NTPL

FLASH BACK TEST

Batch - 2004(M) [Medical]

Time : 3 Hours ***Maximum Marks : 720***

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

1. This booklet is your Question Paper containing **180 questions**.
2. The test is of **3 hours** duration. The question paper consists of **3 sections** (Physics, Chemistry & Biology).
3. Each question carries **4 marks**. For each correct response the candidate will get **4 marks**. For each incorrect response, **one mark** will be deducted. The maximum marks are **720.**
4. Fill the bubbles completely and properly using a **Blue/Black Ball Point Pen** only.
5. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
6. The answer sheet, a machine-readable Optical mark recognition sheet (OMR Sheet), is provided separately.
7. DO NOT TAMPER WITH / MUTILATE THE OMR OR THE BOOKLET.
8. Do not break the seals of the question-paper booklet before being instructed to do so by the invigilator.

Name of the Candidate (in Capitals) _____

Test Centre _____ Centre Code _____

Candidate's Signature _____ Invigilator's Signature _____

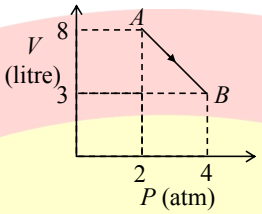
1. The ratio of coefficients of cubical expansion and linear expansion is

(a) 1 : 1 (b) 3 : 1 (c) 2 : 1 (d) none of these

2. Minimum amount of steam of 100ºC required to melt 12gm ice completely, will be

(a) 1.5 gm (b) 1 gm (c) 2 gm (d) 5 gm

3. Work done in process AB will be



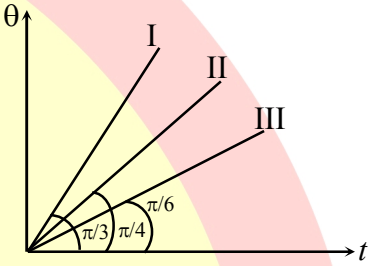
(a) 900 J

(b) 1500 J

(c) 3300 J

(d) 33 J

4. Three bodies A, B and C of masses m, m and $\sqrt{3}\,m$ respectively are supplied heat at a constant rate. The change in temperature θ versus time t graph for A, B and C are shown by I, II and III respectively. If their specific heat capacities are S_A, S_B and S_C respectively then which of the following relation is correct? (Initial temperature of each body is 0°C)



(a) $S_A > S_B > S_C$ (b) $S_B = S_C < S_A$

(c) $S_A = S_B = S_C$ (d) $S_B = S_C > S_A$

5. The amount of heat required will be minimum when a body is heated through

(a) 1 K (b) 1°C

(c) 1°F (d) it will be the same in all the three cases

6. At what temperature will the resistance of a copper wire become three times its value at 0°C (Temperature coefficient of resistance for copper = 4×10^{-3} per °C)

(a) 400°C (b) 450°C (c) 500°C (d) 550°C

7. A metallic ball has spherical cavity at its centre. If the ball is heated, the ratio of volume of ball to that of volume of cavity will

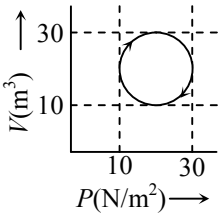
(a) increase (b) decrease

(c) remain same (d) depends on the volume of cavity

8. Two spherical black bodies have maximum emission corresponding to wavelengths which are in the ratio of 2 : 3, and their radius 4 : 9. Then ratio of their emissive powers will be (assume same emissivity for body)

(a) 1 : 1 (b) $\frac{81}{16}$ (c) $\frac{16}{81}$ (d) $\frac{8}{27}$

9. Heat energy absorbed by a system in going through a cyclic process shown in figure is



(a) $10^7\ \pi$J

(b) $10^4\ \pi$J

(c) $10^2\ \pi$J

(d) $10^{-3}\ \pi$J

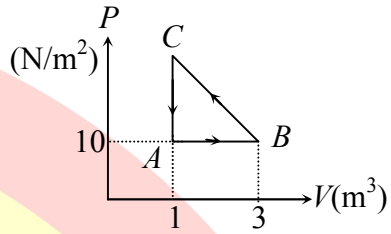
10. The temperature of cold junction of a thermocouple is –20°C and the temperature of inversion is 560°C. The neutral temperature is

(a) 270°C (b) 560°C (c) 1120°C (d) 290°C

11. The average translational kinetic energy of one mole of O_2 molecules (molar mass = 32) at a particular temperature is 0.048 eV. The internal energy of one mole of N_2 molecules (molar mass = 28) in eV at same temperature is

(a) 0.048 (b) 0.003 (c) 0.0288 (d) 0.080

12. An ideal gas is taken through cycle $A \to B \to C \to A$ as shown in figure. If the net heat supplied to the gas is 10 J, then the work done by the gas in process $B \to C$ is



(a) –10 J

(b) –30 J

(c) –15 J

(d)–20 J

13. The work of 146 kJ is performed in order to compress one kilo mole of gas adiabatically and in this process the temperature of the gas increases by 7° C. The gas is ($R = 8.3\ J\ mol^{-1}\ K^{-1}$)

(a) monoatomic (b) diatomic

(c) triatomic (d) a mixture of monoatomic and diatomic

14. The ends of a uniform metre stick of iron are maintained at 80^0C and 30^0C. One end of another rod is maintained at 50^0C, where should its other end be touched on the metre stick so that there is no heat current in the rod in steady state?

