PRACTICE PAPER – VI

MATHEMATICS

1. If $\cos 20° = k$ and $\cos x = 2k^2 - 1$, then the possible values of x between 0° and 36° are
   - (a) 140°
   - (b) 40° and 140°
   - (c) 40° and 320°
   - (d) 40° and 230°

2. If $\cos A = \dfrac{3}{4}$, then $32 \sin\left(\dfrac{A}{2}\right) \sin\left(\dfrac{5A}{2}\right)$ is equal to
   - (a) 11
   - (b) −11
   - (c) 8
   - (d) none of these

3. A function $f : R \rightarrow R$ is defined by
   $$f(x) \begin{cases} 1 \text{ if } x \in Q \\ -1 \text{ if } x \in (R-Q) \end{cases}$$
   The value of $f(\pi) - f\left(\dfrac{22}{7}\right)$ is
   - (a) 0
   - (b) 2
   - (c) −2
   - (d) none of these

4. If $f(x) = \begin{cases} 1, & x > 0 \\ 0, & x = 0 \\ -1, & x < 0 \end{cases}$, then
   - (a) the absolute value function
   - (b) the signum function
   - (c) the greatest integer function
   - (d) a constant function

5. $\sin^2 25° + \sin^2 65°$ is equal to
   - (a) 0
   - (b) 1
   - (c) $\dfrac{1}{2}$
   - (d) none of these

6. $A \cap (A \cup B)$ is equal to
   - (a) $A \cup B$
   - (b) $A \cap B$
   - (c) A
   - (d) B

7. $\cos 1° \cos 2° \cos 3° .... \cos 179°$ is equal to
   - (a) a positive real number
   - (b) a negative real number
   - (c) 0
   - (d) none of these

8. If $B = 2 \sin^2 x - \cos 2x$, then
   - (a) $-1 \le B \le 3$
   - (b) $0 \le B \le 2$
   - (c) $-1 \le B \le 1$
   - (d) $-2 \le B \le 2$

9. The range of the function $\sin([x]\pi)$ is
   - (a) 0
   - (b) {0}
   - (c) [−1,1]
   - (d) [0, 1]

10. The domain of definition of the function
    $$y = 3 e^{\sqrt{x^2-1}} \log(x-1) \text{ is}$$
    - (a) $(1, \infty)$
    - (b) $[1, \infty)$
    - (c) set of all real different from 1
    - (d) $(-\infty, -1) \cup (1, \infty)$

11. Which of the following is correct ?
    - (a) $\cos 1 > \cos 2$
    - (b) $\cos 1 < \cos 2$
    - (c) $\cos 1 = \cos 2$
    - (d) none of these

12. In a triangle ABC, $a = 6$, $b = 12$ and $\angle b = 60°$. Then value of $\sin A$ is
    - (a) $\dfrac{\sqrt{3}}{4}$
    - (b) $\dfrac{1}{\sqrt{3}}$
    - (c) $\dfrac{1}{2}$
    - (d) none of these

13. The function $f(x) = x^2 - 2x$ is strict decreasing in the interval
    - (a) $(-\infty, 1]$
    - (b) $[1, \infty)$
    - (c) R
    - (d) none of these

14. A stone projected vertically upwards moves under the action of gravity alone and its motion is described by $x = 49t - 4.9 t^2$. It is at a maximum height when
    - (a) $t = 10$
    - (b) $t = 5$
    - (c) $t = 0$
    - (d) none of these

15. The value of $\int_{-\pi}^{\pi} (1-x^2) \sin x \cos^2 x \, dx$ is equal to
    - (a) 0
    - (b) $\pi - \dfrac{\pi^3}{3}$
    - (c) $2\pi - \pi^3$
    - (d) $\dfrac{7}{2} - 2\pi^3$

16. $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{x \sin x}$ is equal to
    - (a) 2
    - (b) 0
    - (c) 1
    - (d) $\dfrac{1}{2}$

