

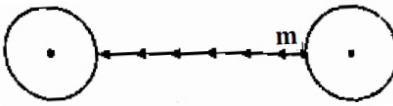


BSF Head Constable (RO) 2016 (English)

1. A given quantity of an ideal gas is at pressure P and absolute temperature T. The isothermal bulk modulus of the gas is
 - (a) $\frac{2}{3} P$
 - (b) P
 - (c) $\frac{3}{2} P$
 - (d) 2 P
2. A closed organ pipe and an open organ pipe of same length produce four beats in their fundamental mode when sounded together. If length of the open organ pipe is increases, then the number of beats will
 - (a) Increase
 - (b) Decrease
 - (c) Remain constant
 - (d) may increase or decrease
3. A source of sound of frequency 600 Hz is placed inside water. The speed of sound in water is 1500 m/s and in air it is 300 m/s. The frequency of sound recorded by an observer who is standing in air is
 - (a) 200 Hz
 - (b) 3000 Hz
 - (c) 120 Hz
 - (d) 600 Hz
4. Two sound waves move in the same direction. If the average power transmitted across a cross-section by them are equal while their wavelengths are in the ratio of 1 : 2. Their pressure amplitudes would be in the ratio of
 - (a) 1
 - (b) 2 m
 - (c) 4
 - (d) $\frac{1}{2}$
5. In the process $PV = \text{constant}$, pressure (P) versus density (ρ) graph of an ideal gas is
 - (a) a straight line parallel to P-axis
 - (b) a straight line parallel to ρ -axis
 - (c) a straight line passing through origin
 - (d) a parabola
6. The quantity $\frac{pV}{kT}$ ($k = \text{Boltzmann's constant}$) represents
 - (a) number of moles of the gas
 - (b) total mass of the gas
 - (c) number of molecules in the gas
 - (d) density of the gas
7. How much heat energy should be added to a mixture of 10g of hydrogen and 40 g of He to change the temperature by 50°C kept in a closed vessel?
 - (a) 2500 cal
 - (b) 2750 cal
 - (c) 2000 cal
 - (d) None of these
8. A hollow convex lens of glass will behave like a
 - (a) convex lens
 - (b) concave lens
 - (c) glass plate
 - (d) mirror
9. Angle of minimum deviation is equal to the angle of prism A of an equilateral glass prism. The angle of incidence at which minimum deviation will be obtained is
 - (a) 60°
 - (b) 30°
 - (c) 45°
 - (d) $\sin^{-1}(2/3)$
10. In the given network, the equivalent resistance between A and B is

 - (a) 6 Ω
 - (b) 16 Ω
 - (c) 7 Ω
 - (d) 5 Ω
11. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of
 - (a) each of them increases
 - (b) each of them decreases
 - (c) copper increases and germanium decreases
 - (d) copper decreases and germanium increases
12. The minimum electrostatic force between two charged particles placed at a distance of 1 m is
 - (a) $2.3 \times 10^{-28} \text{ N}$
 - (b) $6.2 \times 10^{-34} \text{ N}$
 - (c) $1.02 \times 10^{-26} \text{ N}$
 - (d) $4.2 \times 10^{-27} \text{ N}$
13. A capacitor is connected to a battery. The force of attraction between the plates when the separation between them is halved
 - (a) remains the same
 - (b) becomes eight times
 - (c) becomes four times
 - (d) becomes two times
14. A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium if q is equal to
 - (a) $-\frac{Q}{2}$
 - (b) $-\frac{Q}{4}$
 - (c) $+\frac{Q}{4}$
 - (d) $+\frac{Q}{2}$
15. A copper wire of diameter 1.6 mm carries a current i. The maximum magnetic field due to this wire is $5 \times 10^{-3} \text{ T}$. The value of I is
 - (a) 40A
 - (b) 5A
 - (c) 20A
 - (d) 2A

