Bitsat–Pilani
Entrance exam
Model Paper–1

PHYSICS

1. Mercury thermometer can be used to measure temperature upto :
   (a) 50°C
   (b) 150°C
   (c) 250°C
   (d) 357°C

2. When a gas filled in a closed vessel is heated upto 1°C, it increases by 0.4%. The initial temperature of the gas was :
   (a) 25°C
   (b) 250°C
   (c) 250°K
   (d) 350°K

3. Water is flowing through a horizontal pipe of non-uniform cross-section. At the extreme narrow portion of the pipe. The water will have :
   (a) maximum speed and least pressure
   (b) maximum pressure and maximum speed
   (c) both pressure and speed maximum
   (d) both pressure and speed least

4. The side of an equilateral triangle ABC is a. Equal charges $+q$ are placed at point A and B. The magnitude of electric field at point C will be :
   (a) $\dfrac{q}{4\pi\varepsilon_0 a^2}$
   (b) $\dfrac{\sqrt{2}q}{4\pi\varepsilon_0 a^2}$
   (c) $\dfrac{\sqrt{3}q}{4\pi\varepsilon_0 a^2}$
   (d) $\dfrac{q}{4\pi\varepsilon_0 a^2}$

5. 80 g of water at 30°C is poured on a large block of ice at 0°C. The mass of the ice that melts is :
   (a) 160 g
   (b) 80 g
   (c) 40 g
   (d) 30 g

6. The root mean square velocity of molecules in a sample of helium is $\dfrac{5}{7}$th that of the molecules in a sample of hydrogen. If the temperature of hydrogen sample is 0°C. Then the temperature of helium sample is about :
   (a) 0°C
   (b) 283°K
   (c) 5.6°K
   (d) 100°C

7. At which of the following temperature, the molecules of a gas have twice the average kinetic energy of molecules at 20°C :
   (a) 313°C
   (b) 373°C
   (c) 393°C
   (d) 586°C

8. The first law of thermodynamics is conserved with the conservation of :
   (a) number of mole
   (b) energy
   (c) temperature
   (d) number of molecules

9. Find the change in internal energy of the system when a system absorbs 2 kcal of heat and at the same time does 500 J of work :
   (a) 7900 J
   (b) 8200 J
   (c) 5600 J
   (d) 6400 J

10. Two plane mirrors are inclined at an angle of 45° to each other. If an object is placed in between them, the number of images formed is :
    (a) 4
    (b) 5
    (c) 6
    (d) 7

11. The angle of prism is 6° and its refractive index for green light is 1.5. For a green ray passes through it, the deviation will be :
(a) 30°   (b) 25°
(c) 12°   (d) 3°

12. If the critical angle for total internal reflection from a medium to vacuum is 30°, the velocity of light in the medium is :
(a) 3×10^8 m/s   (b) 1.5×10^8 m/s
(c) 6×10^8 m/s   (d) 2.4×10^8 m/s

13. The equivalent focal length of the two lenses in contact is 80 cm. If the focal length of one of the lenses is 20 cm. The power of the second lens is :
(a) 1.66 D   (b) 3.75 D
(c) – 3.75 D   (d) – 1.66 D

14. Inverse square law for the illuminance is valid for :
(a) isotropic point source
(b) cylindrical source
(c) search light
(d) all type of sources

15. The focal lengths of objective and the eye-piece of compound microscope are f_o and f_e respectively. Then :
(a) $f_o > f_e$ (b) $f_o < f_e$
(c) $f_o = f_e$ (d) $f_o \neq f_e$

16. When a ray of white light enters from air into glass lens, then what remains unchanged ?
(a) Frequency only
(b) Frequency and speed both
(c) Wavelength and speed both
(d) Speed only

17. For a particular glass, the refractive index is 1.5. If the velocity of light in vacuum is c, its value in this glass will be :
(a) $\frac{c}{2}$ (b) c
(c) $\frac{2c}{3}$ (d) $\frac{4c}{5}$

18. The velocity of sound in air is not affected by change in :
(a) composition of air
(b) atmospheric pressure
(c) temperature of air
(d) moisture content of air

