62.	B	96	B/D	130	A	164	D	198	B
29.	B	63.	B	97	B	131	C	165	All	199	B
30.	B	64.	A	98	B	132	D	166	C	200	C
31.	D	65.	C	99	A	133	B	167	B		
32.	A	66.	C	100	B	134	C	168	D		
33.	A	67.	A	101	C/B	135	A	169	D		
34.	B	68.	B	102	A	136	B	170	D		

PCA UG D Answer key

Q. No.	Ans	Q. No.	Ans	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1.	B	35.	C	69.	D	103	A	137	B	171	B
2.	B	36.	A	70.	C	104	A	138	B	172	B
3.	C	37.	D	71.	C	105	C	139	All	173	A
4.	B	38.	A	72.	A	106	C	140	A	174	C
5.	C	39.	D	73.	A	107	B	141	All	175	C
6.	B	40.	A	74.	All	108	C	142	B	176	A
7.	D	41.	C	75.	D	109	B/D	143	C	177	B
8.	C	42.	B	76.	A	110	A	144	B	178	D
9.	B	43.	C	77.	B	111	All	145	C	179	B
10.	C	44.	B	78.	C	112	A	146	C	180	B
11.	C	45.	B	79.	C	113	D	147	A	181	D
12.	B	46.	B/D	80.	A	114	D	148	B	182	A
13.	B	47.	B	81.	C	115	All	149	B	183	A
14.	A	48.	B	82.	D	116	C	150	C	184	B
15.	C	49.	A	83.	B	117	B	151	D	185	A
16.	C	50.	B	84.	C	118	D	152	C	186	C
17.	A	51.	C/B	85	A	119	D	153	C	187	A
18.	B	52.	A	86	B	120	D	154	A	188	B
19.	B	53.	All	87	B	121	C	155	B	189	A
20.	D	54.	B	88	A	122	D	156	B	190	D
21.	A	55.	D	89	A	123	D	157	A	191	D
22.	C	56.	B	90	A	124	A	158	B	192	D
23.	A	57.	C	91	C	125	C	159	B	193	B
24.	C	58.	C	92	D	126	D	160	C	194	B
25.	B	59.	C	93	C	127	D	161	A	195	C
26.	C	60.	B	94	D	128	B	162	B	196	C
27.	B	61.	A	95	B	129	D	163	B	197	C
28.	B	62.	B	96	All	130	A	164	A	198	D
29.	C	63.	D	97	A	131	A	165	D	199	D
30.	C	64.	A	98	A	132	C	166	D	200	C
31.	A	65.	C	99	A	133	D	167	C		
32.	B	66.	D	100	D	134	B	168	B		
33.	D	67.	A	101	C	135	C	169	A		
34.	A	68.	A	102	D	136	A	170	B		