

Physics

Single Correct Questions

1. A rocket with a lift off mass of $3.5 \times 10^4 \text{ kg}$ is blasted upwards with initial acceleration of 10 m/s^2 . Then the initial thrust of blast is (Take $g = 10 \text{ m/s}^2$)

(A) $1.75 \times 10^5 \text{ N}$ (B) $3.5 \times 10^5 \text{ N}$ (C) $7.0 \times 10^5 \text{ N}$ (D) $14.0 \times 10^5 \text{ N}$
2. An object is moving with velocity 10 m/s has a constant retardation of 2 m/s^2 . Find distance & displacement in 7 seconds?

(A) 21,21 (B) 25,21 (C) 27,21 (D) 29,21
3. A block of mass 2 kg is placed on floor. The coefficient of static friction is 0.4 . A horizontal force of 2.8 N is applied on block. The force of friction between block and floor is

(A) 2.8 N (B) 8 N (C) 2.0 N (D) zero
4. A body of mass m is thrown vertically upwards with a velocity v . The height h at which the kinetic energy of the body is half of its initial value is given by

(A) $h = \frac{v^2}{g}$ (B) $h = \frac{v^2}{2g}$ (C) $h = \frac{v^3}{3g}$ (D) $h = \frac{v^2}{4g}$
5. A person draws water from a 5 m deep well in a bucket of mass 2 kg of capacity 8 litre by a rope of mass 1 kg . What is the total work done ($g = 10 \text{ m/s}^2$)

(A) 550 J (B) 525 J (C) 425 J (D) 500 J
6. A particle of mass m is being circulated on a vertical circular path of radius r using a massless string. If the speed of particle at the highest point be v then

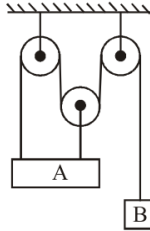
(A) $mg = \frac{mv^2}{r}$ (B) $mg > \frac{mv^2}{r}$ (C) $mg \leq \frac{mv^2}{r}$ (D) $mg \geq \frac{mv^2}{r}$
7. String of total length $2L$ is hung through a smooth pulley with equal lengths on either side of the pulley, initially. The system is then released. The velocity v of the string when it slips out of the pulley (height of pulley from floor $> 2L$)

(A) $\sqrt{\frac{gL}{2}}$ (B) $\sqrt{2gL}$ (C) \sqrt{gL} (D) None of these
8. What should be the minimum coefficient of static friction between an inclined plane and a solid cylinder, for the cylinder not to slip on the inclined plane?

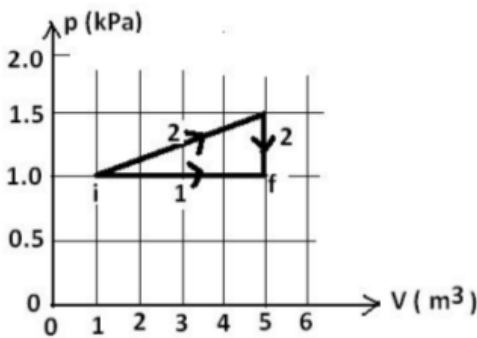
(A) $\frac{1}{3} \tan \theta$ (B) $\frac{1}{3} \sin \theta$ (C) $\frac{2}{3} \tan \theta$ (D) $\frac{2}{3} \sin \theta$

Space for rough use

9. A solid cylinder is thrown on a horizontal surface with axis remaining horizontal in such a way that it slides with a speed V_0 initially without rolling. It will start rolling without slipping when its speed reduces to:
- (A) $\frac{V_0}{2}$ (B) $\frac{2V_0}{3}$ (C) $\frac{3V_0}{5}$ (D) $\frac{5V_0}{7}$
10. Two cars start off to race with velocities 4 m/s and 2 m/s and travel in straight line with uniform accelerations 1 m/s^2 and 2 m/s^2 respectively. If they reach the final point at the same instant, then the length of the path is
- (A) 30 m (B) 32 m (C) 20 m (D) 24 m
11. At a given instant, A is moving with velocity 4 m/s upwards as shown in the figure. The speed of B at that time is:



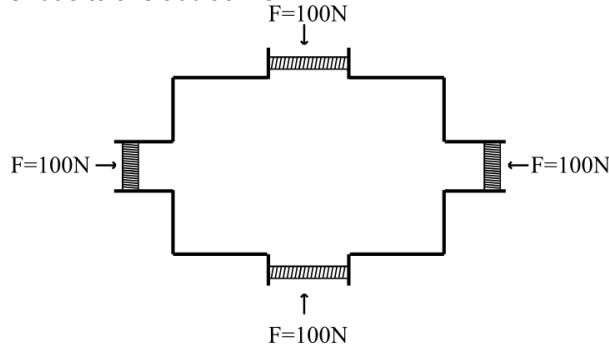
- (A) 4 m/s (B) 8 m/s (C) 12 m/s (D) 16 m/s
12. A thermodynamic system initially at the state-i undergoes a reversible change to the state-f via the route 1, as shown in Figure.