19. The following waves are respectively represented by $y = a \sin (\omega t - kx)$ and $y = b \cos (\omega t - kx)$. The phase difference between the two waves is :
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$
(c) π (d) $\frac{5\pi}{4}$

20. A star is moving away from the earth with a velocity of 10^5 m/s. The shift in the spectral line of wavelength 5700Å as observed on the earth, is :
(a) 1.90Å   (b) 1.06Å
(c) 0.75Å   (d) 0.53Å

21. The speed of sound in air is 333 m/s. The fundamental frequency of an open pipe is 333 Hz. The second overtone of the open organ pipe can be produced with a pipe of length :
(a) 0.5 m   (b) 1.0 m
(c) 1.5 m   (d) 2.0 m

22. The speed of sound in air is 350 m/s. The fundamental frequency of an open pipe 50 cm long will be :
(a) 50 Hz   (b) 175 Hz
(c) 350 Hz   (d) 770 Hz

23. The de-Broglie wavelength associated with an electron of energy 50 eV :
(a) 1.73Å   (b) 2.54Å
(c) 19.2Å   (d) 2.4Å

24. A condenser of capacitance 10 µF has been charged to 100V. It is now connected to another uncharged condenser in parallel. The common potential becomes 40V. The capacitance of another condenser is :
(a) 5 µF   (b) 10 µF
(c) 15 µF   (d) 20 µF

25. A battery of emf 10V and internal resistance 0.5 ohm is connected across a variable resistance R. The value R for which the power delivered in it is maximum, is :
    (a) 0.5 Ω (b) 1.0 Ω
    (c) 2 Ω (d) 40 Ω

26. The example of non-ohmic resistance is :
    (a) copper wire   (b) carbon resistance
    (c) diode   (d) tungsten wire

27. Two electric bulbs rated for the same voltage have powers of 200W and 100W. If their resistances are respectively R_1 and R_2. Then :
    (a) $R_1 = 2R_2$ (b) $R_2 = 2R_1$
    (c) $R_2 = 4R_1$ (d) $R_1 = 4R_2$

28. An ammeter should have very low resistance :
    (a) for large deflection
    (b) for better stability
    (c) so that it may not change the value of current by its presence
    (d) none of the above

29. Which one of the following is ferromagnetic ?
    (a) Gold   (b) Wood
    (c) Manganese   (d) Nickle

30. When the current changes from 2A to 4A in 0.05 second, an emf of 8 volt is induced in a coil. The coefficient of self inductance of the coil is :
    (a) 0.8 H   (b) 0.4 H
    (c) 0.2 H   (d) 0.1 H

31. The angular frequency of a resonant L-C combination ($L = 10$ mH and $C = 1.0$ μF) is :
    (a) 1.0×10^4 Hz
    (b) 1.0×10^4 rad per sec
    (c) 1.0×10^{-4} Hz
    (d) 1.0×10^{-4} rad per sec

32. An electron moving in a variable magnetic field B, having a variable linear velocity v, will remain rotating in a circle of constant radius r only, when :
    (a) B is held constant
    (b) v is held constant
    (c) v and B both are held constant
    (d) angular velocity is constant

33. In a full wave rectifier, current operating from 50 Hz mains frequency in the ripple would be :
    (a) 100 Hz   (b) 75 Hz
    (c) 50 Hz   (d) 25 Hz

34. The wavelength of most energetic X-ray emitted when a metal target is bombarded by a 40 kV electrons, is approximately :
    (a) 0.31Å   (b) 4 Å
    (c) 10 Å   (d) 300 Å

35. The temperature of a furnace is 2324°C and the intensity is maximum in its spectrum nearly at 12000Å. If the maximum intensity in the spectrum of a star is nearly at 4800Å. Then the surface temperature of the star is :
    (a) 8400°C   (b) 6500°C
    (c) 7200°C   (d) 5900°C

36. Electromagnetic waves of constant amplitude and high frequency are called :
    (a) audio waves
    (b) carrier waves
    (c) modulated waves
    (d) infra-red radiation

37. The energy of a hydrogen atom in its ground state is -13.6 eV. The energy of the level corresponding to the quantum number $n = 5$ is :
    (a) -5.40 eV   (b) -0.54 eV
    (c) -8.5 eV   (d) -2.72 eV

