Association of
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PAPER CONTRIBUTOR : WANKHEDE MADAM'S ACADEMY

1. If L, C and R denote the inductance, capacitance and resistance respectively, then the dimensional formula for $C^2 LR$ is

   1) $[ML^2 T^{-1} I^0]$ 2) $[M^0L^0 T^3 I^0]$

   3) $[M^{-1}L^{-2} T^6 I^2]$ 4) $[M^0L^0 T^2 I^0]$

2. If $\vec{A} = 5\vec{i} - 2\vec{j} + 3\vec{k}$ and $\vec{B} = 2\vec{i} + \vec{j} + 2\vec{k}$, component of $\vec{B}$ along $\vec{A}$ is

   1) $\dfrac{\sqrt{14}}{38}$ 2) $\dfrac{28}{\sqrt{38}}$ 3) $\dfrac{\sqrt{28}}{38}$ 4) $\dfrac{14}{\sqrt{38}}$

3. If a bullet of mass 5 gm moving with velocity 100 m/s. penetrates the wooden block upto 6cm. Then the average force imposed by the bullet on the block is

   1) 8300 N   2) 417 N   3) 830N   4) zero

4. A rocket of mass 5700 kg ejects mass at a constant rate of 15 kg/s with constant speed of 12 km/s. The acceleration of the rocket 1 minute after the blast is (g = 10 m/s^2)

   1)34.9 m/s^2 2)27.5 m/s^{2}3) 3.50 m/s^2 4) 13.5 m/s^2

5. A particle is projected up a 45^0 rough inclined with a velocity v. The coefficient of friction is 0.5. The speed

   with which it returns back to the starting point v'. Then v' / v is

   1) $\dfrac{1}{\sqrt{2}}$ 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{\sqrt{3}}$ 4) $\dfrac{1}{3}$

6. Two metallic balls 2 kg each moving with velocities 4 ms^{-1} and 2 ms^{-1} collide head-on. If the coefficient of restitution is 0.5, what is the loss of energy during the collision ?

   1) 2 J   2) 1 J   3) 0.5 J   4) 1.5 J

7. A particle of mass 0.1 kg is subjected to a force which varies with distance as shown. If it starts its journey from rest at x = 0, then its velocity at x = 12 m is
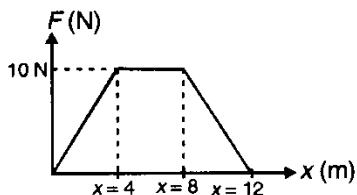
1) 0 m/s 2) $20\sqrt{2}$ 3) $20\sqrt{3}$ 4) 40 m/s

8. Three particles of each mass M are situated at the vertices of an equilateral triangle of side a. The only forces acting on the particles are their mutual gravitational forces. It is desired that each particle move in a circle while maintaining the original mutual separation a velocity should be given to each particle is

1) $\sqrt{\dfrac{GM}{a}}$ 2) $\sqrt{\dfrac{3GM}{a}}$ 3) $3\sqrt{\dfrac{GM}{a}}$ 4) $\sqrt{\dfrac{GM}{3a}}$

9. Bulk modulus of water is 2 x 10^9 N/m². The change in pressure required to

increase the density of water by 0.1 % is

1) 2 x 10^9 N/m²   2) 2 x 10^{12} N/m²

3) 2 x 10^6 N/m²   4) 2 x 10^4 N/m²

10. A wheel starts from rest and attains an angular velocity of 20 radian/s after being uniformly accelerated for 10 s. The total angle in radian through which it has turned in 10 second is

1) 20π 2) 40π 3) 100   4) 100π

11. An iron rod is one meter long at 20°C. At what temperature the length of the rod decreases by 1.2 mm

$$(\alpha_{Fe} = 12 \times 10^{-6} / {}^0C)$$

1) 100°C   2) -80°C 3) 80°C 4) -100°C

12. In a mechanical refrigerator, the low temperature coils are at a temperature of -23°C and the compressed gas in the condenser has a temperature of 27°C. The theoretical coefficient of performance is

1) 5   2) 8   3) 6   4) 6.5

13. 5 moles of hydrogen ($\gamma = 7/5$) initially at STP is compressed adiabatically so that its temperature increases by 400°C (R = 8.3 J/mole K). The increase in internal energy in kJ is

1) 20.5 2) 41.5   3) 21.5 4) 65.5

14. A particle executes S.H.M. of amplitude 25 cm and time period 3s. What is the minimum time required for the particle to move between two points located at 12.5 cm on either side of the mean position ?

1) 0.25 s 2) 0.5 s   3) 0.75 s 4) 1 s

15. What should be the angular speed with which the earth have to rotate on its axis so that a person on the equator would weigh $\dfrac{3}{5}$th as   much as present?

1) $\sqrt{\dfrac{2g}{5R}}$ 2) $\sqrt{\dfrac{2R}{5g}}$ 3) $\dfrac{2\sqrt{R}}{\sqrt{5g}}$ 4) $\dfrac{2g}{5R}$

16. If the frequency of two sources of sound are 512 Hz and 516 Hz. Then the time interval between two consecutive beats produced by sounding them together will be

1) 0.5 s   2) 0.125 s   3) 0.25 s   4) 4 s

17. The energy required to move a charge of 0.25 C between two points 4×10^{20} eV. The potential difference between them is

1) 100 V   2) 256 V 3) 200 V   4) 128 V

18. The resistance of a conductor is $5\,\Omega$ at 50^0C and $6\,\Omega$ at 100^0C. The resistance at 0^0C is

1) $2\,\Omega$ 2) $4\,\Omega$ 3) $2.5\,\Omega$ 4) $4.5\,\Omega$

19. A voltmeter of resistance $2000\,\Omega$ reads 1 volt/division. The resistance required to be connected in series with voltmeter to make it to read 10 volt/division is

1) $18\,\Omega$ 2) $180\,\Omega$ 3) $1800\,\Omega$ 4) $18000\,\Omega$

20. A solid cube of copper of edge 10 cm subjected to a hydraulic pressure of 7×10^6 Pascal. If Bulk modulus of copper is 140 GPa, then contraction in its volume will be

1) $5 \times 10^{-8} \ m^3$ 2) $4\ 5 \times 10^{-8} \ m^3$

3) $2\ 5 \times 10^{-8} \ m^3$ 4) $10^8 \ m^3$

21. The r.m.s. value of alternating current which when passed through a resistor produces heat energy four times that produced by direct current of 2A through the same resistor in same time is