- If, instead, the system is taken from state-i to state-f via the triangular route 2, the heat input required would be
- (A) larger by 1.0 kJ (B) smaller by 1.0 kJ (C) the same (D) larger by 5 kJ

Space for rough use

13. Water is filled in a symmetrical container. Four pistons of equal area A each are used at the four openings to keep the water in equilibrium. Now an additional force each of magnitude 100N is applied at each piston. The increase in the pressure at the centre of container due to this addition is :



- (A) $\frac{100}{A}$ (B) $\frac{200}{A}$ (C) $\frac{400}{A}$ (D) 0
14. The pressure of water changes by 600 N/m^2 between A and B where the area of cross - section are 30 cm^2 and 15 cm^2 respectively. The rate of flow of water through the tube is nearest to:
-
- (A) $600\text{ cm}^3/\text{s}$ (B) $1200\text{ cm}^3/\text{s}$ (C) $1900\text{ cm}^3/\text{s}$ (D) $2400\text{ cm}^3/\text{s}$
15. A spring-piston type pressure gauge has a piston area 0.40 cm^2 . The spring obeys Robert Hooke's law and has the spring constant of 60 N m^{-1} . The pressure of a gas chamber by this gauge is found to be 19 kPa gauge pressure. Atmospheric pressure at the time of measurement is 101 kPa . The spring must be compressed in this process of measurement by
- (A) 2 cm (B) 4 cm (C) 6 cm (D) 8 cm
16. A spherical ball falls through viscous medium with terminal velocity ' v '. If this ball is replaced by another ball by the same mass but half the radius then the terminal velocity will be
- (A) V (B) $2V$ (C) $4V$ (D) $8V$
17. In damped oscillation, the amplitude of oscillation is reduced to $1/3$ of its initial value A_0 at the end of 100 oscillations. When the system completes 200 oscillations, its amplitude must be
- (A) $\frac{A_0}{2}$ (B) $\frac{A_0}{4}$ (C) $\frac{A_0}{6}$ (D) $\frac{A_0}{9}$
18. Two simple pendulum of length 1 m and 4 m respectively are given small linear displacement in same direction at the same time. After how many oscillations of the shorter pendulum will they be in phase again?
- (A) 5 (B) 1 (C) 2 (D) 3

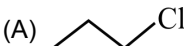

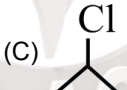

Space for rough use

19. During the propagation of sound waves, the rate at which pressure force does the work is equal to
 (A) Sum of rate of change in kinetic energy and rate of change in potential energy of compression.
 (B) Rate of change in kinetic energy.
 (C) Rate of change in potential energy of compression.
 (D) Rate of change in kinetic energy = rate of change in potential energy of compression.
20. The frequency of the sound produced by a siren increases from 400 Hz to 1200 Hz while its amplitude remains the same. Therefore, the ratio of the intensity of the 1200 Hz wave to that of the 400 Hz wave is
 (A) 1 : 1 (B) 3 : 1 (C) 1 : 9 (D) 9 : 1