38. A photon of frequency v has a momentum associated with it. If c is the velocity of light, then momentum is :
    (a) $\dfrac{vh}{c}$ (b) $\dfrac{vh}{c^2}$
    (c) $\dfrac{vh}{c^3}$ (d) vhc

39. An electron is moving with a velocity equal to 99% of the velocity of light. Its mass is : (rest mass $= 9.1 \times 10^{-31}$ kg)
(a) 6.00×10^{-30} kg   (b) 6.5×10^{-30} kg
(c) 63×10^{-30} kg   (d) none of these

40. If the matter proton is completely converted into energy, it will be about :
(a) 9.31×10^3 MeV   (b) 1.0×10^3 MeV
(c) 931 MeV   (d) 1.0×10^3 MeV

CHEMISTRY

41. Which of the following statements is most appropriate about effective nuclear charge ? It depends upon :
(a) the atomic number
(b) the shielding constant
(c) the charge on nucleus
(d) both the nuclear charge and the shielding constant

42. The pK_a of an acid having ionisation constant 1×10^{-5} is :
(a) 9   (b) -9
(c) 5   (d) -5

43. The hydogen phosphate of certain metal has formula $MHPO_4$ the formula of metal chloride would be :
(a) MCl_2 (b) MCl_3
(c) MCl (d) M_2Cl_2

44. In a homonuclear molecule which of following sets of orbitals are degenerate :
(a) $\sigma\, 2p_z$ and $\pi\, 2p_x$ (b) $\pi\, 2p_z$ and $\sigma\, 2p_z$
(c) $\pi\, 2p_z$ and $\pi\, 2p_y$ (d) $\sigma\, 2s$ and $\sigma\, 1s$

45. For a reaction,
$$M^{x+} + MnO_4^- \rightarrow MO_3^- + Mn^{2+} + 1/2\, O_2,$$
If 1 mole of MnO_4^- oxidises $1\cdot67$ moles of M^{x+} to MO_3^-, the value of x in the reaction is :
(a) 1   (b) 5
(c) 3   (d) 2

46. According to MOT, the species O_2^+ possess
(a) stability lower than O_2 :
(b) three unpaired electrons
(c) bond order of $2\cdot5$
(d) diamagnetic character

47. If $0\cdot3$ mole of $BaCl_2$ mixed with $0\cdot2$ mole of Na_3PO_4. The maximum number of mole of $Ba_3(PO_4)_2$ that can be formed is :
(a) $0\cdot10$ (b) $0\cdot30$
(c) $0\cdot5$ (d) $0\cdot7$

48. The heat of formation of the compound in the following reaction is $H_2(g) + Cl_2(g) \rightarrow 2HCl(g) + 44kcal$:
(a) -22 kcal mol^{-1}
(b) -88 kcal mol^{-1}
(c) -44 kcal mol^{-1}
(d) 11 kcal mol^{-1}

49. Which of follwing is true for a reaction,
$$H_2O(l) \rightleftharpoons H_2O(g)$$
at 100^0C, 1 atmospheric pressure ?
(a) $\Delta E = 0$ (b) $\Delta H = T\,\Delta S$
(c) $\Delta H = \Delta E$ (d) $\Delta H = 0$

50. When sodium acetate is added to an aqueous solution of acetic acid :
(a) the pH of the solution decreases.
(b) the pH of the solution increases.
(c) The pH of the solution remain unchanged.
(d) An acid salt is produced.

51. The amount of $KMnO_4$ required to prepare 100 mL of $0\cdot1$N solution in alkaline medium is :
(a) $3\cdot16$g   (b) $0\cdot31$g
(c) $0\cdot52$g   (d) $1\cdot58$g

52. Which of the following is most soluble ?
(a) Ag_2S ($K_{sp} = 6 \times 10^{-51}$)
(b) MnS ($K_{sp} = 7 \times 10^{-16}$)
(c) CuS ($K_{sp} = 8 \times 10^{-37}$)
(d) Bi_2S_3 ($K_{sp} = 1 \times 10^{-10}$)