1) 2 A   2) 4 A   3) 8 A   4) 16 A

22. Which of the following factors affect the thermal conductivity of a rod?

1) area of cross section 2) length of rod

3) material of rod   4)all of these

23. In a transistor, I_c = 20 mA, I_b = 1mA. What will be the value of B

1) 20/21 2) 1/20   3) 21/20   4) 20

24. One mole of monatomic gas and three moles of diatomic gas are put together in a container. The molar specific heat (in $JK^{-1}mol^{-1}$) at constant volume is (Let R = 8 $JK^{-1} \ mol^{-1}$)

1) 18   2) 19   3) 20   4) 21

25. A simple pendulum of length 1m, the bob performs circular motion in horizontal plane if its string making an angle 60^0 with the vertical, the centripetal acceleration experienced by the bob will be

1) 17.3 m/s² 2) 5.8 m/s² 3) 10 m/s² 4) 5 m/s²

26. A 2 kg mass and 3 kg mass are moving in a straight line. At a certain instant, 2 kg is at 1m from origin with a velocity of 3 ms^{-1} and 3 kg mass is at 2m from origin with a velocity of 1 ms^{-1}. The position and velocity of centre of mass of two body system are

1) 1.6 m ; 1.8 ms^{-1} 2) 1.8 m ; 1.6 ms^{-1}

3) 0.8 m ; 0.6 ms^{-1} 4) 0.6 m ; 0.8 ms^{-1}

27. A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2. If v_1 and v_2 are the linear velocities at these points respectively, then the ratio $\dfrac{v_1}{v_2}$ is

1) $(r_1/ r_2)^2$ 2) r_2/ r_1 3) $(r_2/ r_1)^2$ 4) r_1/ r_2

28. A bubble of air having radius 1 x 10^{-2} m rises vertically upwards in a liquid column with constant velocity 0.21 x 10^2 m/s.. If the density of the liquid is 1.47 x 10^3 kg/m³, then its coefficient of viscosity in M.K.S. will be

1) 1.52   2) 1.52 x 10^{-2}

3) 1.52 x 10^2 4) 1.52 x 10^{-3}

29. A cyclic process ABCA is shown in the V-T diagram. Process on the P-V diagram is
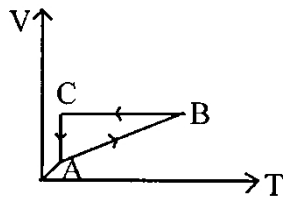
30. A particle is executing SHM. At a displacement y_1 its potential energy is U_1 and at a displacement y_2 its potential energy is U_2. The potential energy of the particle at displacement $(y_1 + y_2)$ is

4

1) $U_1 + U_2$ 2) $\sqrt{U_1^2 + U_2^2}$

3) $U_1 - U_2$ 4) $U_1 + U_{2+2} \sqrt{U_1 U_2}$

31. A cylindrical pipe of length 29.5 cm closed at one end is found to be in resonance when a tuning fork of frequency 864 Hz is sounded near the open end. Then the mode of vibration of the air in the pipe is (Velocity of sound in air is 340 m/s)

1) 2   2) 4   3) 3   4) 5

32. A rectangular surface of sides 10 cm and 15 cm is placed inside a uniform electric field of 25 V/m, such that the surface makes an angle of 30° with the direction of electric field. Find the flux of the electric field through the rectangular surface

1) 0.1675 N/m²C   2) 0.1875 Nm²/C

3) zero   4) 0.1075 nm²/C

33. Two long straight wires are connected by a circular section which has a radius R. All the three segments lie in the same plane and carry a current I. The magnetic induction at the centre O of the circular segment is
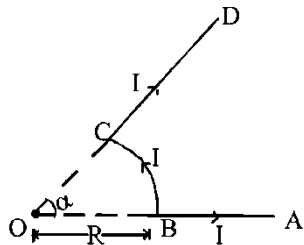
1) $\dfrac{\mu_o I}{4\pi R}$ 2) $\dfrac{\alpha \mu_o I}{4\pi R}$ 3) $\dfrac{\alpha \mu_o I}{R}$ 4) $\dfrac{\alpha \mu_o I}{2\pi R}$

34. A coil having resistance $40\,\Omega$, number of turns 100 and radius 6mm is connected to an ammeter of resistance $160\,\Omega$. The coil is placed perpendicular to the magnetic field. When the coil is taken out of the field, a charge of 32uC passes through it. The intensity of magnetic field will be

1)0.665 T 2)0.656 T 3)0.566 T 4)5.666 T

35. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is

1) $\left(\dfrac{C(V_1 - V_2)^2}{L} \right)^{1/2}$ 2) $\dfrac{C(V_1^2 - V_2^2)}{L}$

3) $\dfrac{C(V_1^2 + V_2^2)}{L}$ 4) $\left(\dfrac{C(V_1^2 - V_2^2)}{L} \right)^{1/2}$

36. Two blocks of masses m and 2m are connected by a light string passing over a frictionless pulley. As shown in the figure, the mass m is placed on a smooth inclined plane of inclination 30° and 2m hangs vertically. If the system is released, the blocks move with an acceleration equal to
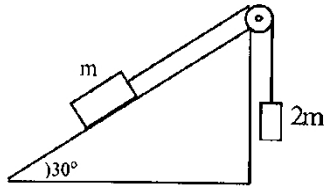
1) g/4   2) g/3   3) g/2   4) g

37. In a new system of units energy (E), density (d) and power (P) are taken as fundamental units, then the dimensional formula of universal gravitational constant G will be

1) $[E^{-1} d^{-2} p^{2}]$ 2) $[E^{-2} d^{-1} p^{2}]$
3) $[E^{2} d^{-1} p^{-1}]$ 4) $[E^{1} d^{-2} p^{-2}]$

38. Two solid spheres (A and B) are made of metals of different densities ρ_A and ρ_B respectively. If their masses are equal, the ratio of their moments of inertia $\left(\dfrac{I_B}{I_A}\right)$ about their respective diameters is

1) $\left(\dfrac{\rho_B}{\rho_A}\right)^{2/3}$ 2) $\left(\dfrac{\rho_A}{\rho_B}\right)^{2/3}$ 3) $\dfrac{\rho_A}{\rho_B}$ 4) $\dfrac{\rho_B}{\rho_A}$