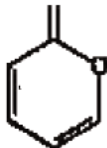
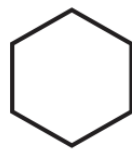
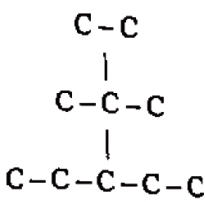


16. A man weighing 70 kg is coming down in a lift. If the cable of the lift breaks suddenly, the weight of the man would become.
 (a) 70 kg (b) 35 kg
 (c) 140 kg (d) Zero
17. The S.I. Unit of acceleration is
 (a) ms^{-1} (b) ms^{-2}
 (c) cms^{-2} (d) kms^{-2}
18. Two particles are released from the same height at an interval of 1s. how long after the first particle begins to fall will the two particles be 10 m apart? ($g = 10 \text{ m/s}^2$)
 (a) 1.5 s (b) 2 s
 (c) 1.25 s (d) 2.5 s
19. A 15g ball is shot from a spring gun whose spring has a force constant of 600 N/m. The spring is compressed by 5 cm. The greatest possible horizontal range of the ball for this compression is ($g = 10 \text{ m/s}^2$)
 (a) 6.0 m (b) 12.0 m
 (c) 10.0 m (d) 8.0 m
20. Kinetic energy of a particle moving in a straight line varies with time t as $K = 4t^2$. The force acting on the particle
 (a) is constant
 (b) is increasing
 (c) is decreasing
 (d) first increases and then decreases
21. A particle of mass 1 kg is projected at an angle of 30° with horizontal velocity $v = 40 \text{ m/s}$. The change in linear momentum of the particle after time = 1 s will be ($g = 10 \text{ m/s}^2$)
 (a) 7.5 kg-m/s (b) 15 kg-m/s
 (c) 10 kg-m/s (d) 20 kg-m/s
22. A particle moves in a circle with constant angular velocity ω about a point P on its circumference. The angular velocity of the particle about the center C of the circle is
 (a) 2ω (b) $\frac{\omega}{2}$
 (c) ω (d) Not constant
23. A particle on earth's surface is given a velocity equal to its escape velocity. Its total mechanical energy will be.
 (a) Negative (b) Positive
 (c) Zero (d) Infinite
24. A planet has a mass of eight times the mass of earth and density is also equal to eight times the average density of the earth. If g be the acceleration due to earth's gravity on its surface, then acceleration due to gravity on planet's surface will be
 (a) $2g$ (b) $4g$
 (c) $8g$ (d) $16g$
25. Two identical spherical masses are kept at some distance as shown. Potential energy when a mass m is taken from surface of one sphere to the other
- 
- (a) increases continuously
 (b) decreases continuously
 (c) first increases then decreases
 (d) first decreases then increases
26. If a, b, c are different and $\begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0$ then x is equal to
 (a) a (b) b
 (c) c (d) 0
27. The number of 3×3 non-singular matrices with four entries as 1 and all other entries as 0 is
 (a) <4 (b) 5
 (c) 6 (d) at least 7
28. The value of $\cos 10^\circ - \sin 10^\circ$ is
 (a) positive (b) negative
 (c) 0 (d) 1
29. Which of the following is correct?
 (a) $\sin 1^\circ > \sin 1$ (b) $\sin 1^\circ < \sin 1$
 (c) $\sin 1^\circ = \sin 1$ (d) $\sin 1^\circ = \frac{\pi}{180} \sin 1$
30. The value of $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$ is equal to
 (a) $-3/16$ (b) $5/16$
 (c) $3/16$ (d) $-5/16$
31. At a point 15 metres away from the base of a 15 metres high house, the angle of elevation of the top is
 (a) 45° (b) 30°
 (c) 60° (d) 90°
32. In an isosceles triangle of which one angle 120° , circle of radius $\sqrt{3}$ is inscribed, then the area of the triangle is:
 (a) 4π sq. units (b) $(12 - 7\sqrt{3})$ sq. unit
 (c) $(12 + 7\sqrt{3})$ sq. units (d) $(7 + 12\sqrt{3})$ sq. units