69. Reducing property of SO_2 is shown in the reaction :
    (a) $3Fe + SO_2 \rightarrow 2FeO + FeS$
    (b) $2H_2S + SO_2 \rightarrow 3S + 2H_2O$
    (c) $I_2 + SO_2 + 2H_2O \rightarrow SO_4^{2-} + 2I^- + 4H^+$
    (d) none of the above

70. Iodine is liberated from KI solution when treated with :
    (a) $CuSO_4$ (b) $NiSO_4$
    (c) $ZnSO_4$ (d) $FeSO_4$

71. The principal constituent of pyrex glass is :
    (a) Cl   (b) Pb
    (c) B   (d) Zn

72. 20 volume of H_2O_2 solution has a strength of about :
    (a) 30%   (b) 10%
    (c) 6%   (d) 3%

73. The substance which is added to ore in order to remove impurities during smelting is known as :
    (a) Catalyst   (b) Gangue
    (c) Flux   (d) Slag

74. Semi water gas is :
    (a) $CO + H_2 + N_2$ (b) $CO + H_2$
    (c) $CO + N_2$ (d) None

75. The formula of Plaster of Paris is :
    (a) $CaSO_4 \cdot H_2O$ (b) $CaSO_4$
    (c) $CaSO_4 \cdot 2H_2O$ (d) $2CaSO_4 \cdot H_2O$

76. Which of the following is not a drying and dehydrating agent ?
    (a) P_2O_5 (b) Silica gel
    (c) Hydrated $CaCl_2$ (d) Conc. H_2SO_4

77. The chemical formula for lunar caustic is :
    (a) Ag_2S (b) Ag_2SO_4
    (c) $AgNO_3$ (d) $AgCl$

78. The complex $[Cr(H_2O)_4Br_2]Cl$ gives the test for :
    (a) Br^- (b) Cl^-
    (c) Cr^{3+} (d) Br^- and Cl^- both

79. The highest oxidation state shown by manganese is :
    (a) $+3$ (b) $+2$
    (c) $+4$ (d) $+7$

80. The IUPAC name of the compound is CH_2—CH_2—CH_2 is :
    $\quad\;\;|\qquad\;\;|\qquad\;\;|$
    $\quad CN\quad CN\quad CN$
    (a) 1,2,3-tri cyano propane
    (b) 3-cyano pentane-1,5 dinitrile
    (c) 1,2,3-cyano propane
    (d) 1,2,3-propane tri nitrile.

MATHEMATICS

81. Let $|\vec{a}| = 3$ and $|\vec{b}| = 4$, then the value of λ for which $\vec{a} + \lambda\vec{b}$ and $\vec{a} - \lambda\vec{b}$ are perpendicular is given by :
    (a) $-\dfrac{3}{5}$ (b) $\dfrac{2}{3}$
    (c) $-\dfrac{2}{3}$ (d) $\pm\dfrac{3}{4}$

82. The value of the determinant $\begin{vmatrix} \sec x & \tan x \\ \tan x & \sec x \end{vmatrix}$ is equal to :
    (a) 1   (b) 0
    (c) ∞ (d) none of these

83. Let $A = \{a, b, c\}$, $B = \{a, b\}$, $C = \{a, b, d\}$ $D = \{c, d\}$, and $E = \{d\}$. Then which statement is not correct ?
    (a) $D \subseteq B$ (b) $B \subseteq C$
    (c) $B \subseteq A$ (d) $D \supseteq E$

84. If $(\omega \ne 1)$ is a cube root of unity, and $(1 + \omega)^7 = A + B\omega$, then A and B are respectively the numbers :
    (a) $-1, 1$
    (b) $1, 0$
    (c) $1, 1$
    (d) $0, 1$