Chemistry

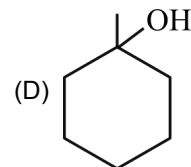
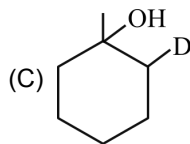
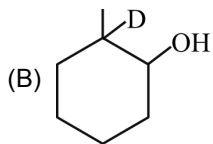
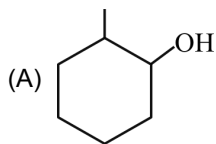
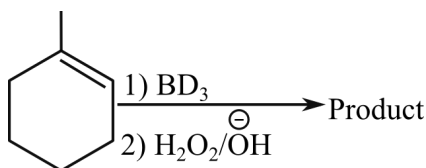
21. Two gases have same initial pressure, volume & temperature. They expand to same final volume via different thermodynamics process. One adiabatically and other isothermally. In which process is final pressure greater ?
 (A) isothermal (B) adiabatic (C) same (D) data insufficient
22. The most stable carbocation among the following is
- (A) $\text{ClCH}_2-\overset{\oplus}{\text{C}}\begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_3 \end{matrix}$ (B) $\text{CH}_3-\overset{\oplus}{\text{C}}\begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_2\text{CH}_3 \end{matrix}-\text{CH}_2$
- (C) $\text{CH}_3\text{O}-\text{CH}_2-\text{CH}_2-\overset{\oplus}{\text{C}}\begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_2\text{CH}_3 \end{matrix}$ (D) $\text{C}_6\text{H}_5-\overset{\oplus}{\text{C}}\begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_2\text{CH}_3 \end{matrix}$
23. Which of the following sets of quantum numbers are not possible ?
 (I) $n = 0, l = 0, m_l = 0, m_s = +\frac{1}{2}$ (II) $n = 1, l = 0, m_l = 0, m_s = -\frac{1}{2}$
 (III) $n = 1, l = 1, m_l = 0, m_s = +\frac{1}{2}$ (IV) $n = 2, l = 1, m_l = 0, m_s = -\frac{1}{2}$
 (V) $n = 3, l = 3, m_l = -3, m_s = +\frac{1}{2}$ (VI) $n = 3, l = 1, m_l = 0, m_s = +\frac{1}{2}$
 (A) I, II and III (B) I, III and V (C) I, IV and VI (D) I, II, III and V
24. Which of the following set of metal ions have equal magnetic moment.
 (A) $\text{Fe}^{2+}, \text{Ni}^{2+}, \text{Co}^{3+}$ (B) $\text{Fe}^{3+}, \text{Co}^{3+}, \text{Ni}^{2+}$ (C) $\text{Fe}^{2+}, \text{Co}^{3+}, \text{Mn}^{3+}$ (D) $\text{Fe}^{3+}, \text{Co}^{3+}, \text{Mn}^{3+}$
25. A J-shaped tube with smaller end closed & longer end open was taken. Mercury was added into it, till the level of mercury in both the limbs was same. Volume of air enclosed in the closed end was found to be 2.4 ml. Now more mercury was added and the air enclosed in the closed end reduced to 1.9 ml. Now, the difference in the level of the two limbs will be
 (A) 43 cm (B) 5 cm (C) 10 cm (D) 20 cm

Space for rough use

26. The critical temperature & reduced temperature of a gas are 150K & 3K respectively. What is the temperature of a gas.
 (A) 50K (B) 141K (C) 153K (D) 450K
27. For the following three reaction 1,2 and 3 equilibrium constants are given
 1) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$ K_1
 2) $CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}$ K_2
 3) $CH_{4(g)} + 2H_2O_{(g)} \rightleftharpoons CO_{2(g)} + 4H_{2(g)}$ K_3
 Which of the following relations is correct ?
 (A) $K_1 = \frac{K_2}{K_3}$ (B) $K_3 = K_1K_2$ (C) $K_1K_3^2 = K_2$ (D) $K_1\sqrt{K_2} = K_3$
28. The density of air at N.T.P. is 1.293 gm/lit. If the pressure is tripled keeping its temperature constant its density becomes
 (A) 3.879 gm/ltr (B) 1.293gm/ltr (C) 2.586 gm/ltr (D) 0.431 gm/ltr
29. A purple coloured solution is added from a burette to $FeSO_4$ solution kept in the flask. After sometime, the purple colour changes to light pink. The ion formed from that solution is
 (A) MnO_4^- (B) Fe^{2+} (C) Fe^{3+} (D) Mn^{2+}
30. In the gaseous equilibrium $A + 2B \rightleftharpoons C + \text{Heat}$, the forward reaction is favoured:
 (A) Low P , High T (B) Low P , Low T (C) High P , Low T (D) High P , High T
31. The pH of pure water at $25^\circ C$ and $35^\circ C$ are 7 and 6 respectively. The heat of dissociation of H_2O into H^+ and OH^- ions will be nearly
 (A) 330 $kJ\ mol^{-1}$ (B) 430 $kJ\ mol^{-1}$ (C) 351.5 $kJ\ mol^{-1}$ (D) 480 $kJ\ mol^{-1}$
32. $CH_3-\overset{\overset{O}{\parallel}}{C}-CH_3 \xrightarrow[\text{con HCl}]{Zn-Hg} A \xrightarrow[h\nu]{Cl_2} B + C$
 (major) (minor)
 'B' is
 (A)  (B)  (C)  (D) 

Space for rough use

33.