33. $\int \frac{e^x(1+\sin x)}{(1+\cos x)} dx$ is equal to
 (a) $\log \tan x$ (b) $e^x \tan(x/2)$
 (c) $\sin \log x$ (d) $e^x \cot x$
34. The value of $\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{(\sin x)+\sqrt{(\cos x)}}} dx$ is
 (a) 0 (b) $\pi/2$
 (c) $\pi/4$ (d) None of these
35. Solution of the differential equation $\cos x dy = y(\sin x - y)dx, 0 < x < \frac{\pi}{2}$ is
 (a) $\sec x = (\tan x + c)y$ (b) $y \sec x = \tan x + c$
 (c) $y \tan x = \sec x + c$ (d) $\tan x = (\sec x + c)y$
36. A sample of 35 observations has the mean 80 and s.d. 4. A second sample of 65 observations from the same population has mean 70 and s.d. 3. The s.d. of the combined sample is
 (a) 5.85 (b) 37.2
 (c) 5.58 (d) none of these
37. If the average of the number, 1, 2, 3, ... 98, 99, x is $100x$ then the value of x is
 (a) $\frac{51}{100}$ (b) $\frac{50}{99}$
 (c) $\frac{50}{101}$ (d) $\frac{51}{99}$
38. An aeroplane is flying horizontally with a velocity of 600 km/h and at a height of 1960 m. When it is vertically at a point A on the ground a bomb is released from it. The bomb strikes the ground at point B. The distance AB is
 (a) 1200 m (b) 0.33 km
 (c) 3.33 km (d) 33 km
39. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 100 m high, the distance between the two ships is:
 (a) 173 m (b) 200 m
 (c) 273 m (d) 300 m
40. The angle of elevation of the sun, when the length of the shadow of a tree 3 times the height of the tree, is:
 (a) 30° (b) 45°
 (c) 60° (d) 90°
41. The ratio between the length and the breadth of a rectangular park is 3 : 2. If a man cycling along the boundary of the park at the speed of 12 km/hr completes one round in 8 minutes, then the area of the park (in sq. m) is:
 (a) 15360 (b) 153600
 (c) 30720 (d) 307200
42. $(935421 \times 625) = ?$
 (a) 575648125 (b) 584638125
 (c) 584649125 (d) 585628125
43. The distance between the point P (2m, 3, 4m) and the x-axis is
 (a) $\sqrt{29}$ m (b) 5 m
 (c) $\sqrt{13}$ m (d) $\sqrt{20}$ m
44. The sum of 40 terms of an A.P. whose first term is 2 and common difference 4, will be
 (a) 3200 (b) 1600
 (c) 200 (d) 2800
45. If a, b, c, d are in H.P., then the value of $\left(\frac{1}{a^2} - \frac{1}{a^2}\right)\left(\frac{1}{b^2} - \frac{1}{c^2}\right)$ is
 (a) 1 (b) 2
 (c) 3 (d) 4
46. A person is to count 4500 currency notes. Let α_n denote the number of notes he counts and $\alpha_{10}, \alpha_{11}, \dots$ are in an A.P. with common difference 2 then the time taken by him to count all notes is
 (a) 24 minutes (b) 34 minutes
 (c) 125 minutes (d) 135 minutes
47. If 2, 3 be the roots of $2x^3 + mx^2 - 13x + n = 0$ then the values of m and n are respectively
 (a) -5, -30 (b) -5, 30
 (c) 5, 30 (d) none
48. The number of terms in the expansion of $(x + y + z)^{10}$ is
 (a) 11 (b) 33
 (c) 66 (d) None of these
49. If the coefficients of x^7 and x^8 in $\left(2 + \frac{x}{3}\right)^n$ are equal, then n is
 (a) 56 (b) 55
 (c) 45 (d) 15
50. If each element of a determinant of third order with value A is multiplied by 3, then the value of newly formed determinate is
 (a) 3A (b) 9A
 (c) 27A (d) none of these
51. The number of elements present in fifth period is:
 (a) 18 (b) 32
 (c) 8 (d) 24
52. Which of the following anion has the smallest radius?
 (a) H^- (b) F^-
 (c) Cl^- (d) Br^-