85. In decimal systems, the number $(11011101)_2$ is equivalent to :

  (a) 222   (b) 221

  (c) 2021   (d) none of these

86. If $y = \sin^{-1}(\cos x)$, then $\dfrac{dy}{dx}$ is equal to :

  (a) $\sin^2 x$ (b) $\sin x$

  (c) -1 (d) none of these

87. If $2x^{1/3} + 2x^{-1/3} = 5$, then x is equal to :

  (a) 8 or 1/8   (b) 4 or 1/4

  (c) 2 or 1/2   (d) 1 or –1

88. The value of determinant
$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix}$$ is equal to :

  (a) $-4a^2 b^2 c^2$ (b) $4a^2 b^2 c^2$

  (c) $-4ab$ (d) $4abc$

89. If $\vec{a}$ and $\vec{b}$ are any two vectors, then :

  (a) $|\vec{a} \times \vec{b}| < |\vec{a}|\,|\vec{b}|$

  (b) $|\vec{a} \times \vec{b}| > |\vec{a}|\,|\vec{b}|$

  (c) $|\vec{a} \times \vec{b}| \geq |\vec{a}|\,|\vec{b}|$

  (d) $|\vec{a} \times \vec{b}| \leq |\vec{a}|\,|\vec{b}|$

90. If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$, then :

  (a) $\rho(A) = 1$ (b) $\rho(A) = 2$

  (c) $\rho(A) = 3$ (d) none of these

91. The value of the integral
$$\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx \quad \text{or}$$
$$\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx \text{ is equal to:}$$

  (a) $\dfrac{\pi}{4}$ (b) $\dfrac{\pi}{2}$

  (c) $\dfrac{\pi}{6}$ (d) $\dfrac{\pi}{8}$

92. If the roots of the equation $\dfrac{a}{x-a} + \dfrac{b}{x-b} = 1$ are equal in magnitude

and opposite in sign, then :

  (a) $a + b = 0$ (b) $a - b = 1$

  (c) $a - b = 0$ (d) $a + b = 1$

93. If $y = \sin^{-1}\sqrt{1 - x} + \cos^{-1}\sqrt{x}$, then $\dfrac{dy}{dx}$ is equal to :

  (a) $\dfrac{-1}{\sqrt{x\,(1-x)}}$ (b) $\dfrac{1}{\sqrt{x\,(a+x)}}$

  (c) $\dfrac{1}{\sqrt{x\,(1-x)}}$ (d) none of these

94. The value of $\displaystyle\sum_{k=1}^{6}\left(\sin\frac{2\pi k}{7} - i\cos\frac{2\pi k}{7}\right)$ is :

  (a) $-i$ (b) i

  (c) 0   (d) -1

95. Everybody in a room shakes with everybody else. The total number of hand shakes is 91. Then total number of persons in the room are :

  (a) 16   (b) 15

  (c) 14   (d) 13

96. For a non-zero vector $\vec{a}$, the set of real number satisfying the inequality, $|(5 - x)\vec{a}| < |2\vec{a}|$ consists of all x such that :

  (a) $-7 < x < -3$ (b) $-7 < x < 3$

  (c) $0 < x < 3$ (d) $3 < x < 7$

97. If
$$[2\vec{a} + 4\vec{b},\ \vec{c},\ \vec{d}] = \lambda\,[\vec{a},\ \vec{c},\ \vec{d}] + \mu\,[\vec{b},\ \vec{c},\ \vec{d}],$$
then $\lambda + \mu$ is equal to :

  (a) -6 (b) 8

  (c) 6   (d) 10

98. If the A.M. between the roots of the equation is 8 and G.M. is 5, then the equation is :

  (a) $x^2 - 16x - 25 = 0$ (b) $x^2 - 16x + 25 = 0$

  (c) $x^2 - 8x + 5 = 0$ (d) $x^2 + 16x - 25 = 0$

99. If $\vec{a} + \vec{b} + \vec{c} = \alpha\vec{d}$, $\vec{b} + \vec{c} + \vec{d} = \beta\vec{a}$ and $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, then $\vec{a} + \vec{b} + \vec{c} + \vec{d}$ is equal to :

  (a) $\alpha\vec{a}$ (b) $\beta\vec{b}$

  (c) $\vec{0}$ (d) $(\alpha + \beta)\vec{c}$

100. Inverse of $\begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ is :

   (a) $\begin{bmatrix} -1 & 3 \\ 2 & -5 \end{bmatrix}$ (b) $\begin{bmatrix} -1 & 2 \\ 3 & -5 \end{bmatrix}$

   (c) $\begin{bmatrix} 2 & -3 \\ -1 & 5 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix}$