39. The velocity at the maximum height of a projectile is $\dfrac{\sqrt{3}}{2}$ times its initial velocity of projection (u). Its range on the horizontal plane is

1) $\dfrac{\sqrt{3}u^{2}}{2g}$ 2) $\dfrac{3u^{2}}{2g}$ 3) $\dfrac{3u^{2}}{g}$ 4) $\dfrac{u^{2}}{2g}$

40. One mole of an ideal gas expands at a constant temperature of 300 K from an initial volume of 10 liters to a final volume of 20 liters. The work done in expanding the gas is

(R = 8.31 J/mole-K)

1) 750 J   2) 1728 J   3) 1500 J   4) 3456 J

41. Two wavelengths of sodium light 590 nm and 596 nm are used in turn to study diffraction due to single slit of aperture 2 x 10^{-6} m. The distance between slit and screen is 1.5m. What is the separation between first maximum of diffraction pattern obtained in two cases.

1)5.5 mm 2)5.75 mm 3)6.25 mm 4)6.75 mm

42. A sound wave $y = A \sin(\omega t - kx)$ is propagating through a medium of density 'ρ'. Then the sound energy per unit volume is

1) $1/2\ \rho\omega^2 A^2$ 2) $\rho A^2 \omega^2$

3) $2\ \rho A^2 \omega^2$ d) $4\rho\ A^2 \omega^2$

43. The strength of the magnetic field along solenoid having 5000 turns per meter is 3.14×10^{-2} T. The current flowing through the solenoid is

1) 2 A   2) 3 A   3) 4 A   4) 5 A

44. 10^{20} photons of wavelength 660 nm are emitted per second from a lamp. What is the wattage of the lamp ?

1) 30 W   2) 60 W

3) 100 W   4) 500 W

45. An astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective the lenses must be separated by a distance of

1) 54.0 cm   2) 37.3 cm

3) 46.0 cm   4) 50.0 cm

46. Hybridisation of 'F' when it shows back bonding with Boron atom in BF_3 is

1) sp   2) sp^2 3) sp^3 4) $sp^2 d$

47. Sparingly soluble salt is

1) KCl   2) NaCl   3) NH_4Cl 4) $BaSO_4$

48. The property of hydrogen that distinguishes from alkali metal's is

1) its electropositive character

2) its reducing nature

3) its affinity for non-metal's

4) its non- metallic character

49. Which one is paramagnetic

1) $[CoF_6]^{3-}$ 2) $[Co(H_2O)_6]^{3+}$

3) $[CoF_3(H_2O)_3]$ 4) all

50. Which one exhibit cis- trans isomerism

1) $CH \equiv CH$ 2) $ClCH = CHCl$

3) $CH_3 - CHCl - COOH$ 4) $ClCH_2 - CH_2Cl$

51. Total no. of isomer's possible for trimethyl benzene

1) 2   2) 3   3) 4   4) 6

52. Total no. of compound soluble in Aq. NaOH
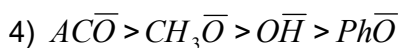
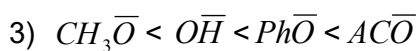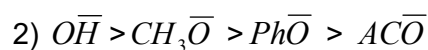 , CH_3OH, , CF_3COOH,
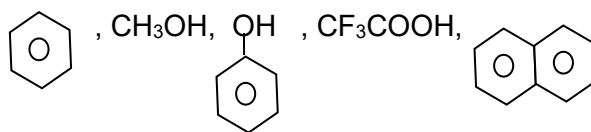
1) 1   2) 2   3) 3   4) 4

53. Borane hydride is used to reduce selectively

1)Ester 2) Carboxylic acid 3) Amine 4) Aldehyde

7

Stable reagent is
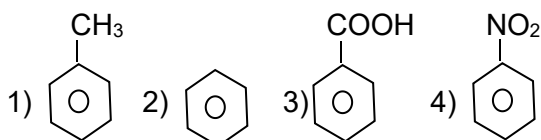
1) H^+/H_2O 2) $NaBH_4$ 3) B_2H_6 4) THF

54. Equivalent wt. of salicylic acid when it is reacted with excess of Aq. NaOH is

1) 138 2) 69 3) 40 4) 80

55. Correct order of nucleophilicity

1) $CH_3\bar{O} > O\bar{H} > Ph\bar{O} > AC\bar{O}$

2) $O\bar{H} > CH_3\bar{O} > Ph\bar{O} > AC\bar{O}$

3) $CH_3\bar{O} < O\bar{H} < Ph\bar{O} < AC\bar{O}$

4) $AC\bar{O} > CH_3\bar{O} > O\bar{H} > Ph\bar{O}$
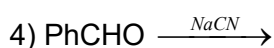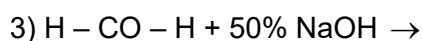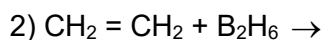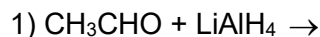
56. Compound most reactive towards E^+

57. In the stable conformer of methyl cyclohexane, how many hydrogen atom's are present at axial position

1) 11 2) 10 3) 5 4) 6

58. Which group show's –M as well as –I effect
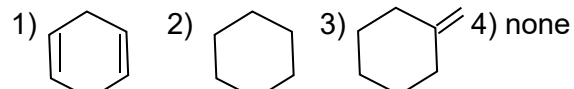
1) CH_3 - 2) O_2N - 3) Cl - 4) F-

59. In Which of the following reaction H^- transfer do not take place

1) $CH_3CHO + LiAlH_4 \rightarrow$

2) $CH_2 = CH_2 + B_2H_6 \rightarrow$

3) $H – CO – H + 50\%$ NaOH $\rightarrow$

4) PhCHO $\xrightarrow{NaCN}$

60.