53. The correct order of increasing atomic radius of the following elements is:
 (a) $S < O < Se < C$ (b) $O < C < S < Se$
 (c) $O < S < Se < C$ (d) $C < O < S < Se$
54. Dipole moment of NF_3 is smaller than:
 (a) NH_3 (b) CO_2
 (c) BF_3 (d) CCl_4
55. Which of the following compounds has the lowest boiling point?
 (a) HF (b) HCl
 (c) HBr (d) HI
56. Solid NaCl is a bad conductor of electricity because:
 (a) in solid NaCl there are no ions
 (b) solid NaCl is covalent
 (c) in solid NaCl there is no mobility of ions
 (d) in solid NaCl there are no electrons
57. The most stable ion is:
 (a) $[Fe(C_2O_4)_3]^{3-}$ (b) $[Fe(CN)_6]^{3-}$
 (c) $[Fe(CN)_6]^{4-}$ (d) $[Fe(H_2O)_6]^{3+}$
58. Equal masses of oxygen, hydrogen and methane are kept under identical conditions. The ratio of the volumes of gases will be
 (a) 2 : 16 : 2 (b) 2 : 16 : 1
 (c) 1 : 16 : 2 (d) 1 : 1 : 1
59. $C_6H_5 - CO - CH_3$ represents
 (a) Acetone (b) Acetic acid
 (c) Acetophenone (d) Phenyl acetate
60. A gaseous oxide contains 30.4% of nitrogen, one molecule of which contains one nitrogen atom. The density of the oxide relative to oxygen is
 (a) 0.94 (b) 1.44
 (c) 1.50 (d) 3.0
61. How many grams are contained in 1 gram-atom of Na?
 (a) 13g (b) 23g
 (c) 1g (d) $\frac{1}{23}$ g
62. 5 moles of a gas in a closed vessel was heated from 300 K to 600 K. The pressure of the gas doubled. The number of moles of the gas will be
 (a) 5 (b) 2.5
 (c) 10 (d) 20
63. 2.76 g of silver carbonate on being strongly heated yields a residue weighing
 (a) 2.16 g (b) 2.48 g
 (c) 2.32 g (d) 2.64 g
64. For the reaction $A+2B \rightarrow C$, 5 moles of A and 8 moles of B will produce
 (a) 5 moles of C (b) 4 moles of C
 (c) 8 moles of C (d) 13 moles of C
65. The time required for a current of 3 amp to decompose electrolytically 18g of H_2O is
 (a) 18 hours (b) 36 hours
 (c) 9 hours (d) 18 seconds
66. The maximum number of covalent formed by nitrogen is
 (a) 1 (b) 2
 (c) 3 (d) 4
67. The molecular formula of phosphorous is
 (a) P_1 (b) P_2
 (c) P_3 (d) P_4
68. How many pi (π) electrons are there in the following molecule?

 (a) 4 (b) 6
 (c) 8 (d) 10
69. In homologous series, the molecular mass of two consecutive members differ by:
 (a) 12 (b) 13
 (c) 14 (d) 15
70. How many σ - bonds are present in the given compound?

 (a) 6 (b) 12
 (c) 18 (d) 24
71. How many carbons are present in longest carbon chain of given compound?