101. The solution set of the equation $\tan(\pi \tan x) = \cot(\pi \cot x)$ is :

   (a) $\{0\}$ (b) ϕ

   (c) $\{\pi/4\}$ (d) none of these

102. Two non-zero vectors $\vec{a}$ and $\vec{b}$ are perpendicular if $\vec{a} \cdot \vec{b}$ equals :

   (a) free vector   (b) zero vector

   (c) unit vector   (d) zero

103. The equation of the line passing through $(4, 5)$ and parallel to $2x - 3y = 5$ is :

   (a) $2x - 3y = -7$ (b) $2x + 3y = 23$

   (c) $2x - 3y = 5$ (d) $2x - 3y = 0$

104. The value of the integral $\int_{-\pi/4}^{\pi/4} \sin^{-4} x \, dx$ is equal to :

   (a) $3/2$ (b) $8/3$

   (c) $-8/3$ (d) none of these

105. The value of $\int_0^{1/2} \dfrac{dx}{\sqrt{1-x^{2n}}}$ is between :

   (a) $\dfrac{1}{2}$ and $\dfrac{\pi}{6}$

   (b) lies between 1 and $\dfrac{\pi}{3}$

   (c) $\dfrac{1}{2}$ and $\dfrac{\pi}{3}$

   (d) none of these

106. For non-zero real numbers x and y the equality $(x+y)^2 \sec^2 \theta = 4xy$ is possible only when :

   (a) $x - y = 0$ (b) $x + y = 0$

   (c) $x + y = 1$ (d) $x + y = -1$

107. The solution of the differential equation $x^2 \dfrac{dy}{dx} - xy = 1 + \cos \dfrac{y}{x}$ is :

   (a) $x^2 = (c + x)^2 = c + \dfrac{1}{x}$

   (b) $\cos \dfrac{y}{x} = 1 + \dfrac{c}{x}$

   (c) $\tan \dfrac{y}{x} = c + \dfrac{1}{x}$

   (d) $\tan \dfrac{y}{2x} = c - \dfrac{1}{2x^2}$

108. The period of the function $f(x) = \sin 2x$ is :

   (a) $3\pi/2$ (b) $\pi/2$

   (c) π (d) 2π

109. The maximum value of $\sin x + \cos x$ is :

   (a) $\dfrac{1}{\sqrt{2}}$ (b) $\sqrt{2}$

   (c) 2 (d) 1

110. The product of n positive integers is unity. Then their sum is :

   (a) divisible by n

   (b) a positive integer

   (c) never less than n

   (d) equal to $n + 1/n$

111. The condition that the roots of the equation $px^2 - px + q = 0$ are in the ratio $p : q \ [q \neq 0, p \neq 0]$ is :

   (a) $2p + q = 0$ (b) $p + q = 0$

   (c) $2p - q = 0$ (d) none of these

112. The number of different four digits numbers that can be formed with the digits 2, 3, 4, 5, 7 using each digit only once is :

   (a) $5\,!$ (b) $4\,!$

   (c) $4 \cdot (4\,!)$ (d) $5\,(7\,!)$

113. If the system of equations $x + ay + az = 0, bx + y + bz = 0, cx + cy + z = 0$ where a, b and c are non-zero and non-unity, has a non-trivial solution, then the value of $\dfrac{a}{1-a} + \dfrac{b}{1-b} + \dfrac{c}{1-c}$ is :

   (a) $\dfrac{abc}{a^2 + b^2 + c^2}$ (b) -1

   (c) zero   (d) 1

114. The number of significant numbers which can be formed by using any number of digits 0, 1, 2, 3, 4 but using each not more than once in each number is :
   (a) 260   (b) 410
   (c) 356   (d) 96

115. If $x > 0$, then the sum of the series $e^{-x} - e^{-2x} + e^{-3x} \ldots \infty$ is :
   (a) $\dfrac{1}{1 + e^{-x}}$ (b) $\dfrac{1}{1 + e^{x}}$
   (c) $\dfrac{1}{1 - e^{-x}}$ (d) $\dfrac{1}{e^{x} - 1}$