61. Ozonolysis followed by oxidation gives adipic acid

  4) none

62. Diazonium coupling is an example of

1) Nucleophilic substitution

2) Aromatic electrophilic substitution

3) elimination addition mechanism

4) aliphatic nucleophilic substitution

63. Which one is optically active

  4) none
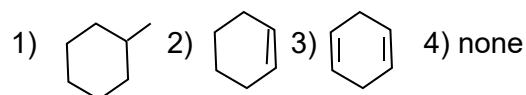
64. Dye test can be used to distinguish

1) $EtNH_2$ and CH_3CONH_2 2) Et NH_2 and Ph NH_2

3) urea and acetamide 4) CH_3NH_2 and Et NH_2

65. Activation of benzene ring in aniline can be decreased by treating with

1) dil HCl 2) Et OH 3) ACOH 4) CH_3COCl

66. 'MO' type oxide is not formed by

1) Cu 2) Ba 3) Ag 4) Pb

67. Formula of mercurous ion is.

1) Hg^+ 2) Hg^{2+} 3) Hg_2^{2+} 4) none

68. For the reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$
The rate of change of concentration for hydrogen is 0.3×10^{-4} Ms^{-1}.
The rate of change of concentration of ammonia is
1) -0.2×10^{-4} 2) 0.2×10^{-4}
3) 0.1×10^{-4} 4) 0.3×10^{-4}

69. What is the order of a reaction which has following rate expression? (rate = $K[A]^{3/2} [B]^{-1}$

1) $\frac{3}{2}$ 2) $\frac{1}{2}$ 3) 0   4) none of these

70. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH_3 an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from
   1) -3 to +3 2) -3 to 0 3) -3 to +5   4) 0 to -3

71. On heating lead (II) nitrate gives a brown gas A. The gas A on cooling changes to colourless solid B. Solid B on heating with NO changes to a blue solid C. Identify C
   1) NO_2 2) N_2O_4 3) N_2O_5 4) N_2O_3

72. In the equation, $H_2S + 2HNO_3 \rightarrow 2 H_2O + 2NO_2 + S$, the equivalent weight of hydrogen sulphide is
   1) 18   2) 16   3) 34   4) 17

73. The number of radial nodes of 3s and 2p-orbital are
   1) 2, 0 2) 0, 2 3) 1, 2   4) 2, 1

74. The set of quantum numbers n = 4, l = 0, m = 0 and s = $+\frac{1}{2}$ corresponds to the most loosely bound, ground state electron of which one of the following atoms
   1) Na 2) Cl   3) Cr   4) Rb

75. Which of the following is second most electronegative element?
   1) chlorine 2) oxygen 3) sulphur 4) fluorine

76. The volume temperature graphs of a given mass of an ideal gas at constant pressure are shown below
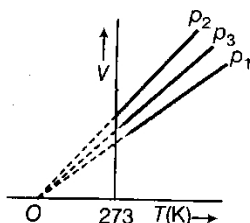
   What is the correct order of pressure?
   1) $p_1 > p_3 > p_2$ 2) $p_1 > p_2 > p_3$
   3) $p_2 > p_3 > p_1$ 4) $p_2 > p_1 > p_3$

77. Calculate the entropy change for
   $CH_4(g) + H_2O(g) \rightarrow 3H_2(g) + CO(g)$,
   Using the following data

   Substance $CH_4(g)$ $H_2O(g)$ $H_2(g)$ $CO(g)$
   S^o/JK^{-1} mol^{-1} 186.2 188.7   130.6 197.6
   The entropy change is
   1) -46 JK^{-1} mol^{-1} 2) +46 JK^{-1} mol^{-1}
   3) -214.5 JK^{-1} mol^{-1} 4) +214.5 JK^{-1} mol^{-1}

78. Maximum entropy will be in which of the following?
   1) Ice 2) liquid water 3) snow 4) water vapours

79. The ionization constant of ammonium hydroxide is 1.77×10^{-5} at 298 K. Hydrolysis constant of ammonium chloride is
   1) 5.65×10^{-10} 2) 6.50×10^{-12}
   3) 5.65×10^{-13} 4) 5.65×10^{-12}

80. The hydrolysis of sodium carbonate involves the reaction between
   1) sodium ion and water 2) Na^+ and OH^-
   3) CO_3^{2-} and water   4) CO_3^{2-} and H^+

81. Which of the following substances acts as an oxidizing as well as reducing agent?
   1) Na_2O 2) $SnCl_2$ 3) $NaNO_3$ 4) $NaNO_2$
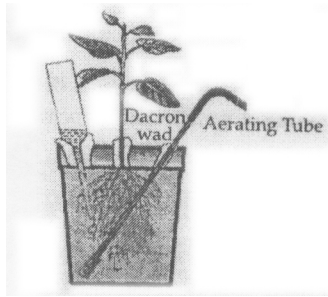
82. A solid AB has NaCl structure. If the radius of cation A^+ is 170 pm. Calculate the maximum possible radius of the anion B^-
   1) 210.3 pm 2) 397.4 pm 3) 410.6 pm 4) 347.9 pm

83. The diffraction of a crystal of barium with X-rays of wavelength 2.29 A^o gives a first order reflection at 27°8'. What is the distance between the diffracting planes? [sin 27°8' = 0.4561]
   1) 1.46 A^o 2) 1.59 A^o 3) 2.51 A^o 4) 5.46 A^o

1) gold 2) silver 3) copper 4) zinc

84. How many grams of sulphuric acid is to be dissolved to prepare 200 mL aqueous solution having concentration of $[H_3O^+]$ ions 1 M at 25°C temperature? [H = 1, O = 16, S = 32 g mol^{-1}]

1) 4.9 g 2) 19.6 g 3) 9.8 g 4) 0.98 g

85. What is the mole fraction of benzene in solution containing 30% by mass in carbon tetrachloride?

1) 1.459 2) 0.459 3) 4.159 4) none

86. AT 25°C, molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 Ω^{-1} cm^2 and at infinite dilution, its molar conductance is 238 Ω^{-1} cm^2 mol^{-1}. The degree of ionization of ammonium hydroxide at the same concentration and temperature is

1) 2.080 % 2) 20.800 % 3) 4.008 % 4) 40.80 %

87. Molar conductivities (Λ_m^o) at infinite dilution of NaCl, HCl and CH$_3$COONa are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. Λ_m^o for CH$_3$COOH will be

1) 425.5 S cm^2 mol^{-1} 2) 180.5 S cm^2 mol^{-1}
3) 290.8 S cm^2 mol^{-1} 4) 390.5 S cm^2 mol^{-1}

88. Which of the following statement is incorrect for physical adsorption?

1) it is instantaneous

2) monomolecular layer forms on the adsorbent

3) less activation energy is required for it

4) generally it results at low temperature and adsorption decreases with increase in temperature

89. Azurite is an ore of

90. A major constituent of Portland cement (except lime) is

1) silica   2) alumina
3) iron oxide   4) magnesia

91. Micronutrients are present in plant tissues in concentrations less than ..... of dry matter

1) 1 m mole kg^{-1} 2) 10 m mole kg^{-1}
3) 0.1 m mole kg^{-1} 4) 2 m mole kg^{-1}

92. The given experimental set up is used

1) to show that CO_2 is required during photosynthesis
2) to show that O_2 is evolved during photosynthesis
3) for nutrient solution culture
4) to measure growth of a plant

93. In .... pathway, water crosses at least two membranes for each cell in its path (i.e., plasma membranae on entering and existing).