 (a) 4 (b) 5
 (c) 6 (d) 7



72. Which is the strongest base?
 (a) LiOH (b) CH₃Li
 (c) LiNH₂ (d) LiF
73. Which of the following is strongest acid?
 (a) CH₃NH (b) CH₃OH
 (c) CH₃SH (d) CH₃Cl
74. Rank the following compound in order of increasing acidic strength:
 (i) CH₃OH
 (ii) CH₃ - NH₂
 (iii) CH₃ - CH₃
 (a) i < ii < iii (b) ii < i < iii
 (c) i < iii < ii (d) ii < i < iii
75. The most electropositive element possesses the electronic configuration:
 (a) [He]2S¹ (b) [Ne]3s²
 (c) [Xe]6s¹ (d) [Xe]6s²
76. Choose antonym of "COMMISSIONED"
 (a) Started (b) Closed
 (c) Finished (d) Terminated
- Directions:** I felt the wall of the tunnel shiver. The master alarm squeal through my earphones. Almost simultaneously, Jack yelled down to me that there was a warning light on. Fleeting but spectacular sights snapped into and out of view, the snow, the shower of debris, the moon, looming close and big, the dazzling sunshine for once unfiltered by layers of air. The last twelve hours before re-entry were particular bone-chilling. During this period, I had to go up in to command module. Even after the fiery re-entry splashing down in 81° water in south pacific, we could still see our frosty breath inside the command module.
77. The word 'Command Module' used twice in the given passage indicates perhaps that it deals with
 (a) an alarming journey
 (b) a commanding situation
 (c) a journey into outer space
 (d) a frightful battle.
78. Which one of the following reasons would one consider as more as possible for the warning lights to be on?
 (a) There was a shower of debris.
 (b) Jack was yelling.
 (c) A catastrophe was imminent.
 (d) The moon was looming close and big.
79. The statement that the dazzling sunshine was "for once unfiltered by layers of air" means
 (a) that the sun was very hot
 (b) that there was no strong wind
 (c) that the air was unpolluted
 (d) none of above

80. Choose Synonym of "BRIEF"
 (a) Limited (b) Small
 (c) Little (d) Short
81. Choose Synonym of "AUGUST"
 (a) Common (b) Ridiculous
 (c) Dignified (d) Petty
82. Arrange right sentence
 1. left 2. the
 3. House 4. he
 5. suddenly
 (a) 12345 (b) 21354
 (c) 45123 (d) 52341
83. Arrange right sentence
 1. tea 2. have
 3. That 4. some
 5. before
 (a) 43251 (b) 24315
 (c) 24153 (d) 52431
84. A person pretending to be somebody he is not
 (a) Magician (b) Rogue
 (c) Liar (d) Imposter
85. Correct the Sentence
 The small child does whatever his father was done.
 (a) has done (b) did
 (c) does (d) had done
86. I need not offer any explanation regarding this incident - my behaviour is speaking itself.
 (a) will speak to itself (b) speaks for itself
 (c) has been speaking (d) speaks about itself
87. Rabindranath Tagore's 'Jana Gana Mana' has been adopted as India's National Anthem. How many stanzas of the said song were adopted?
 (a) Only the first stanza
 (b) The whole song
 (c) Third and Fourth stanza
 (d) First and Second stanza
88. Choose best course of Action:
Statement: Severe drought is reported to have set in several parts of the country.
Courses of Action:
 (I) Government should immediately make arrangement for providing financial assistance to those affected.
 (II) Food, water and fodder should immediately be sent to all these areas to save the people and cattle.
 (a) Only I follows (b) Only II follows
 (c) Either I or II follows (d) Neither I nor II follows