(a) 40 cm from hot end (b) 40 cm from cold end

(c) 50 cm from cold end (d) 70 cm from cold end

15. Equal amount of same gas in two similar cylinders A and B, compressed to same final volume from same initial volume one adiabatically and another isothermally, respectively then

(a) final pressure in A is more than in B

(b) final pressure in B is greater than in A

(c) final pressure in both able equal

(d) for the gas, value of $\gamma = \frac{C_p}{C_V}$ is required

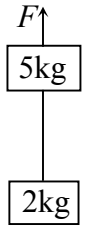
16. The x and y co-ordinates of a particle at any time t are given by $x = 7t + 4t^2$ and $y = 5t$ where x and y are in metre and t in sec. The acceleration of the particle at 5 s is

(a) zero (b) 8 m/s^2 (c) 20 m/s^2 (d) 40 m/s^2

17. A balloon is moving vertically upward with a velocity of 4 m/s. When it is at a height of h, a stone is dropped from it. If it reaches the ground in 4s, the height of the balloon, when the stone is released, is ($g = 9.8$ m/s^2)

(a) 62.4 m (b) 42.4 m (c) 78.4 m (d) 82.2 m

18. Two blocks of masses 5 kg and 2 kg are connected by a massless string as shown in figure. A vertical force F is applied on the 5kg block. Find the value of F if tension in the string is 40 N. ($g = 10$ m/s^2)



(a) 140 N (b) 70 N

(c) 40 N (d) 100 N

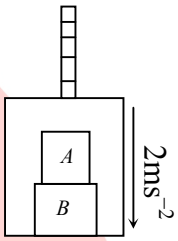
19. A body of mass m is kept stationary on a rough inclined plane of inclination θ. The magnitude of force acting on the body by the inclined plane is

(a) mg (b) $mg \sin\theta$ (c) $mg \cos\theta$ (d) $mg\sqrt{1+\cos^2\theta}$

20. A block of metal weighing 2 kg is resting on a frictionless plane. It is struck by a jet of water at a rate of 1 kgs^{-1} at a speed of 5 ms^{-1}. The initial acceleration of the block is

(a) $\frac{2}{5}$ ms^{-2} (b) $\frac{5}{2}$ ms^{-2} (c) 5 ms^{-2} (d) $\frac{1}{5}$ ms^{-2}

21. The elevator shown in figure is descending with an acceleration of 2 m s^{-2}. The mass of the block A = 0.5 kg. The force exerted by the block A on the block B is (g = 10 ms^{-2})



(a) 2N (b) 4N

(c) 6N (d) 8N

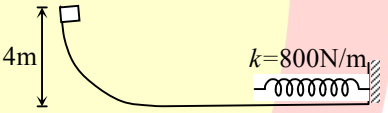
22. Two identical balls are projected, one vertically up and the other at an angle of 30° with the horizontal, with same initial speed. The potential energy at the highest point is in the ratio

(a) 4 : 3 (b) 3 : 4 (c) 4 : 1 (d) 1 : 4

23. A particle is released from rest at origin. It moves under the influence of potential field $U = x^2 - 3x$, where U is in Joule and x is in metre. Kinetic energy at x = 2 m will be

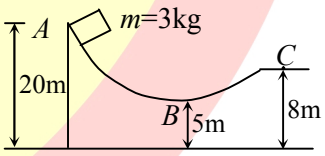
(a) 2 J (b) 1 J (c) 1.5 J (d) 0 J

24. A block of mass m = 0.1 kg is released from a height of 4 m on a curved smooth surface. On the horizontal smooth surface it collides with a spring of force constant 800 N/m. The maximum compression in spring will be (g = 10 m/s^2)



(a) 1 cm (b) 5 cm (c) 10 cm (d) 20 cm

25. A block of mass 3 kg slides down a rough curved path from point A as shown. If it stops at C, the work done by friction is (g = 10 ms^{-2})



(a) –360 J (b) –240 J

(c) –600 J (d) –450 J

26. A particle of mass m describes a circle of radius r. The centripetal acceleration of the particle is $4/r^2$. The momentum of the particle is

(a) $\frac{4m}{r}$ (b) $\frac{2m}{r}$ (c) $\frac{4m}{\sqrt{r}}$ (d) $\frac{2m}{\sqrt{r}}$

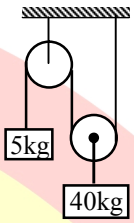
27. A metal ball of mass 2 kg moving with speed of 36 km/h has a head-on collision with a stationary ball of mass 3 kg. If after collision, both the balls move together, then the loss in kinetic energy due to collision is

(a) 40 J (b) 60 J (c) 100 J (d) 140 J

28. Two balls of masses $m_1 = 3$ kg and $m_2 = 2$ kg are moving towards each other with speeds u_1 and u_2. The ball m_1 stops after collision and m_2 starts moving with speed u_1. The co-efficient of restitution between the balls is

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

29. The acceleration of centre of mass of the system shown in figure will be



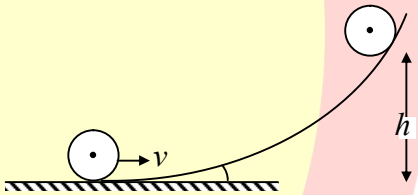
(a) 10 m/s^2 (b) $-\frac{10}{3}$ m/s^2

(c) $\frac{5}{3}$ m/s^2 (d) –5 m/s^2

30. A thin circular ring of mass M and radius R is rotating about its axis with a constant angular velocity ω. Two objects, each of mass m, are attached gently to the opposite ends of a diameter of the ring. The ring rotates now with an angular velocity

(a) $\frac{\omega M}{M+m}$ (b) $\frac{\omega(M-2m)}{M+2m}$ (c) $\frac{\omega M}{M+2m}$ (d) $\frac{\omega(M+m)}{M}$

31. A disc of mass M and radius R rolls on a horizontal surface and then rolls up and inclined plane as shown in the figure. If the velocity of the disc is v, then height to which the disc will rise will be



(a) $\frac{3v^2}{2g}$ (b) $\frac{3v^2}{4g}$

(c) $\frac{v^2}{4g}$ (d) $\frac{v^2}{2g}$

32. A thick walled hollow sphere has outer radius R. It rolls down an inclined plane without slipping and its speed at bottom is v_0. Now the incline is waxed so that the friction becomes zero. The sphere is observed to slide down without rolling and the speed now is $(5\ v_0/4)$. The radius of gyration of the hollow sphere about the axis through its centre is

(a) $\frac{3R}{4}$ (b) $\frac{R}{2}$ (c) $\frac{R}{4}$ (d) $\frac{4}{5}R$

33. The escape velocity on the surface of the earth is 11.2 km/s. What would be the escape velocity on the surface of another planet of the same mass but 1/4 times the radius of the earth?