1) apoplast   2) symplast
3) transmembrane   4) both 1 and 3

94. Read the given statements and select the correct ones

i. A membrane which permits the passage of pure solvent molecules to pass through it and no the solute particles, is called semipermeable.
ii. A membrane which allows some substances to pass through it more readily than others is known as selectively differentially permeable
iii. all living biological membranes are semi permeable

1) i and ii 2) ii and iii 3) i and iii 4) i, ii, and iii

95. Select the incorrect statement regarding S phase of interphase

1) occurs between G_1 and G_2

2) DNA replicates in the nucleus

3) Centrioles duplicate in the cytoplasm

4) As DNA is doubled, number of chromosomes also doubles

96. Identify A, B, C and D in the given diagram depicting cell cycle and select the correct option
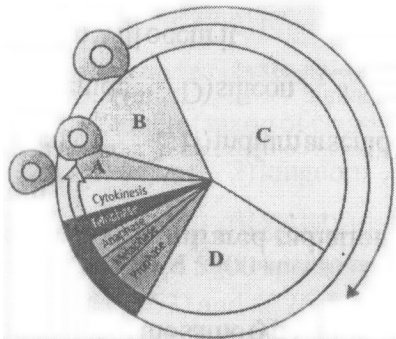
	A	B	C	D
1)	G_0	G_1	S	G_2
2)	G_1	S	G_2	G_0
3)	G_1	G_0	S	G_2
4)	S	G_0	G_1	G_2

97. Which of the following statements is **not** correct regarding chitin?

1) it is a storage polysaccharide

2) it is a heteropolysaccharide

3) it is a constituent of arthropod exoskeleton and fungal cell wall

4) it is a second most abundant carbohydrate on earth

98. Refer the given reaction

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Enzyme A}} 2C_6H_{12}O_6$$

Maltose   glucose
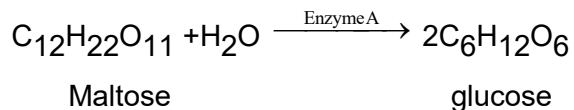
Enzyme A used in the reaction, belongs to which class of enzymes?

1) Dehydrogenases   2) transferases

3) Hydrolases   4) Lyases

99. Which one of the following equation suggests that O_2 released during photosynthesis comes from water?

1) $6CO_2{}^{18} + 12H_2O \; 6O_2{}^{18} + C_6H_{12}O_6 + 6H_2O^{18}$

2) $6CO_2 + 12H_2O^{18} \; 6O_2 + C_6H_{12}O_6 + 6H_2O^{18}$

3) $6CO_2{}^{18} + 12H_2O \; 6O_2{}^{18} + C_6H_{12}O_6 + 6H_2O$

4) $6CO_2 + 12H_2O^{18} \; 6O_2{}^{18} + C_6H_{12}O_6 + 6H_2O$

100. Who used prism, green alga Cladophora, and aerobic bacteria and plotted the first action spectrum for photosynthesis?

1) Sachs   2) Arnon   3) Arnold   4) Englmann

101. Who, after conducting experiments on purple and green sulphur bacteria, inferred that O_2 evolved during photosynthesis comes from H_2O not from CO_2?

1) Sachs   2) Engelmann

3) Van Niel   4) Blackmann

102. Corophilus fungi belongs to

1) Phycomycetus   2) Basidiomycetes

3) ascomycetus   4) Deuteromycetus

103. Linnaeus described 5900 species of plants in his book ...... (1753) and 4326 species of animals in his book ......(1758).

1) Philosophia Botanica, Genera Plantarum

2) Historia Naturalis, Species Plantarum

3) Systema Naturae, Species Plantarum

4) Species Plantarum, Systema naturae

104. Which of the following statements is incorrect

1) pathogenic bacteria cause 90% of human diseases

2) a large number of antibiotics are produced by Actinomycetes (e.g. Streptomyces), which are a class of Fungi

3) N_2 fixing bacteria pick up free N_2 from soil atmosphere and convert it into nitrogenous compounds

4) Archaebacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions

105. The kingdom Protista forms a link with kingdom

1) plantae   2) Fungi

3) Animalia   4) all of these

106. Match column I with column II

Column I   **Column II**

A. Food   i. Brown Algae

B. Agar   ii. Porphyra, Laminaria

C. Algin   iii. Gelidium, Gracilaria

D. Carrageenin   iv. Red algae

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

107. Major photosynthetic pigments in green algae are

1) chl a and b   2) chl a, c and fucoxanthin

3) chl a,d & phycoerythrin   4) chl a and c.

108. Select the mismatched pair out of the following

1) Rhizome   - Drypteris, Nelumbo nucifera

2) Corm   - Crocus sativus, Amorphophallus

3) Sucker   - Curcuma domestica, Zingiber officinal

4) Tuber   - Helianthus tuberculous, Solanum tuberosum

109. X is a scar on the seed coat through which the developing seeds were attached to the fruit, above the X is a small pore called Y Identify X and Y and select the correct option