89. In the last one decade, which one among the following sectors has attracted the highest foreign direct investment inflows into India?
(a) Chemicals other than fertilizers
(b) Services sector
(c) Food processing
(d) Telecommunication
90. The present Lok Sabha is the
(a) 13th Lok Sabha (b) 14th Lok Sabha
(c) 15th Lok Sabha (d) 16th Lok Sabha
91. The members of the Rajya Sabha are elected for a term.
(a) of six years
(b) determined by the state legislative assembly of a state
(c) of four years
(d) None of the above
92. Which of the following is NOT written by Munshi Premchand?
(a) Gaban (b) Godan
(c) Guide (d) Mansarovar
93. The refineries at Mathura, Digboi and Panipat are set up by
(a) Indian Oil Corporation Ltd.
(b) Hindustan Petroleum Corporation Ltd.
(c) Bharat Petroleum Corporation Ltd.
(d) Crude Distillation unit of Madras Refineries Ltd.
94. The Radcliffe line is a boundary between
(a) India and Pakistan (b) India and China
(c) India and Myanmar (d) India and Afghanistan
95. The mass number of an atom is equal to
(a) the number of protons
(b) the number of protons and electrons
(c) the number of nucleons
(d) the number of neutrons
96. The metal that is usually extracted from sea water is
(a) Ca (b) Na
(c) K (d) Mg
97. The inert gases are _____ in water
(a) sparingly soluble (b) insoluble
(c) soluble (d) None of these
98. The names of the scientists, Newlands, Mendeleev, and Meyer are associated with the development of
(a) atomic structure
(b) Metallurgy
(c) periodic table of contents
(d) discovery of elements
99. Rain is falling vertically downwards. To a man running eastwards, the rain will appear to be coming from
(a) east (b) west
(c) northeast (d) southeast
100. Natural radioactivity was discovered by
(a) Marie Curie (b) Ernest Rutherford
(c) Henri Becquerel (d) Enrico Fermi

Solutions

- S1. Ans.(b)
S2. Ans.(b)
S3. Ans.(d)
S4. Ans.(a)
S5. Ans.(c)
S6. Ans.(c)
S7. Ans.(b)
S8. Ans.(c)
S9. Ans.(a)
S10. Ans.(d)
S11. Ans.(d)
S12. Ans.(a)
S13. Ans.(c)
S14. Ans.(b)
S15. Ans.(c)
S16. Ans.(d)
S17. Ans.(b)
S18. Ans.(a)

- S19. Ans.(c)
S20. Ans.(a)
S21. Ans.(c)
S22. Ans.(a)
S23. Ans.(c)
S24. Ans.(c)
S25. Ans.(c)
S26. Ans.(d)
S27. Ans.(d)
S28. Ans.(a)
S29. Ans.(b)
S30. Ans.(c)
S31. Ans.(a)
S32. Ans.(c)
S33. Ans.(b)
S34. Ans.(c)
S35. Ans.(a)
S36. Ans.(a)



S37. Ans.(c)
S38. Ans.(c)
S39. Ans.(c)
S40. Ans.(a)
S41. Ans.(b)
S42. Ans.(b)
S43. Ans.(b)
S44. Ans.(a)
S45. Ans.(c)
S46. Ans.(b)
S47. Ans.(b)
S48. Ans.(c)
S49. Ans.(b)
S50. Ans.(c)
S51. Ans.(a)
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S53. Ans.(a)
S54. Ans.(b)
S55. Ans.(b)
S56. Ans.(c)
S57. Ans.(c)
S58. Ans.(c)
S59. Ans.(b)
S60. Ans.(b)
S61. Ans.(a)
S62. Ans.(a)
S63. Ans.(b)
S64. Ans.(a)
S65. Ans.(c)
S66. Ans.(d)
S67. Ans.(c)
S68. Ans.(c)

S69. Ans.(b)
S70. Ans.(d)
S71. Ans.(b)
S72. Ans.(c)
S73. Ans.(c)
S74. Ans.(b)
S75. Ans.(b)
S76. Ans.(d)
S77. Ans.(c)
S78. Ans.(c)
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S80. Ans.(d)
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S87. Ans.(a)
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S89. Ans.(b)
S90. Ans.(d)
S91. Ans.(a)
S92. Ans.(c)
S93. Ans.(a)
S94. Ans.(d)
S95. Ans.(c)
S96. Ans.(d)
S97. Ans.(a)
S98. Ans.(c)
S99. Ans.(a)
S100. Ans.(c)