(a) 44.8 km/s (b) 22.4 km/s (c) 5.6 km/s (d) 11.2 km/s

34. The depth d at which the value of acceleration due to gravity becomes $\frac{1}{n}$ times the value at the surface, is (R = radius of the earth)

(a) $\frac{R}{n}$ (b) $R\left(\frac{n-1}{n}\right)$ (c) $\frac{R}{n^2}$ (d) $R\left(\frac{n}{n+1}\right)$

35. A metal wire of length L and radius r is clamped rigidly at one end. A force F is applied at another end so that its length increases by L. The increase in length of another metal wire of length $2L$ and radius $2r$, when stretched by a force $2F$, will be

(a) $2L$ (b) L (c) $L/2$ (d) $L/4$

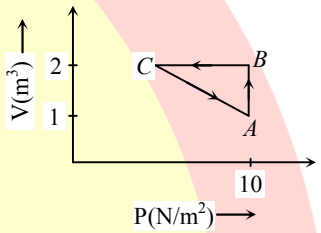
36. A tuning fork of known frequency 256 Hz makes 5 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per second when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was

(a) 261 Hz (b) 258 Hz (c) 254 Hz (d) 251 Hz

37. If the temperature of the sun is increased from T to $2T$ and its radius from R to $2R$, then the ratio of the radiant energy received on earth to what it was previously will be

(a) 4 (b) 16 (c) 32 (d) 64

38. An ideal gas is taken through the cycle $A \to B \to C \to A$ as shown in figure. If the net heat supplied to the gas in the cycle is 5 J, the work done by the gas in the process $C \to A$ is



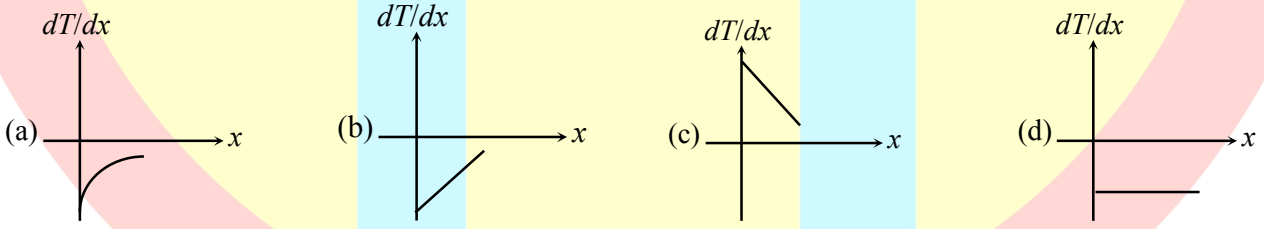
(a) – 5 J (b) – 10 J

(c) – 15 J (d) – 20 J

39. If amount of heat given to a system be 50 J and work done on the system be 15 J, then change in internal energy of the system is

(a) 35 J (b) 50 J (c) 65 J (d) 15 J

40. The curved surface of uniform rod is thermally isolated from surrounding. Its ends are maintained at temperature T_1 and T_2 $(T_1 > T_2)$. If in steady state temperature gradient at a distance x from hot end is equal to $\frac{dT}{dx}$, then which one of the following graphs is correct?



41. Temperature of source is 330ºC. Temperature of sink is changed in order to increase the efficiency of engine from $\frac{1}{5}$ to $\frac{1}{4}$, by

(a) 30ºK (b) 303 K (c) 603 K (d) 60 K

42. A body cools from 60°C to 50°C in 10 minutes. If the room temperature is 25°C and assuming Newton's law of cooling to hold good, the temperature of the body at the end of the next 10 minutes will be

(a) 38.5°C (b) 40°C (c) 42.85°C (d) 45°C

43. The amount of heat required will be minimum when a body is heated through

(a) 1 K (b) 1°C

(c) 1°F (d) it will be the same in all the three cases

44. A constant volume gas thermometer shows pressure reading of 50 cm and 90 cm of mercury at 0°C and 100°C respectively. When the pressure reading is 60 cm of mercury, the temperature is

(a) 25°C (b) 40°C (c) 15°C (d) 12.5°C

45. A hot body is being cooled in air according to Newton's law of cooling, the rate of fall of temperature being k times the difference of its temperature with respect to that of surroundings. The time, after which the body will lose half the maximum heat it can lose, is

(a) $\frac{1}{k}$ (b) $\frac{\ln 2}{k}$ (c) $\frac{\ln 3}{k}$ (d) $\frac{2}{k}$

46. The enthalpy of formation for $C_2H_4(g)$, $CO_2(g)$ and $H_2O(\ell)$ at 25ºC and 1 atm, pressure be 52, – 394 and – 286 KJ mol^{-1} respectively. The enthalpy of combustion of $C_2H_4(g)$ will be –

(a) + 1412 KJ mol^{-1} (b) – 1412 KJ mol^{-1} (c) + 141.2 KJ mol^{-1} (d) – 141.2 KJ mol^{-1}

47. The favourable conditions for a spontaneous reaction are –

(a) $T\Delta S > \Delta H$, ΔH = +ve, ΔS = +ve (b) $T\Delta S > \Delta H$, ΔH = +ve, ΔS = –ve

(c) $T\Delta S = \Delta H$, ΔH = –ve, ΔS = –ve (d) $T\Delta S = \Delta H$, ΔH = +ve, ΔS = +ve

48. Calculate the temperature at which ΔG = – 5.2 KJmol^{-1}, ΔH = 145.6 KJ mol^{-1} and ΔS = 216 JK^{-1} mol^{-1} for a chemical reaction –

(a) 698ºC (b) 425ºC (c) 650 K (d) 650ºC

49. The heat of atomisation of $PH_3(g)$ is 228 kcal mol^{-1} and that of $P_2H_4(g)$ is 355 kcal mol^{-1}. The energy of P—P bond is

(a) 62 kcal (b) 51 kcal (c) 52 kcal (d) 53 kcal

50. Which of the following statements is correct?

(a) Slope of adiabatic P-V curve is smaller than that in isothermal one

(b) Slope of the adiabatic P-V curve will be same as that in isothermal one

(c) Slope of adiabatic P-V curve will be larger than in isothermal one

(d) Both (B) and (C)

51. Determine the value of ΔH and ΔE for the reversible isothermal evaporation of 900g of water at 100°C. Assume that water vapour behaves as an ideal gas and heat of evaporation of water is 540 cal g^{-1} (R = 20 cal mol^{-1} K^{-1}).