      X   Y

1) Micropyle   Hilum

2) Hilum   Micropyle

3) Testa   Tegmen

4) Chalaza   Micropyle

110. Cereals, castor and coconut possess ...... seeds

1) endospermic   2) zoospermic

3) non albuminous   4) none of these

111. Identify the given figure and select the correct option for A, B and C
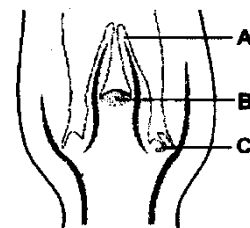
	A	B	C
1)	leaf primordium	Shoot apical meristem	Apical bud
2)	leaf primordium	shoot apical meristem	Axillary bud
3)	root hair	root apical meristem	Axillary bud
4)	root hair	root apical	Apical bud

meristem

112. Match Column I with column II and select the correct option from codes given below

Column I	Column II
A. Meristem	i. Photosynthesis, storage
B. Parenchyma	ii. Mechanical support
C. Collenchyma	iii. Activelydividing cells
D. Sclerenchyma	iv. Stomata
E. Epidermal tissue	v. Sclereids

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

113. Both apical meristems and intercalary meristems are ...... meristems

1) primary
2) secondary
3) lateral
4) both 2 and 3

114. Which of the following exhibits the highest rate of respiration

1) Growing shoot apex
2) germinating seed 3) root tip 4) leaf bud

115. Select the correct statement

1) pyruvate is formed in the mitochondrial matrix
2) during the conversion of succinyl CoA to succinic acid a molecule of ADP is produced
3) oxygen is vital in respiration for removal of hydrogen
4) there is complete breakdown of glucose in fermentation

116. Mitochondria are called powerhouses of the cell. Which of the following observations support this statement

1) mitochondria synthesize ATP
2) mitochondria have a double membrane
3) the enzymes of the Krebs cycle and the cytochromes are found in mitochondria
4) mitochondria are found in almost all plant and animal cells

117. The exponential growth can be mathematically expressed as

1) $L_t = L_o + rt$
2) $W_1 = W_0 + e^n$
3) $W_1 = W_o e^{rt}$
4) $L_t = L_o - rt$

118. Read the given statements and select the correct option

i. One maize root cell can give rise to more than 17,500 cells

ii. A cell in water melon can increase in size upto 350000 times

iii. The growth of pollen tube is measured in terms of length

iv. the growth of the leaf is measured in term of surface area

1) statement i and ii are correct
2) statements iii and iv are correct
3) statements i and iii are correct
4) statements i, ii, iii and iv are correct

119. Which one of the following processes results in the formation of clone of bacteria?

1) transformation
2) transduction
3) binary fission
4) conjugation

120. Select the mismatched pair

1) microsporangium - pollen sac
2) megasporangium - ovule
3) pollen grain - male gamete

4) embryo sac - female gametophyte

121. Refer the given statements

i. outer exine is made up of sporopollenin

ii. inner intine is pecto cellulosic in nature

iii. generative cell is bigger and contains abundant food reserve

iv. vegetative cell is small and floats in the cytoplasm of the generative cell

Which of the given statements are not true regarding structure of pollen grain

1) i and ii 2)ii and iii3) iii and iv 4) i and iv

122. Mendel proposed that the factor controlling any character is discrete and independent. This proposition was based on the

1) results of F_3 generation of a cross

2) observations that the offspring of a cross made between the plants having two contrasting characters shows only one character without any blending

3) self pollination of F_1 offsprings

4) Cross pollination of parental generations

123. Which of the following will not result in variations among siblings

1) independent assortment of genes

2) crossing over 3) linkage 4)mutation

124. Histone proteins are

1) basic, negatively charged

2) basic, positively charged

3) acidic positively charged

4)acidic, negatively charged

125. .... was the first genetic material

1) DNA 2) RNA 3) protein 4) plasmid

126. Which one of the following crop varieties correctly matches with its resistance to a disease

Variety	**Resistance to diseases**
1)Pusa Komal	- Bacterial blight
2) Pusa Sadabahar	- white rust
3) Pusa Swarnim	- Tobacco mosaic virus
4) Pusa Shubhra	- Chilli mosaic virus

127. Match column I with column II and select the correct answer from the codes given below

Column I	**Column II**
A. Mycorrhizae	i. Azadirachtin
B.Bacillus thuringiensis	ii. Photophorus nutrition
C. Root nodules	iii. Leghaemoglobin
D. Biopesticide	iv. Bio insecticide

1) A - iii, B - i, C - ii, D - iv

2)A - ii, B -iii, C - iv, D - i

3) A - ii, B - iv, C - iii, D - i

4) A - iii, B - iv, C - ii, D - i

128. Identify A, B, C and D in the given figure of E. coli cloning vector pBR 322 and select the correct option

14
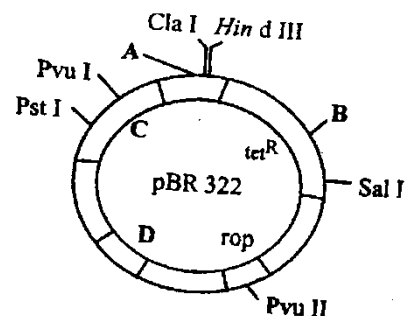
	A	B	C	D
1)	Hin d 1	Eco R I	amp^R	ori
2)	Hin d I	Bam H I	Kan^R	amp^R
3)	Bam H I	Pst I ori	amp^R	
4)	Eco R I	Bam H I	amp^R	ori

129. The restriction enzyme responsible for the cleavage of following sequence is

↓

5' - G - T - C - G - A - C - 3'

3' - C - A - G - C - T - G - 5'
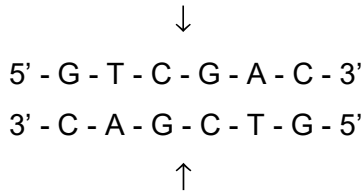
↑

1) Eco R I 2) Hin d II 3) Bam H I 4) Eco R II

130. Study the following statements and select the incorrect ones

i. 'Bt' in 'Bt cotton' indicates that it is a genetically modified crop produced through biotechnology

ii. the anticoagulant 'hirudin' is being produced from transgenic Brassica napus seeds

iii. 'Flavr Savr' transgenic tomatoes remain fresh for a longer period than the normal tomato variety

iv. Golden rice is a transgenic variety of Oryza sativa, which is rich in -carotene and helps to prevent night blindness