34. The reagent which can distinguish 1-butyne from 2-butyne is

(A) Baeyer's reagent

(B) Ammoniacal Cu_2Cl_2 (C) Ammoniacal AgNO_3

(D) Both (B) & (C)

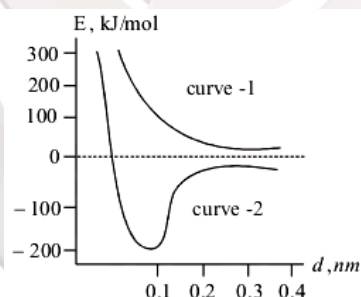
35. The elements $_{30}\text{Zn}$, $_{48}\text{Cd}$ and $_{80}\text{Hg}$ belong to

(A) 10th group

(B) 11th group

(C) 12th group

(D) 13th group

36. If the ionic radii of K^+ and F^- are about 1.34\AA each, then the expected values of atomic radii of K and F should be respectively :(A) 2.31 and 0.64\AA (B) 2.31 and 1.34\AA (C) 0.64 and 2.31\AA (D) 1.34 and 1.34\AA 37. Consider the diagram below showing the possible levels of the energy of H_2^+ ion depending on internuclear distance versus potential energy of the system.

It may be easily assumed that the ground state of the molecular hydrogen ion, H_2^+ corresponds to the lowest level which means that

(A) Curve 1 represents the most stable state of the system for H_2^+ ion(B) Curve 2 represents the most stable state of the system for H_2^+ ion

(C) Curve 1 indicates that the molecular hydrogen ion is formed

(D) Curve 2 represents the energy level of the antibonding region

38. In the formation of N_2^+ from N_2 the electron is removed from(A) σ orbital(B) π orbital(C) σ^* orbital(D) π^* orbital

Space for rough use

39. The volume of oxygen liberated at NTP from 15 mL of 20 volume H_2O_2 is
 (A) 250 mL (B) 300 mL (C) 150 mL (D) 200 mL
40. H_2 , D_2 and T_2 do not differ in
 (A) freezing point (B) boiling point (C) critical temperature (D) none of these

Mathematics

41. The set of all values of k for which the equation $x^2 + 2(k - 1)x + (k - 5) = 0$ has atleast one non - negative root is
 (A) $[1, \infty)$ (B) $[-1, 1]$ (C) $(-\infty, -5]$ (D) $(-\infty, 5]$
42. The equation $\left(\frac{10}{9}\right)^x = -3x^2 + 2x - \frac{9}{11}$ has
 (A) No solution (B) exactly one solution
 (C) exactly two solution (D) none of these
43. If $\sin^2 \theta + 3 \cos \theta = 2$, then value of $\cos^3 \theta + \sec^3 \theta + 2$ is equal to:
 (A) 18 (B) 20 (C) 16 (D) 21
44. If $n = \frac{\pi}{4\alpha}$, then $\tan \alpha \cdot \tan 2\alpha \cdot \tan 3\alpha \dots \tan(2n - 1)\alpha$ is equal to
 (A) 1 (B) -1 (C) ∞ (D) None of these.
45. Let 4 be the A.M. and 2 be the G.M. of two numbers a and b then their H.M. is
 (A) 3 (B) 1 (C) $10/3$ (D) $16/5$
46. The sum of the infinite terms of the series $\frac{5}{3^2 \cdot 7^2} + \frac{9}{7^2 \cdot 11^2} + \frac{13}{11^2 \cdot 15^2} + \dots$ is
 (A) $\frac{1}{18}$ (B) $\frac{1}{36}$ (C) $\frac{1}{54}$ (D) $\frac{1}{72}$
47. In a group of 8 girls, two girls are sisters. The number of ways in which the girls can sit in a row so that two sisters are not sitting together is:
 (A) $6 \times 7!$ (B) $7 \times 7!$ (C) 40210 (D) 35280
48. A four digit number of distinct digits is formed by using the digits 2, 3, 4, 5, 6, 7, 8. The number of such numbers which are divisible by 25 is
 (A) 60 (B) 40 (C) 20 (D) 15