(a) 2.83×10^6 (b) 28.3×10^6 (c) 2.83×10^{14} (d) 283×10^6

52. In which of the following case work done by the system is maximum at the definite external pressure?

(a) $C(S) + \frac{1}{2}O_2(g) \longrightarrow CO(g)$ (b) $HCl(g) \longrightarrow \frac{1}{2}H_2(g) + \frac{1}{2}Cl_2(g)$

(c) $H_2O(\ell) \longrightarrow H_2O(g)$ (d) $H_2(g) + \frac{1}{2}O_2(g) \longrightarrow H_2O(\ell)$

53. The exothermic formaton of ClF_3 is represented by the equation –

$l_{2(g)} + 3F_{2(g)} \rightleftharpoons 2\ ClF_{3(g)}$; Δ_rH = –329 kJ Which of the following will increase the quantity of ClF_3 in an equilibrium mixture of Cl_2, F_2 and ClF_3 ?

(a) Removing Cl_2 (b) Increasing the temperature

(c) Adding F_2 (d) Increasing the volume of the container

54. What is the equilibrium expression for the reaction $P_{4(S)} + 5O_{2(g)} \rightleftharpoons P_4O_{10(s)}$?

(a) $K_C = [P_4O_{10}] / [P_4]\ [O_2]^5$ (b) $K_C = [P_4O_{10}] / 5\ [P_4]\ [O_2]$

(c) $K_C = [O_2]^5$ (d) $K_C = 1/\ [O_2]^5$

55. The equilibrium constant for the reaction $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ at temperature T is 4×10^{-4}. The value of K_C for the reaction $NO_{(g)} \rightleftharpoons \frac{1}{2}N_{2(g)} + \frac{1}{2}O_{2(g)}$ at the same temperature is

(a) 2.5×10^{2} (b) 50 (c) 4×10^{-4} (d) 0.02

56. The equilibrium constants Kp_1 and $Kp_2$for the reactions $X \rightleftharpoons 2Y$ and $Z \rightleftharpoons P + Q$, respectively are in the ratio of 1 : 9. If the degree of dissociation of X and Z be equal then the ratio of total pressures at these equilibria is –

(a) 1 : 1 (b) 1 : 3 (c) 1 : 9 (d) 1 : 36

57. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm pressure. Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask. When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm ? The equilibrium constant for NH_4HS decomposition at this temperature is –

(a) 0.18 (b) 0.30 (c) 0.11 (d) 0.17

58. What is the free energy change ΔG, When 1.0 mole of water at 100ºC and 1 atm pressure is converted in to steam at 100ºC and 1 atm pressure?

(a) 540 cal (b) – 9800 cal (c) 9800 cal (d) 0 cal

59. 100 ml of 1.0 N CH_3COOH are added to 100 ml of 1.0 N NaOH solution. What will be the p^H of resulting solution –

(a) 7.0 (b) > 7.0 (c) < 7.0 (d) Zero

60. The solubility in water of a sparingly soluble salt AB_2 is 1.0×10^{-5} mol L^{-1} . Its solubility product will be –

(a) 1×10^{-15} (b) 1×10^{-10} (c) 4×10^{-15} (d) 4×10^{-10}

61. The dissociation constants of monobasic acids A,B,C and D are 6×10^{-4}, 5×10^{-5}, 3.6×10^{-6} , and 7×10^{-10} respectively. The pH values of their 0.1 molar aqueous solutions are in the order –

(a) A < B < C < D (b) A > B > C > D (c) A = B = C = D (d) A > B < C > D

62. In a buffer solution X^- and HX concentration are same. If K_b value for X^- is 10^{-8} then p^H of the buffer solution is –

(a) 8.0 (b) 6.0 (c) 4.0 (d) 10.0

63. In the reaction $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$, the oxidation state of S is –

(a) Increased (b) Decreased (c) Remains same (d) None

64. Which of following is not a redox change?

(a) $2H_2S + SO_2 = 2H_2O + 3S$ (b) $2BaO + O_2 = 2BaO_2$

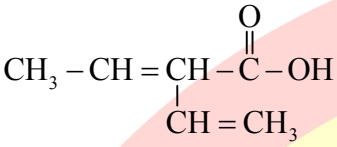
(c) $BaO_2 + H_2SO_4 = BaSO_4 + H_2O$ (d) $2KClO_3 = 2KCl + 3O_2$

65. In the following reaction

$4P + 3KOH + 3H_2O \longrightarrow 3KH_2PO_2 + PH_3$

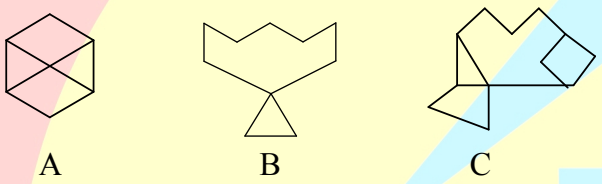
(a) Only phosphorus is oxidized
(b) Only phosphorous is reduced
(c) Phosphorus is both oxidised and reduced
(d) Phosphorus is neither oxidised nor reduced