1) i only   2) i and iv 3) ii and iii 4) i, ii, iii and iv

131. Genetic engineering is possible because

1) we can cut DNA at specific sites by restriction endonucleases

2) restriction endonucleases purified from virus can be used in bacteria

3) the phenomenon of transduction in bacteria is well understood

4) we can see DNA by electron microscope

132. Read the following statements and select the correct ones

i. A given species may occupy more than one trophic level in the same ecosystem at the same time

ii. productivity of an aquatic ecosystem is less than that of a terrestrial ecosystem

iii. producers constitute the first trophic level of a detritus food chain

1) i and ii 2) ii and iii 3) i and iii 4) i, ii and iii

133. What kind of pyramid is represented by the given figure

1) pyramid of numbers in a forest ecosystem
2) pyramid of numbers in a parasitic food chain
3) pyramid of biomass in a forest ecosystem
4) it is a wrong pyramid

134. Which of the following is a method utilized to get rid of particulate matter present in the exhaust from a thermal power plant

1) magnetic precipitator
2) chromatography
3) electrostatic precipitator
4) mass spectrometry

135. Study carefully the following figure representing green house effect. Select the correct statements regarding this
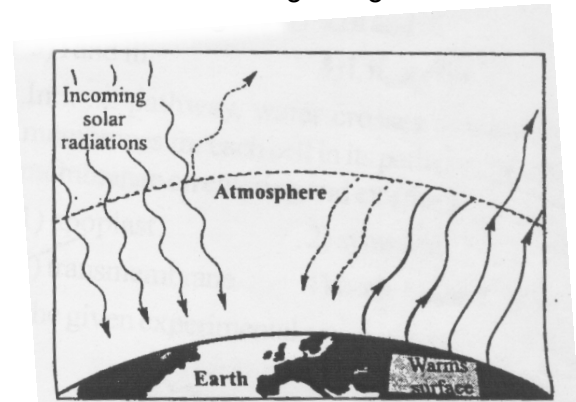
1) much of the long wavelength infrared radiations re radiated by the earth's surface are absorbed by the atmospheric green house gases

2) CO_2, CH_4, CFCs and N_2O are the gases which are responsible for green house effect
3) the atmosphere to the incoming short wavelength radiations and is translucent to the long wavelength infra red radiations
4) all of these

136. Identify the type of blood circulation and the organisms in which it is found

1) single circulation, fishes
2) incomplete double circulation, Pisces
3) incomplete double circulation, Amphibians
4) incomplete double circulation, Reptiles

137. Select the correct passage of air during expiration
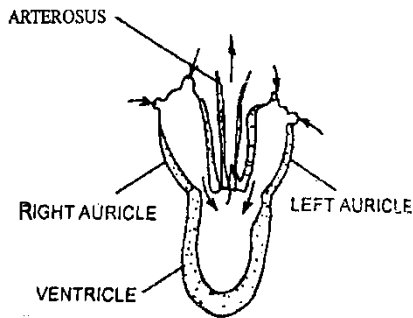1) Alveoli $\rightarrow$ Bronchioles $\rightarrow$ Bronchi $\rightarrow$ Trachea $\rightarrow$ Larynx $\rightarrow$ Pharynx $\rightarrow$ Nasal cavities $\rightarrow$ External nostrils
2) Lungs $\rightarrow$ Trachea $\rightarrow$ Larynx $\rightarrow$ Pharynx $\rightarrow$ Nasal cavities $\rightarrow$ External nares
3) External nares $\rightarrow$ Nasal cavities $\rightarrow$ Pharynx $\rightarrow$ Larynx $\rightarrow$ Trachea $\rightarrow$ Lungs
4) External nostrils $\rightarrow$ Nasal cavities $\rightarrow$ Pharynx $\rightarrow$ Larynx $\rightarrow$ Trachea $\rightarrow$ Bronchi $\rightarrow$ Bronchioles $\rightarrow$ Alveoli

138. This protein enables glucose transport into the cells
1) haemoglobin   2) collagen
3) GLUT -4   4) carbonic anhydrase

139. In which of the following stage implantation takes place?
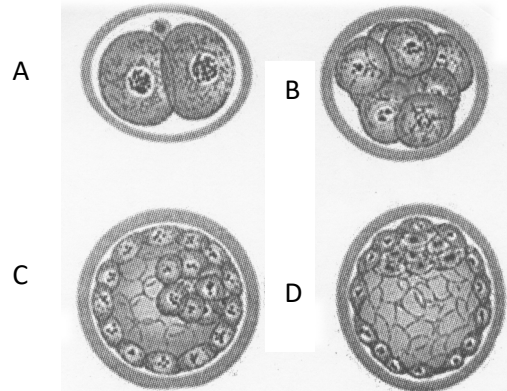
1) A   2) B   3)C   4) D

140. Three layers of retina from outside to inside is
1) ganglionated cell, bipolar cells, photoreceptor cells
2) ganglionated cell, unipolar cells, photoreceptor cells
3) photoreceptor cell, bipolar cells, nonganglionated cells
4) rod and cone cells, bipolar neurons, ganglionated cells

141. Countercurrent exchange takes place at
1) vasa recta   2) Henle's loop
3) both   4) peritubular capillaries

142. Select the correct property of Ctenoplana and Pleurobranchia
1) marine or freshwater
2) tissue level of organisation without mesogloea
3) external rows of 8 ciliated comb plates
4) all of these are correct

143. Odd one out
1) Neurilemma   2) Sarcolemma
3) Epineurium   4) Perineurium

144. Select the correct pairing from following

A) Alexander – Van – Humboldt = species Area relationship

B) Paul Ehrlich = Rivet Popper hypothesis

C) Tilman = Global species diversity

D) Edward Wilson = Term conservation

E) Verhulst – Pearl = Exponential growth curve

F) Gause = competitive Release Principle

G) Mac Arthur = Resource Partitioning

    1) A, B, E , F   2) A, B, E, F, G

    3) A, B, C, G   4) A, B, G

145. Does not act as any sensory organ in cockroach

1) labial palp 2) antenna 3) fenestrae 4) anal cerci

146. All these enzymes are present in succus entericus except

    1) nucelases   2) nucleotidases

    3) nucleosidases   4) dipeptidases

147. All these are inactive forms except

    1) prorenin   2) proinsulin

    3) fibrinogen / prothrombin

    4) Pepsinogen / Trypsinogen

148. Epithelium of visceral organ is known as

    1) ectothelium   2) Mesothelium

    3) Endothelium   4) all of these

149. Clara cells are present in human

  1) brain 2) lungs 3) spinal cord 4) kidneys

150. This hormone requires tyrosine amino acid for its synthesis

    1) T_3 and T_4 2) melatonin

    3) erythropoietin   4) all of these

151. One of the following take part in defence mechanism

    1) Ig   2) ANF   3) Vit – B_{12} 4) Lysosome

152. All these males are heterogametics except

  1) human 2) sparrow 3) lizard 4) grasshopper

153. Capacitation takes place in

1) frog $\overset{\uparrow}{O}$ 2) frog O 3) mammal $\overset{\uparrow}{O}_+$ 4) mammal O_+