116. The domain of definition of the function
   $$f(x) = x \, \frac{1 + 2\,(x + 4)^{-0.5}}{2 - (x + 4)^{0.5} + 5\,(x + 4)^{0.5}} + 5\,(x + 4)^{0.5}$$
   is :
   (a) R^{+} (b) R
   (c) $[-4, 4]$ (d) $(-4, 0) \cup (0, \infty)$

117. If $a_n = \dfrac{\Sigma\, n}{n!}$ then the sum of the series $\Sigma\, a_n$ is :
   (a) $\dfrac{3e}{2}$ (b) $\dfrac{e}{2}$
   (c) e^{-1} (d) 13

118. Two persons A and B throw a die alternately fill one of them gets a 'three' and wins the game. Find their respectively probabilities of winning, if A begins :
   (a) $\dfrac{1}{3}, \dfrac{2}{3}$ (b) $\dfrac{6}{11}, \dfrac{5}{11}$
   (c) $\dfrac{5}{11}, \dfrac{4}{11}$ (d) none of these

119. The angle θ between the line $\dfrac{x + 1}{3} = \dfrac{y - 1}{2} = \dfrac{z - 2}{4}$ and the plane $2x + y - 3z + 4 = 0$ is :
   (a) $\sin^{-1}\left(\dfrac{-4}{\sqrt{406}}\right)$ (b) $\cos^{-1}\left(\dfrac{-4}{\sqrt{406}}\right)$
   (c) $30°$ (d) none of these

120. The term independent of y in the expansion $(y^{1/6} - y^{1/3})^{9}$ is :
   (a) 8.4   (b) 84
   (c) -84 (d) -0.84

121. If x and y are two independent variables with means 5 and 10 and variances 4 and 9 respectively. If $u = 3x + 4y$ and $v = 3x - y$, then $r\,(u, v)$ is equal to :
   (a) 1
   (b) 0
   (c) $\dfrac{2}{3}$
   (d) none of the above

122. The sum of n terms of series
   $$\frac{1}{1^3} + \frac{1 + 2}{1^3 + 2^3} + \frac{1 + 2 + 3}{1^3 + 2^3 + 3^3} + \ldots \text{ is :}$$
   (a) $\dfrac{2n}{n + 1}$ (b) $\dfrac{2}{n\,(n + 1)}$
   (c) $\dfrac{n}{n + 1}$ (d) $\dfrac{n}{2\,(n + 1)}$

123. The weighted mean of first n natural numbers whose weights are equal to the squares of corresponding numbers is :
   (a) $\dfrac{n\,(n + 1)}{2}$ (b) $\dfrac{(n + 1)\,(2n + 1)}{6}$
   (c) $\dfrac{n + 1}{2}$ (d) $\dfrac{3n\,(n + 1)}{2\,(2n + 1)}$

124. An urn contains 6 white and 4 black balls. A fair die is rolled and that number of balls are chosen from the urn. The probability that the balls selected are white is :
   (a) $\dfrac{1}{5}$ (b) $\dfrac{1}{6}$
   (c) $\dfrac{1}{7}$ (d) $\dfrac{1}{8}$

125. If $\int f(x)\, dx = f(x)$, then $\int (f(x))^{2}\, dx$ is :
   (a) $\dfrac{1}{3}\,(f(x))^{3}$ (b) $\dfrac{1}{2}\,(f(x))^{2}$
   (c) $(f(x))^{2}$ (d) $f(x)$

REASONING

Directions (for Q. 126 to Q. 130) : *Read the following statement and answers the following questions.*

Six books A, B, C, D, E and F are placed side by side. C, B and E have yellow covers and other books have green cover. Only D and F are new books and the rest are old, A, C and D are law reports and others are Gazatteers.