17. $\lim_{x \to 0} \dfrac{\tan x}{\log(1+x)}$ is equal to

(a) 1   (b) 0

(c) does not exist   (d) none of these

18. $\int \dfrac{\tan^{-1} x}{1+x^2}\, dx$ is equal to

(a) $\dfrac{1}{2}(\tan^{-1} x)^2$ (b) $\log(1+x^2)\,\tan^{-1}x$

(c) $\log |\tan^{-1} x|$ (d) none of these

19. $\lim_{x \to n}[x - [x]]$ is equal to

(a) 0   (b) does not exist

(c) –1   (d) 1

20. Derivative of log |x| with respect to |x| is

(a) $\dfrac{1}{x}$ (b) $\dfrac{1}{|x|}$

(c) $\pm\dfrac{1}{x}$ (d) none of these

21. The area enclosed between the curves $y = x^2$ and $x = y^2$ is

(a) $\dfrac{1}{3}$ (b) $\dfrac{2}{3}$

(c) $\dfrac{1}{6}$ (d) none of these

22. $\int \dfrac{e^{-x}(1-x)}{\cos^2(xe^{-x})}\, dx$ is equal to

(a) $\tan(x\,e^{-x})$ (b) $-(\cos(xe^{-x}))^{-1}$

(c) $\tan^2(xe^{-x})$ (d) none of these

23. The differential coefficient of log (| log x|) with respect to log x is

(a) $\dfrac{1}{x\log x}$ (b) $\dfrac{1}{x|\log x|}$

(c) $\dfrac{1}{\log x}$ (d) none of these

24. Which of the following is not equal to $\int \dfrac{-1}{\sqrt{1-x^2}}\, dx$?

(a) $\cos^{-1} x$ (b) $-\sin^{-1} x$

(c) $\dfrac{\pi}{2}\sin^{-1} x$ (d) $\dfrac{\pi}{2}-\cos^{-1} x$

25. $\int_0^1 \dfrac{1}{\sqrt{x^2+1}}\, dx$ is equal to

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

(c) $\dfrac{1}{2}\log(\sqrt{2}+1)$ (d) $\log(\sqrt{2}+1)$

26. The vectors $2\hat{i}-\hat{j}+\hat{k}$, $\hat{i}+2\hat{j}+\hat{k}$ and $\hat{i}+2b\hat{j}+5\hat{k}$ are coplanar, if b is equal to

(a) – 4   (b) 4

(c) 0   (d) –2

27. If $\vec{a}\cdot\vec{b}=0$, then $\vec{a}$ is a

(a) free vector   (b) localised vector

(c) null vector   (d) none of these

28. Length of the tangent from (2, 1) to the circle $x^2 + y^2 + 4y + 3 = 0$ is

(a) 12   (b) 6

(c) $\sqrt{6}$ (d) $\sqrt{12}$

29. The line $3x - 4y = 0$

(a) is a tangent to the circle $x^2 + y^2 = 25$

(b) is a normal to the circle $x^2 + y^2 = 25$

(c) does not meet the circle $x^2 + y^2 = 0$

(d) does not pass through the origin

30. In a triangle ABC, D is the mid-point of side [BC]; $\overline{AD}$ is equal to

(a) $\overline{AB}+\overline{AC}$ (b) $\dfrac{1}{2}(\overline{AB}+\overline{AC})$

(c) $\overline{AB}-\overline{AC}$ (d) none of these

31. Direction cosines of the vector $\vec{v}=a_1\hat{i}+a_2\hat{j}+a_3\hat{k}$ are

(a) $< a_1, a_2, a_3 >$ (b) $< a_1, -a_2, -a_3 >$

(c) $\dfrac{a_1}{|\vec{v}|}, \dfrac{a_2}{|\vec{v}|}, \dfrac{a_3}{|\vec{v}|}$ (d) none of these

32. The number of tangents which can be drawn from the point (–1, 2) to the circle $x^2 + y^2 + 2x - 4y + 4 = 0$, is

(a) 0   (b) 1

(c) 2   (d) 3

33. $x = \dfrac{e^t + e^{-t}}{2}$, $y \ne \dfrac{e^t - e^{-t}}{2}$; $t \in R$ represents

(a) an ellipse   (b) a parabola

(c) a hyperbola   (d) a circle

34. If $|\vec{a}| = 8$, then $|(-5)\vec{a}|$ is

(a) – 40   (b) 40

(c) 40 or – 40   (d) none of these

35. (1, 0, 0) . (0, 0, 0) is equal to

(a) 2   (b) (1, 1, 0)