66. Write the IUPAC name of the following compound



(a) 2-ethenylbit-2-enric acid
(b) 2-ethylenebit-2-enoic acid
(c) 2-Alkylenebit-2-enoic acid
(d) none of these

67. Find the D.B. F.



A B C

(a) A, B, C
4, 2, 4
(b) A, B, C
2, 4, 4
(c) A, B, C
4, 4, 2
(d) None of these

68. Which one of shows both electrophile and nucleophile

(a) $-N=O$
(b) $-OH$
(c) $-NH_2$
(d) $-CH_3$

69. Which will show metamers

(a) $CH_3-O-COC_3H_7$
(b) $CH_3-O-C_3H_7$
(c) $C_2H_5-S-C_2H_5$
(d) All of these

70. Which one shows both +M and −M

(a) $-CH=CH_2$
(b) $-OH$
(c) $-CH=O$
(d) $-CN$

71. $M(g) \rightarrow M^+(g) + e^-$ $\Delta H = 100$ eV

$M(g) \rightarrow M^{2+}(g) + 2e^-$ $\Delta H = 250$ eV

ΔH is the energy required for ionisation. Which of the above statement is incorrect?

(a) IE_1 of M(g) is 100 eV
(b) IE_1 of $M^+(g)$ is 150 eV
(c) IE_2 of M(g) is 250 eV
(d) IE_2 of M(g) is 150 eV

72. Which of the following has largest radius?

(a) Mg^{2+}
(b) Na^+
(c) O^{2-}
(d) F^-

73. In which of the following have higher difference in the value of IInd and IIIrd I.P. –

(a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$
(b) $1s^2\ 2s^2\ 2p^6\ 3s^2$
(c) $1s^2\ 2s^2\ 2p^6\ 3s^1$
(d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

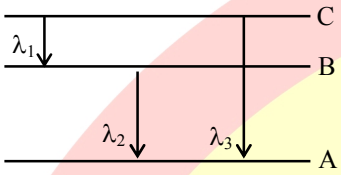
74. Pauling's electronegativity scale is based upon experimental values of –

(a) Atomic radii (b) Bond energies (c) Ionization energies (d) Electron affinity

75. Atomic number 15, 33, 51 represents the following family –

(a) Carbon family (b) Nitrogen family (c) Oxygen family (d) None

76. Energy levels A, B, C of a certain atom correspond to increasing value of energy, i.e., $E_A < E_B < E_C$. If λ_1, λ_2 & λ_3 are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A respectively, which of the following statement is correct :



(a) $\lambda_3 = \lambda_1 + \lambda_2$ (b) $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$ (c) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ (d) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

77. Calculate the number of quanta of radiations of frequency 4.67×10^{13} s^{-1} that must be absorbed in order to melt 5 g of ice (The energy required to melt 1 g of ice is 333 J)

(a) 3.36×10^{18} (b) 17 (c) 5.38×10^{22} (d) 30.91×10^{-21}

78. Find the ratio of frequency of e^- in 1^{st} orbit of H atom to 3^{rd} orbit of He^+ ion.

(a) $\frac{27}{4}$ (b) $\frac{4}{27}$ (c) $\frac{54}{4}$ (d) $\frac{27}{8}$

79. Neutron is not present in –

(a) Helium (b) Protium (c) Deuterium (d) Tritium

80. The number of radial nodal surface in 4d, 5s, 2p respectively

(a) 1, 4, 0 (b) 4, 1, 0 (c) 1, 4, 1 (d) 2, 4, 0

81. The bonds present in N_2O_5 are:

(a) Only ionic (b) Covalent & coordinate

(c) Only covalent (d) Covalent & ionic

82. Maximum no. of hydrogen bonds formed by a water molecule in ice is:

(a) 4 (b) 3 (c) 2 (d) 1

83. A sigma bond is formed by the overlapping of :

(a) s-s orbital alone (b) s and p orbitals alone

(c) s-s, s-p or p-p orbitals along internuclear axis (d) p-p orbital along the sides

84. The d-orbitals involved in sp^3d hybridisation is :

(a) $d_{x^2-y^2}$ (b) d_{z^2} (c) d_{xy} (d) d_{xz}

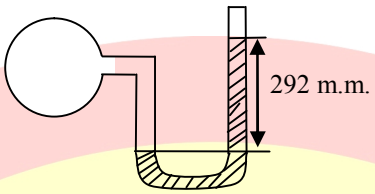
85. The shape of I_3^- is :

(a) Tetrahedral (b) Linear (c) T-shape (d) Trigonal

86. The gas equation PV = nRT is derived from –

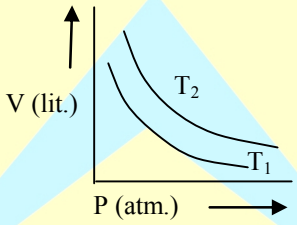
(a) Boyle's law (b) Charle's law (c) both A & B (c) Gay-Lussac's law

87. An open ended Hg manometer is used to measure the pressure exerted by a trapped gas as shown in the figure. Atmospheric pressure is 749 m.m. of Hg. What is the pressure of the trapped gas-



(a) 292 m.m. Hg (b) 457 m.m. Hg (c) 749 m.m. Hg (d) 1041 m.m. Hg

88. A P-V curve at constant temperature is shown below. T_1 and T_2 in kelvin are-



(a) 500, 250 (b) 250, 500 (c) 300, 150 (d) 300, 300

89. The cylinder contains 100 gm of an ideal gas (mol. wt. = 40 gm/mol) at 27°C and 2 atm. pressure. In transportation the cylinder fell and a dent was created. The valve present cannot keep the pressure greater than 2 atm. Hence 10 gm of a gas got leaked out. The volume of the container before and after dent is-

(a) 30.8 L ; 27.7 L (b) 27.7 L ; 30.8 L (c) 30.8 L ; 30.8 L (d) 27.7 L ; 27.7 L

90. There are 201 equidistant rows of spectators sitting in a hall. A magician releases laughing gas, N_2O (mol wt = 44) from the front and the tear gas (mol wt = 176) from the rear of the hall simultaneously. Which row of spectators will have a tendency to smile and weep simultaneously at first ?