Space for rough use

49. Coefficient of x^{11} in the expansion of $(1+x^2)^4 (1+x^3)^7 (1+x^4)^{12}$ is _____
 (A) 1051 (B) 1106 (C) 1113 (D) 1120
50. The number of terms in the expansion $(\sqrt{3} + \sqrt[4]{5})^{124}$ which are integer is equal to
 (A) 0 (B) 30 (C) 31 (D) 32
51. The complex numbers $\sin x + i \cos 2x$ and $\cos x - i \sin 2x$ are conjugate to each other, for
 (A) $x = n\pi$ (B) $x = 0$
 (C) $x = \left(n + \frac{1}{2}\right)\pi$ (D) no value of x
52. $\sqrt{-4} \times \sqrt{\frac{-9}{4}} =$
 (A) 3 (B) -3 (C) -2 (D) $-\frac{3}{2}$
53. The probability that a teacher will give an unannounced test during any class meeting is $\frac{1}{5}$. If a student is absent twice, then the probability that the student will miss at least one test is
 (A) $\frac{4}{5}$ (B) $\frac{2}{5}$ (C) $\frac{7}{25}$ (D) $\frac{9}{25}$
54. From a city population, the probability of selecting (i) a male or a smoker is $\frac{7}{10}$. (ii) a male smoker is $\frac{2}{5}$ and (iii) a male, if a smoker is already selected is $\frac{2}{3}$. Then probability of selecting a smoker, if a male is first selected, is
 (A) $\frac{1}{5}$ (B) $\frac{4}{5}$ (C) $\frac{2}{5}$ (D) $\frac{3}{5}$
55. If a, b, c are the roots of the equation $7x^3 - 25x + 42 = 0$, then the value of the expression $(a+b)^3 + (b+c)^3 + (c+a)^3$ is
 (A) -18 (B) -12 (C) 12 (D) 18
56. Value of the expression $\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots \infty}}}}$ is
 (A) -1 (B) 2 (C) 3 (D) None of these
57. If $25a^2 + 16b^2 - 40ab - c^2 = 0$; then line $2ax + by + c = 0$ passes through fixed points. One of these points is ?
 (A) $\left(\frac{5}{2}, +4\right)$ (B) $\left(\frac{5}{2}, -4\right)$ (C) $\left(-\frac{5}{2}, -4\right)$ (D) $(5, -4)$

Space for rough use

58. t_1 and t_2 are two points on the parabola $y^2 = 4ax$. If the focal chord joining them coincides with the normal chord, then
 (A) $t_1(t_1 + t_2) + 2 = 0$ (B) $t_1 + t_2 = 0$
 (C) $t_1t_2 = -1$ (D) None of these
59. Two mutually perpendicular tangents of the parabola $y^2 = 4ax$ meet the parabola at P_1 and P_2 . If S is the focus of the parabola, then $\frac{1}{(SP_1)} + \frac{1}{(SP_2)}$ is equal to
 (A) $\frac{4}{a}$ (B) $\frac{2}{a}$ (C) $\frac{1}{a}$ (D) $\frac{1}{4a}$
60. Let P be the point $(-1, 0)$ and Q a point on $y^2 = 16x$, then the locus of mid point of PQ is
 (A) $y^2 = x + 4$ (B) $y^2 = x - 4$ (C) $y^2 = 8x + 4$ (D) $y^2 = 8x - 4$

Biology

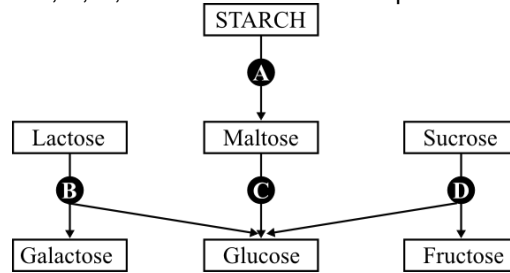
61. The classification of plants on the basis of its secondary metabolites would be
 (A) Alpha taxonomy (B) Beta taxonomy (C) New systematics (D) Chemotaxonomy
62. Which one of the following have the highest number of species in nature ?
 (A) Fungi (B) Insects (C) Birds (D) Angiosperms
63. The gymnosperm which shows the presence of mycorrhiza is
 (A) *Gnetum* (B) *Cordaites* (C) *Pinus* (D) *Cycas*
64. Ergot of rye is caused by
 (A) *Erysiphe* (B) *Claviceps* (C) *Ustilago* (D) *Puccinia*
65. The virus with cubical symmetry is
 (A) TMV (B) Influenza virus
 (C) T_2 phage (D) Turnip Mosaic Virus
66. Negatively geotropic roots for gaseous exchange occur in
 (A) *Vanda* (B) *Heritiera* (C) *Ficus* (D) *Cuscuta*
67. Mark the correct statement.
 (A) The gynoecium occupies the highest position in perigynous flowers.
 (B) Cucumber has inferior ovary.
 (C) Marginal placentation occurs in China rose
 (D) Lemon has parietal placentation