(c) (0, 0, 1)   (d) 0

36. The eccentricity of $3x^2 + 4y^2 = 24$ is

   (a) $\dfrac{1}{4}$　　　　　(b) $\dfrac{7}{4}$

   (c) $\dfrac{1}{2}$　　　　　(d) $\sqrt{\dfrac{7}{4}}$

37. The vertex of the parabola $y^2 = 4a\,(x - a)$ is

   (a) $(a, 0)$　　　　　(b) $(0, 0)$

   (c) $(0, a)$　　　　　(d) none of these

38. The equation

   $x^2 + y^2 + z^2 - 4x + 6y - 8z + 29 = 0$

   represent

   (a) a sphere　　　　　(b) the empty set

   (c) a point　　　　　(d) none of these

39. The position vector of the centre of the sphere

   $(\vec{r} - \vec{a}) . (\vec{r} - \vec{b}) = 0$ is

   (a) $\dfrac{\vec{a}}{2}$　　　　　(b) $\dfrac{\vec{b}}{2}$

   (c) $\dfrac{\vec{a} + \vec{b}}{2}$　　　　　(d) none of these

40. Equation of the parabola with focus at $(0, 0)$ and directrix, $y + a = 0$, is $(a > 0)$

   (a) $x^2 = 4ay$

   (b) $y^2 = 4ax$

   (c) $x^2 = -4ay$

   (d) none of these

41. Centre of the sphere through the points $(0, 3, 4)$, $(0, 5, 0)$, $(4, 0, 3)$ and $(-3, 4, 0)$ is

   (a) $\left(\dfrac{1}{4}, 3, \dfrac{4}{4}\right)$　　　　　(b) $(0, 0, 0)$

   (c) $(-4, 3, 0)$　　　　　(d) none of these

42. Length of the perpendicular from the point $(1, -1, 2)$ on the line $\dfrac{x+1}{2} = \dfrac{y-2}{-3} = \dfrac{z+2}{4}$ is

   (a) $\sqrt{29}$　　　　　(b) $\sqrt{6}$

   (c) $\sqrt{21}$　　　　　(d) none of these

43. The standard deviation of the observations 22, 26, 28, 20, 24, 30 is

   (a) 2　　　　　(b) 2.4

   (c) 3　　　　　(d) 3.42

44. If standard deviations for two variables X and Y are 3 and 4 respectively and their covariance is 8, then correction coefficient between them is

   (a) $\dfrac{2}{3}$　　　　　(b) $\dfrac{8}{3\sqrt{2}}$

   (c) $\dfrac{9}{8\sqrt{12}}$　　　　　(d) $\dfrac{2}{9}$

45. Two unlike parallel forces P and Q $(P = Q)$ act at two distinct points of a rigid body. The magnitude of their resultant is

   (a) $P - Q$　　　　　(b) $Q - P$

   (c) $|P - Q|$　　　　　(d) none of these

PHYSICS

46. A tuning fork vibrates with two beats in 0.4 second, the frequency is

   (a) 6　　　　　(b) 8

   (c) 5　　　　　(d) none of these

47. If a cyclist moving with a speed of 4.9 m/s on a level road can take a sharp circular turn of radius 4 m. Then coefficient of friction between the cycle tyre and the road is

   (a) 0.71　　　　　(b) 0.61

   (c) 0.51　　　　　(d) 0.81

48. A drum of radius R full of liquid of density d is rotated at ω rad/sec. The increase in pressure at the centre of the drum will be

   (a) $\dfrac{\omega^2 R^2 d^2}{2}$　　　　　(b) $\dfrac{\omega R d^2}{2}$

   (c) $\dfrac{\omega^2 R D}{2}$　　　　　(d) $\dfrac{\omega^2 R^2 d}{2}$

49. A body of mass M at rest explodes into three masses two of which of mass $\dfrac{M}{4}$ each are thrown off in perpendicular directions with velocity of 3 m/s and 4 m/s respectively. The third piece will be thrown off with a velocity of

   (a) 3 m/s　　　　　(b) 2.5 m/s

   (c) 2.0 m/s　　　　　(d) 1.5 m/s

50. The distance of a geostationary sattelite from the centre of earth (radius R = 6400 km) is nearest to

   (a) 18 R

   (b) 10 R

   (c) 7 R

   (d) 5 R

51. The measurement of voltmeter in the following circuit is

(a) 6.0 V

(b) 4.0 V

(c) 3.4 V

(d) 2.4 V

6V

60Ω

40Ω
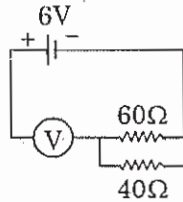
52. Rutherford's α-particle experiment show 0 that the atoms have

(a) electrons
(b) neutrons
(c) nucleus
(d) proton

53. A simple pendulum is executing simple harmonic motion with a time period t. If the length of the pendulum is increased by 21 % the increase in the time period of the pendulum of increased length is

(a) 50%
(b) 30%
(c) 21 %
(d) 10%

54. A particle is thrown vertically upwards. Its velocity at half of the height is 10 m/s. Then the maximum height attained by it is (g =10m/s²)

(a) 16 m
(b) 10 m
(c) 8 m
(d) 18 m

55. With what velocity should a particle be projected so that its height becomes equal to radius of earth

(a) $\sqrt{\dfrac{4GM}{R_e}}$

(b) $\sqrt{\dfrac{2GM}{R_e}}$

(c) $\sqrt{\dfrac{8GM}{R_e}}$

(d) $\sqrt{\dfrac{GM}{R_e}}$

56. The potentiometer consists of a wire of length 4m and resistance 10 Ω . It is connected to a cell of e.m.f. 2V the potential difference per unit length of the wire will be