(a) At 134th row if the numbering of rows start from front.

(b) At 67th row if the numbering of rows start from front.

(c) At 134th row if the numbering of rows start from the rear.

(d) At 113th row if the numbering of rows start from front.

91. Which of the following statements is correct?
(a) All bacteria are autotrophic
(b) All bacteria are heterotrophic
(c) Mostly bacteria are heterotrophic but some are autotrophic
(d) All bacteria are photosynthetic

92. Bacteriophages are:
(a) Bacteria that are parasite on other bacteria
(b) Bacteria that are parasite of viruses
(c) Viruses that are parasite of bacteria
(d) Viruses that are parasite of crops.

93. 'Peptidoglycan' is a characteristic constituent of the cell wall of:
(a) Eubacteria are unicellular eukaryotes
(b) Bacteria and cyanobacteria
(c) Archaebacteria and eukaryotes
(d) All members of 'monera' and 'protista'.

94. Nuclear material without nuclear membrane is observed in:
(a) Mycoplasmas and green algae
(b) Cyanobacteria and red algae
(c) Bacteria ad cyanobacteria
(d) Bacteria and green algae.

95. Heterocysts are found in certain:
(a) Viruses (b) Bacteria (c) Cyanobacteria (d) *Mycoplasmas*.

96. Monerans devoid of cell-well are:
(a) Actinomycetes (b) Cyanobacteria (c) Mycoplasma (d) Bacteria.

97. Which bacteria is utilized in Gobar gas plant?
(a) Methanogens
(b) Nitrifying bacteria
(c) Ammonifying bacteria
(d) Denitrifying bacteria.

98. Dinoflagellates have:
(a) One flagellum (b) Two flagella (c) Three flagella (d) Four flagella.

99. In chlorophyta, mode of sexual reproduction is:
(a) Oogamy and anisogamy
(b) Oogamy only
(c) Isogamy, anisogamy and oogamy
(d) Isogamy and anisogamy.

100. *Spirogyra* has a :
(a) Haplontic life cycle
(b) Diplontic life cycle
(c) Haplobiontic life cycle
(d) diplobiontic life cycle.

101. Agar-agar which is used in culture medium as stabilizing agent is obtained from:
(a) Red algae (b) Green algae (c) Kelps (d) Bacteria.

102. Zygotic meiosis takes place:
(a) *Selaginella* (b) *Spirogyra* (c) *Pinus* (d) *Brassica*.

103. *Nostoc* is a :
(a) Green algae (b) Yellow-green algae (c) Blue-green algae (d) Red algae.

104. Floridean starch is present in:
(a) Rhodophyceae (b) Chlorophyceae (c) Cyanophyceae (d) Cyanobacteria.

105. All fungi are always:
(a) Parasites (b) Autotrophs (c) Heterotrophs (d) Saprophytes.

106. Dicaryotic cells are formed in:
(a) Phycomycetes (b) Ascomycetes (c) Basidiomycetes (d) In both (b) & (c).

107. Lichens are good indicators of:
(a) Air pollution (b) Water pollution (c) Soil pollution (d) All of these.

108. Mycorrhiza is:
(a) A fungus parasitizing root system of higher plants
(b) An association *Rhizobium* with the roots of leguminous plants
(c) A symbiotic association of plant roots and certain fungi
(d) An association of algae with fungi.

109. Black rust of wheat is caused by a member:
(a) *Mucor* (b) *Aspergillus* (c) *Puccinia* (d) *Rhizopus*.

110. Reserve food material in fungi is:
(a) Glycogen (b) Starch (c) Sucrose (d) Glucose.

111. Cell wall of *Mucor* is made up of:
(a) Chitin (b) Cellulose (c) Pectin (d) Mucilage.

112. Sporangiospores of *Mucor* are:
(a) Haploid (b) Diploid (c) Triploid (d) Polyploid.

113. During the formation of bread it becomes porous due to release of CO_2 by the action of:
(a) Yeast (b) Bacteria (c) Virus (d) Protozoans.

114. Gentic material in TMV is:
(a) DNA (b) RNA (c) Capsid (d) Both DNA and RNA

115. Credit for first crystallization of virus goes to:
(a) Louis Pasteur (b) D. Iwanowski (c) S. Luvia (d) W.M. Stanley.

116. Protein coat of virus is calle:
(a) Capsid (b) Capsomere (c) Viroid (d) Prophage.

117. Interferons are synthesized in response to:
(a) Mycoplasma (b) Bacteria (c) Viruses (d) Fungi.

118. The process which cannot take place in the absence of viruses:
(a) Transduction (b) Translocation (c) Conjugation (d) Transformation.

119. Which is not a viral disease?
(a) Chicken pox (b) Rabies (c) Polio (d) Leprosy.

120. The moss plant is a :
(a) Sometimes gametophyte and sometimes sporophyte
(b) Predominantly gametophyte with sporophyte attached to it
(c) Gametophyte
(d) Sporophyte.

121. To which group would you assign a plant which produces spores, embryo but lack seed and vasculature?
(a) Algae (b) Fungi (c) Bryophyta (d) Pteridophyta.

122. Which among the following is called 'peat moss'?
(a) *Funaria* (b) *Porella* (c) *Pellia* (d) *Sphagnum*.

123. The female sex organs in bryophytes are called:
(a) Oogonia (b) Antheridia (c) Archegonia (d) Ascogonia.

124. The Antherozoids of *Funaria* are:
(a) Aciliated (b) Biciliated (c) Multiciliated (d) Monociliated.

125. Which of the following has a well developed gametophyte:
(a) *Pinus* (b) Mango (c) *Mentha* (d) Moss.

126. Fern plant is a :
(a) Haploid gametophyte (b) Diploid gametophyte (c) Diploid sporophyte (d) Haploid sporphyte.

127. A water-fern which is used as a green manure in rice fields is:
(a) *Salvinia* (b) *Mucor* (c) *Aspergillus* (d) *Azolla*.