Space for rough use

68. Sunken stomata are found in -
(A) *Eucalyptus* (B) *Azadirachta* (C) *Cycas* (D) *Vinca*
69. Transpiration is reduced in *Opuntia* by the formation of -
(A) Nodes (B) Internodes
(C) Flat, fleshy structures (D) Spines / scales
70. Epithelial tissues lie on the basement membrane. Which is made up of
(A) Basal lamina composed of glycoproteins
(B) Fibrous lamina composed of collagen or reticular fibres suspended in mucopolysaccharide of underlying connective tissue
(C) Both (A) and (B)
(D) Cellular layer
71. Erythropoiesis in the foetus occurs in
(A) Spleen (B) Liver (C) Both (A) and (B) (D) Bone marrow
72. Covering of striped muscle
(A) Epimysium (B) Perimysium (C) Endomysium (D) Plasma lemma
73. Which of the following is a matching set of phylum and its 3 examples;
(A) Porifera - spongilla, Euplectella, Pennatula.
(B) Cnidaria - Pleurobrachia, Physalia, Aurelia.
(C) Platyhelminthes - Planaria, Schistosoma, enterobeous.
(D) Mollusc - Loligo, Octopus, Sepia.
74. The adhesive pads (soft pads) present in the legs of cockroach are;
(A) Galea (B) Lacinea (C) Glossa (D) Plantula
75. In cockroach, stink gland is found in
(A) 5th & 6th segment (B) 7th & 8th segment
(C) 6th & 7th segment (D) 2nd & 3rd segment
76. At junction of midgut and hindgut is present following organ/organs:
(A) Hepatic caecae (B) Malpighian tubules
(C) Both A & B (D) Gizzard
77. Succus entericus contains following enzymes, except:
(A) Amylase (B) Maltase (C) Sucrase (D) Lactase

Space for rough use

78. The following is the scheme showing the fate of carbohydrate during digestion in human alimentary canal. Identify the enzymes acting at stages indicated as A, B, C, D. Choose the correct options from given below:



- (A) A - amylase, B - lactase, C - invertase, D - maltase
 (B) A - amylase, B - lactase, C - maltase, D - invertase
 (C) A - lactase, B - amylase, C - maltase, D - invertase
 (D) A - lactase, B - amylase, C - invertase, D - maltase
79. Contraction of which of the following muscles helps to increase the volume of the thoracic cavity:
- (A) Diaphragm and external intercostal muscles
 (B) Diaphragm and internal intercostal muscles
 (C) External and internal intercostal muscles
 (D) Diaphragm and abdominal muscles
80. Which of the following does not apply to the air that reaches into the lungs, when compared with the air of the atmosphere?
- (A) Its temperature is equal to that of the body's temperature
 (B) It contains large amount of oxygen as compared to the blood reaching the lungs
 (C) It is quiet dry
 (D) It is moist

Space for rough use



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Rao Intelligence Search Exam 2019

Std- XI / Sample Paper

ANSWERKEY

- | | | | |
|-------|-------|-------|-------|
| 1. C | 2. D | 3. A | 4. D |
| 5. B | 6. C | 7. C | 8. A |
| 9. B | 10. D | 11. C | 12. A |
| 13. A | 14. C | 15. D | 16. B |
| 17. D | 18. C | 19. A | 20. D |
| 21. A | 22. D | 23. B | 24. C |
| 25. D | 26. D | 27. B | 28. A |
| 29. D | 30. C | 31. C | 32. C |
| 33. B | 34. D | 35. C | 36. A |
| 37. B | 38. A | 39. B | 40. D |
| 41. D | 42. A | 43. B | 44. A |
| 45. B | 46. D | 47. A | 48. B |
| 49. C | 50. D | 51. D | 52. B |
| 53. D | 54. B | 55. D | 56. B |
| 57. B | 58. D | 59. C | 60. C |
| 61. D | 62. B | 63. C | 64. B |
| 65. D | 66. B | 67. B | 68. C |
| 69. D | 70. C | 71. C | 72. A |
| 73. D | 74. D | 75. A | 76. B |
| 77. A | 78. B | 79. A | 80. C |