126. Which books is a new law report with a green cover ?
     (a) A   (b) B
     (c) C   (d) D

127. Which is the old volume of a Gazatteer?
     (a) C   (b) D
     (c) E   (d) F

128. Which green covered Gazatteer is a new book ?
     (a) B   (b) D
     (c) E   (d) F

129. Which two books are old Gazatteers with yellow cover ?
     (a) B and C   (b) B and F
     (c) B and F   (d) E and F

130. Which is the old yellow covered law report ?
     (a) D   (b) C
     (c) B   (d) A

Directions (for Q. 131 to Q. 135) : *Choose the odd man out :*

131. (a) Milk   (b) Tea
     (c) Coffee   (d) Pepsi

132. (a) Colgate   (b) Forhans
     (c) Lux   (d) Cibaca

133. (a) Cotton   (b) Wool
     (c) Tericot   (d) Shirt

134. (a) Pen   (b) Pencil
     (c) Copy   (d) He

135. (a) Ram   (b) Shyam
     (c) Mohan   (d) Sita

ENGLISH

Directions (for Q. 136 to Q. 138) : *Read the following passage carefully and answer the questions given below the passage.*

Our country is facing a severce environmental crisis. If it is not tackled on a war footing, it will certainly lead to socio-economic and ecological disaster, which will seriously affect the lives of million of people, especially the poor. Government data usually understate the extent of environmental destruction. The recent satellite data have revealed thay India is losing millions of hectares of forest every year which is many times more than the annual rate of deforestation put out by the forest department.

136. If India's environmental problem is not dealt with urgently, it will :
     (a) create problems of poverty
     (b) ruin the ecology of the country
     (c) lead to war
     (d) make people unemployed

137. The latest data regarding loss of forests have been collected by :
     (a) environmentalists
     (b) satellites
     (c) Indian farmers
     (d) state government

138. The amount of environmental damage as indicated by official figures is :
     (a) not very alarming
     (b) much less than the actual one
     (c) more than the actual damage
     (d) as much as it really is

Directions (for Q. 139 to Q. 142) : *Choose the correct meaning of the given words.*

139. ADAMANT :
     (a) tractable   (b) flexible
     (c) inflexible   (d) soft

140. GOAD :
(a) features   (b) complain
(c) urge   (d) pertinent

141. FABULOUS :
(a) unbelievable (b) soft
(c) weaken   (d) strong

142. ACME :
(a) surface layer (b) perfection
(c) bottom   (d) depth

Directions (for Q. 143 to Q. 146) : *Choose the correct synonyms of given words.*

143. IDOL :
(a) rough   (b) normal
(c) favourite   (d) bad

144. INFER :
(a) last   (b) conclude
(c) enough   (d) end

145. IMPRESS :
(a) hint   (b) inexpressible
(c) show   (d) force

146. ENTRY :
(a) come in   (b) penetration
(c) inside   (d) admittance

Directions (for Q. 147 to Q. 150) : *Choose the correct antonym from the given set of words.*

147. INSERTION :
(a) displacement (b) extraction
(c) withdrawl   (d) removal

148. PERMANENT :
(a) disheveled   (b) improper
(c) indifferent   (d) temporary

149. BLASE :
(a) cultured   (b) indifferent
(c) afraid   (d) worldly

150. FATUOUS :
(a) witty   (b) in one
(c) thin   (d) planned

Answers

PHYSICS

1. (d)	2. (b)	3. (a)	4. (c)	5. (d)	6. (c)	7. (a)	8. (b)
9. (a)	10. (d)	11. (d)	12. (b)	13. (c)	14. (a)	15. (b)	16. (a)
17. (c)	18. (b)	19. (b)	20. (a)	21. (a)	22. (c)	23. (a)	24. (c)
25. (a)	26. (c)	27. (b)	28. (c)	29. (d)	30. (c)	31. (b)	32. (c)
33. (a)	34. (a)	35. (b)	36. (b)	37. (b)	38. (a)	39. (b)	40. (c)

CHEMISTRY

41. (d)	42. (c)	43. (a)	44. (c)	45. (d)	46. (c)	47. (a)	48. (a)
49. (b)	50. (b)	51. (d)	52. (b)	53. (c)	54. (b)	55. (a)	56. (c)
57. (b)	8. (b)	59. (a)	60. (a)	61. (d)	62. (c)	63. (b)	64. (b)
65. (d)	66. (c)	67. (b)	68. (b)	69. (c)	70. (a)	71. (c)	72. (c)
73. (c)	74. (a)	75. (d)	76. (c)	77. (c)	78. (b)	79. (d)	80. (b)