128. Pteridophytes differ from bryophytes in having:
(a) Vascular tissues (b) Archegonia
(c) Motile Antherozoids (d) Alternation of generations.

129. In which stage meiosis takes place in *Pteridium*?
(a) During the spore germination (b) During the spore formation
(c) During the gamete formation (d) During the organ formation in prothallus.

130. The endosperm in Gymnosperms is:
(a) Haploid (b) Diploid (c) Triploid (d) Tetraploid.

131. The largest known ovules, largest male and female gametes and largest plants are found among:
(a) Dicotyledonous plants (b) Gymnosperms
(c) Angiosperms (d) Tree ferns and some monocots.

132. Fruits are not formed in gymnosperms because:
(a) Seeds are not formed (b) Ovules are naked
(c) Fertilization is absent (d) Seeds fall down in little stage.

133. Which one of the following is a living fossil?
(a) *Ginkgo* (b) *Cedrus* (c) *Pinus* (d) *Metasequoia*.

134. Which of the following plant produces seeds but not flowers?

(a) Maize (b) Mint (c) Peepal (d) *Pinus*.

135. In which of the following groups would you place a plant, which produces embryo, vascular tissues, seeds and fruits?

(a) Angiosperms (b) Bryophytes (c) Gymnosperms (d) Pteriophytes.

136. Totipotency in plant cell was discovered by :

(a) Steward (b) Leeuwenhoek (c) Haberlandt (d) Henrietta Lacks

137. The main difference between active and passive transport across cell membrane is that:

(a) passive transport is non selective

(b) active transport occurs more rapidly than passive transport

(c) passive transport is gradient based while active transport is energy based against concentration gradient

(d) passive transport is confined to anions while active transport is for cations only.

138. Match List I (Substructures) with List II (Functions) and select the correct answer using the codes given below the lists:

List-I **(Substructures)**	**List-II** **(Functions)**
A. Nucleosome	1. Cell adhering junctions
B. Tubulin	2. Battery of degradative enzyme
C. Desmosomes	3. Structural units of chromatin
D. Lysosomes	4. Protein units of microtubules
	5. Oxidative phosphorylation

Codes:

(a) A $\rightarrow$3, B $\rightarrow$4, C $\rightarrow$1, D $\rightarrow$2 (b) A $\rightarrow$2, B $\rightarrow$5, C $\rightarrow$4, D $\rightarrow$3

(c) A $\rightarrow$3, B $\rightarrow$5, C $\rightarrow$4, D $\rightarrow$2 (d) A $\rightarrow$2, B $\rightarrow$4, C $\rightarrow$1, D $\rightarrow$3

139. Some cellular structures bounded by single or double membranes while some other without a membrane. Match the organelle in list-I with the nature of membrane in list-II and select the correct answer using the codes given below the list:

List-I	**List-II**
A. Mitochondria	1. Without membrane
B. Lysosomes	2. Single membrane
C. Ribosomes	3. Double membrane
D. Nucleus	

Codes:

(a) A $\rightarrow$1, B $\rightarrow$2, C $\rightarrow$3, D $\rightarrow$4 (b) A $\rightarrow$3, B $\rightarrow$1, C $\rightarrow$1, D $\rightarrow$1

(c) A $\rightarrow$3, B $\rightarrow$2, C $\rightarrow$1, D $\rightarrow$3 (d) A $\rightarrow$2, B $\rightarrow$3, C $\rightarrow$1, D $\rightarrow$3

140. Match the cell organelles given in list-I with cellular processes in list-II:

List-I	List-II
A. Lysosomes	1. Protein synthesis
B. Ribosomes	2. Hydrolytic activity
C. Smooth endoplasmic Reticulum	3. Steroidogenesis
D. Centriole	4. Glycolytic activity
E. Chromosomes	5. Respository of genetic information
	6. Formation of spindle apparatus

Codes :

(a) A $\rightarrow$2, B $\rightarrow$1, C$\rightarrow$3, D$\rightarrow$6, E$\rightarrow$5 (b) A $\rightarrow$6, B $\rightarrow$3, C$\rightarrow$4, D$\rightarrow$5, E$\rightarrow$1

(c) A $\rightarrow$1, B $\rightarrow$4, C$\rightarrow$3, D$\rightarrow$6, E$\rightarrow$1 (d) A $\rightarrow$4, B $\rightarrow$3, C$\rightarrow$1, D$\rightarrow$2, E$\rightarrow$3.

141. Ribosomes are so called because of high:

(a) ribose content (b) ribonucleic acid content

(c) both 'a' and 'b' (d) none of these

142. Which one of the following remain absent in prokaryotes?

(a) Nuclear membrane (b) Ribosome

(c) Cell wall (d) Plasma membrane.

143. Two sister chromosomes remain attached by means of:

(a) Chromocentre (b) Chromatids (c) Spindle fibre (d) Centromere.

144. In which stage the chromosomes appear thin and long thread like:

(a) Zygotene (b) Leptotene (c) Pachytene (d) Prophase.

145. A chromosome having substerminal centromere is:

(a) Acrocentric (b) Submetacentric (c) Telocentric (d) Metacentric.

146. The suffix S in ribosome unit indicates:

(a) Sedimentation coefficient (b) Solubility

(c) Surface area (d) Size.

147. Prokaryote is characterized by:

(a) Absence of nucleolus

(b) Absence of nuclear envelope

(c) Dispersed DNA and lack of membrane bound organelles

(d) All the above.

148. Plasmalemma prevents escape of Na^+ and K^+ to:

(a) Cause disruption in neighbouring cells through through desmosomes

(b) Maintain electrostatic neutrality of cells

(c) Maintain cell sap

(d) All the above.

149. The major importance of meiosis lies in:
(a) Development of mutations
(b) Sexual reproduction
(c) It transfers chromosomes through mitosis
(d) It maintains chromosome number generation after generation.