154. Erythroxylum sp. is

  1) A pathogen 2) A parasite on Mango tree

  3) A prokaryote member 4) A dicot member

155. All these are concerned with cancer except

    1) Metastasis   2) Carcinogen

    3) Benign tumour   4) Oncogene

156. F-actin is a polymer of

    1) troponin   2) tropomyosin

    3) G actin   4) meromyosin

157. Site for TCA cycle is

    1) stroma of chloroplast

    2) Matrix of Mitochondria

    3) Nucleoplasm   4) cytoplasm

158. Trypsin enzyme can hydrolyse all these except

  1) fibrinogen 2) insulin 3) albumin 4) keratin

159. Sr^{-90}, a radioactive chemical can cause

    1) Lung cancer   2) blood cancer

    3) breast cancer   4) liver cancer

160. Decidua is part of

    1) placenta   2) ovary

    3) mature follicle of ovary 4) skin

161. GEAC stands for

1) genetic engineering agriculture committee

2) genetic engineering approval committee

3) genetic engineering advanced centre

4) genetic engineering account centre

162. To treat ADA deficiency, the vector used was

    1) Rota virus   2) Retro virus

    3) paramyxo virus   4) corona virus

163. It is not a part of human skeletal system

    1) foramen of magnum

    2) synovial cavity   3) pulp cavity

    4) glenoid cavity

164. Swollen ends of semicircular canals of internal human ear are known as
1) Cristae
2) Ampullae
3) Macullae
4) Saccule

165. In which year ------ company prepared human insulin A and B peptide chains separately
1) 1981, HLL
2) 1983, Ranbaxy
3) 1983, Eli Lily
4) 1985, NIH

166. All these hormones are produced from endocrine tissue except
1) human chorionic gonadotropin
2) glucagon
3) hPL
4) T_4

167. Delay in O_+ puberty is termed as
1) amenorrhoea
2) eunucoidism
3) castration
4) cryptorchidism

168. Loose cords of epithelioid secretory cells separated by reticular connective tissue containing blood sinusoids are found in
1) pars nervous
2) pars distalis
3) pars intermedia
4) all of these

169. Vestibule of reproductive system encloses
1) urethral opening
2) vaginal opening
3) both
4) none

170. Invitro fertilization takes place
1) inside the body
2) outside the body in almost similar condition as that of in the body
3) In artificial medium
4) into water

171. Which one is incorrect?
1) World Earth Day – 22nd April
2) World Ozone Day – 16th September
3) Biosphere Day – 21th September
4) World Conservation Day – 3rd December

172. What is required to correct inbreeding depression
1) cross breeding
2) out crossing
3) MOET
4) all of these

173. In gout, what is deposited into synovial joints ?
1) urea
2) NH_3
3) uric acid
4) any of these

174. Streaming of protoplasm in Amoeba / Entamoeba leads to the formation of

1) cilia
2) flagella
3) pseudopodia
4) tentacles

175. Select the unpaired facial bones of human skull
1) sphenoid and ethmoid
2) vomer and mandible
3) frontal and oocipital
4) all of these

176. Which part can be easily felt as high point of shoulder
1) sterno - clavicle joint
2) acromion - clavical joint
3) gleno - clavicle joint
4) superior angle of scapula

177. How many are true fishes?
Dog fish, Hag fish, Jelly fish, Saw fish, Angel fish, Shell fish, Devil fish, Sting Ray, Gold fish, silver fish, Star fish, Globefish, Pilot fish
1) 6
2) 9
3) 7
4) 8

178. Select the mismatch
1) calorigenic hormone = T_3 and T_4
2) hyperglycemic hormone = Insulin
3) Hyper calcemic hormone = PTH
4) antagonistic hormones = TCT and PTH

179. A cockroach can survive without its head for a week due to
1) open circulation and tubular heart throughout thorax and abdomen
2) no spiracles in the head part, only in thorax and abdomen
3) very small part of nervous system in the head region
4) all of these

180. Haversian system is a characteristic of
1) dense / compact bone of mammals
2) dense bone of reptiles
3) spongy / pneumatic bone of Aves
4) all of these

ANSWER KEY

1	B	46	B	91	B	136	C
2	D	47	D	92	C	137	A
3	B	48	D	93	B	138	C
4	B	49	A	94	A	139	C
5	C	50	B	95	D	140	D
6	D	51	B	96	A	141	A
7	D	52	C	97	B	142	C
8	A	53	B	98	C	143	B
9	C	54	B	99	D	144	D
10	C	55	A	100	D	145	C
11	B	56	A	101	C	146	A
12	A	57	D	102	C	147	A
13	B	58	B	103	D	148	B
14	B	59	D	104	B	149	B
15	A	60	C	105	D	150	A
16	C	61	D	106	A	151	A
17	B	62	B	107	A	152	B
18	B	63	D	108	C	153	D
19	D	64	B	109	B	154	D
20	A	65	D	110	A	155	C
21	B	66	B	111	B	156	C
22	C	67	C	112	B	157	B
23	D	68	B	113	A	158	D
24	A	69	B	114	B	159	B
25	A	70	A	115	A	160	A
26	A	71	D	116	A	161	B
27	B	72	D	117	C	162	B
28	B	73	A	118	D	163	C
29	C	74	C	119	C	164	B
30	D	75	B	120	C	165	C
31	A	76	A	121	C	166	D
32	B	77	D	122	C	167	A
33	B	78	D	123	C	168	B
34	C	79	A	124	B	169	C
35	D	80	C	125	B	170	B
36	C	81	B	126	A	171	D
37	B	82	C	127	C	172	B
38	A	83	C	128	D	173	C
39	A	84	B	129	B	174	C
40	B	85	B	130	A	175	B
41	D	86	C	131	B	176	B
42	A	87	D	132	A	177	C
43	D	88	B	133	C	178	B
44	A	89	C	134	C	179	D
45	A	90	A	135	D	180	A