150. In mitotic metaphase, each chromosome is:
(a) One (b) Two (c) Three (d) Four.

151. Autolysis is connected with:
(a) Ribosome (b) Kinetosome (c) Lysosome (d) Golgi apparatus.

152. Which of the following disaccharides will give two molecules of glucose on hydroxylation
(a) Maltose (b) Sucrose (c) Lactose (d) None

153. Which is very most structural part of the body
(a) Protein (b) Carbohydrates (c) Lipid (d) Nucleic acid

154. Which of the following sugar is found in ATP
(a) Deoxyribose (b) Ribose (c) Trehalose (d) Glucose

155. Deficiency of protein leads to
(a) Rickets (b) Scurvy (c) Kwashiorkor (d) Carotenemia

156. Lactose is composed of –
(a) Glucose + galactose (b) Glucose + fructose (c) Glucose + glucose (d) Glucose + mannose

157. True statement for cellulose molecule
(a) $\beta-1'-4''$ linkage, unbranched (b) $\beta-1'-4''$ linkage, branched
(c) α - T - 4" linkage, branched (d) $\beta-1'-6''$ linkage unbranched

158. Contractile protein is
(a) Actin (b) Myosin (c) Troponin (d) Tropomyosin

159. Variations in proteins are due to –
(a) Sequence of amino acids (b) Number of amino acids
(c) R - group (d) None

160. The antibodies are
(a) γ (Gamma) - globulins (b) Albumins
(c) Vitamins (d) Sugar

161. Sweetest sugar among the naturally occuring sugar –
(a) Glucose (b) Fructose (c) Sucrose (d) Saccharine

162. Histone is a basic protein due to –
(a) Alanine & glycine (b) Methionine & serine
(c) Tryptophan & tyrosine (d) Lysine & Arginine

163. Lipid derivatives which occur in faecal material –

(a) Cholesterole (b) Ergesterole (c) Lanoline (d) Coprosterole

164. Example of phospho protein is

(a) Mucin (b) Fibrinogen (c) Casien (d) Myosin

165. Sugar with five membered ring called

(a) Pyranose (b) Furanose (c) Dextrorotatory (d) Laevorotatory

166. Which sugar occurs only in mammals

(a) Trehalose (b) Galactose (c) Lactose (d) Mannose

167. Carotenoids composed of units –

(a) Fatty acids (b) Amino acids (c) Isoprene (d) Pyran

168. Sugar which occurs in haemolymph of insects

(a) Chondriotin (b) Heparin (c) Trehalose (d) Maltose

169. Which sugar does not give Benedict's test –

(a) Glucose (b) Maltose (c) Fructose (d) Sucrose

170. Amylose and Amylopectin chains occur in –

(a) Glycogen (b) Starch (c) Cellulose (d) Chitin

171. All lipids are –

(a) Composed of fatty acids (b) Triglycerides

(c) Insoluble in water (d) All the above

172. Which of the following does not contain metal:-

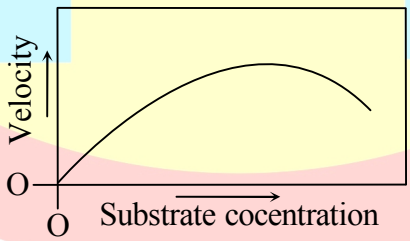
(a) Glycoproteins (b) Ferritin (c) Cytochromes (d) Chromoproteins

173. The catalytic efficiency of two different enzymes can be compared by the –

(a) The Km value (b) The pH optimum value

(c) Molecular size of the enzyme (d) Formation of the product

174. The graph given below shows the effect of substrate concentration on the rate of reaction of the enzyme green-gram phosphatase.



What does the graph indicate?

(a) The rate of enzyme reaction is directly proportional to the substrate concentration

(b) Presence of an enzyme inhibitor in the reaction mixture

(c) Formation of an enzyme-substrate complex

(d) At higher substrate concentration the pH increases.

175. Which is not true for enzymes –

(a) Enzymes are proteins with complex structure

(b) Enzymes can be regulated with specific molecule

(c) Enzymes are much sensitive to changes in pH and temperature

(d) Enzymes can catalyse diverse reactions

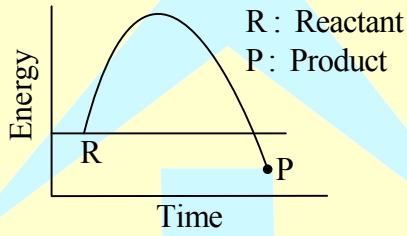
176. An enzyme that can stimulate germination of barley seed is –

(a) α-amylase (b) Lipase (c) Protease (d) Invertase

177. An organic substance bound to an enzyme and essential for its activity is called –

(a) Coenzyme (b) Holoenzyme (c) Apoenzyme (d) Isoenzyme

178. The chemical reaction indicated in the graph is –



(a) Exergonic (b) Endergonic (c) Isothermal (d) Endothermal

179. A test tube contains potato extract. To it a small quantity of amylase and a drop of iodine solution is added. The tube is incubated at 70°C for 10 mins. and then at 37°C for 5 mins. Mark the expected result –

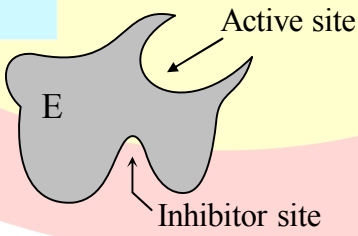
(a) The solution will show blue colour which will fade at the end of 15 mins

(b) The solution will remain colourless throughout the experiment

(c) The solution will remain blue throughout the experiment

(d) The solution will be blue at the end of 10 mins and colourless at the end of 15 mins

180. Addition of substrate and inhibitor to the enzyme molecule depicted below will result in –



(a) Non competitive inhibition (b) Competitive inhibition

(c) Reversible competitive inhibition (d) Feed back inhibition

ANSWER

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