(a) 10 V/m
(b) 5 V/m
(c) 2 V/m
(d) 0.5 V/m

57. The energy released by fission of one atom of $_{92}U^{235}$ is 200 MeV the number of fission required per second to produce a power of 1 kW is

(a) 3.125×10^9
(b) 3.125×10^{12}
(c) 3.125×10^{13}
(d) 3.125×10^{11}

58. A radioactive element $_{90}X^{238}$ decay into $_{83}Y^{222}$, then the number of β particle emitted are

(a) 1
(b) 2
(c) 4
(d) 6

59. The concentric spheres of radii R and r have similar charges with equal surface densities (σ) what is the electric potential at their common centre ?

(a) $\dfrac{\sigma}{\varepsilon_0} (R - r)$

(b) $\dfrac{\sigma}{\varepsilon_0} (R+r)$

(c) $\dfrac{R\sigma}{\varepsilon_0}$

(d) $\dfrac{\sigma}{\varepsilon_0}$

60. What is the de-Broglie wavelength of 1 kg mass moving with a velocity of 10 ms⁻¹ ?

(a) 6.626×10^{-35}m
(b) 6.626×10^{-33}m
(c) 6.626×10^{-34}m
(d) none of these

61. Two waves, whose intensities are 9 : 16 are made to interfere the ratio of maximum and minimum intensities in the interference pattern is

(a) 49 : 1
(b) 25 : 7
(c) 10 : 9
(d) 4 : 3

62. A charge QμC is placed at the centre of cube, the flux coming out from any surface will be

(a) $\dfrac{Q}{24\varepsilon_0}$

(b) $\dfrac{Q}{8\varepsilon_0}$

(c) $\dfrac{Q}{6\varepsilon_0} \times 10^{-6}$

(d) $\dfrac{Q}{6\varepsilon_0} \times 10^{-3}$

63. The reactance of a coil when used in the A.C. power supply (220 volt, 50 cycles/sec) is 50 ohms. The inductance of the coil is nearly

(a) 0.16 henry
(b) 0.22 henry
(c) 2.2 henry
(d) 1.6 henry

64. A capacitor C_1 is charged by a potential difference V_0 as shown in the figure. This charging battery then removed and the capacitor is connected as into an uncharged capacitor C_2 what is the final potential difference V across the combination ?

(a) $V_0 \dfrac{(C_1 - C_2)}{C_1}$

(b) $V_0 \dfrac{C_1}{(C_1 - C_2)}$

(c) $V_0 \dfrac{C_1}{(C_1 + C_2)}$

(d) $C_0 \dfrac{(C_1 + C_2)}{C_1}$


Key

V_0 C_1 C_2
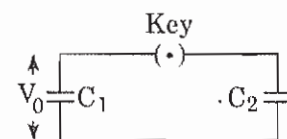
65. Two rods having thermal conductivity in the ratio of 5 : 3 and having equal length and equal cross-sectional area, are joined face to face. If the temperature of free end of first rod is 100° C and temperature of free end of second rod is 20° C. Temperature of junction will be

(a) 90°C   (b) 85°C

(c) 70°C   (d) 50°C

66. An organ pipe P_1 is closed at one end and vibrating in its first overtone and another pipe P_2 opened at both ends vibrating in its third overtone are in resonance with a given tuning fork. Then the ratio of length P_1 and P_2 is

(a) $\dfrac{1}{3}$ (b) $\dfrac{2}{3}$

(c) $\dfrac{8}{3}$ (d) $\dfrac{3}{8}$

67. Two light springs of force constants k_1 and k_2 and a block of mass m are in one line. AB on a smooth horizontal table such that one end of each spring is fixed to a required support and other end is attached to block of mass m kg as shown in fig. The frequency of vibration is
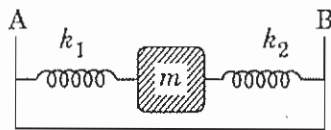
(a) n = $\dfrac{1}{2\pi}\sqrt{\dfrac{k_1 - k_2}{m}}$

(b) n = $\dfrac{1}{2\pi}\sqrt{\dfrac{k_1 + k_2}{m}}$

(c) n = $\dfrac{1}{2\pi}\sqrt{\dfrac{k_1 k_2}{m}}$

(d) none of these

68. Two particles are executing simple harmonic motion. At an instant of time t their displacement are

$y_1 = a \cos(\omega t)$ and $y_2 = a \sin(\omega t)$

Then the phase difference between y_1 and y_2 is

(a) 120°   (b) 90°

(c) 180°   (d) zero

69. If a capillary tube of radius r is dipped vertically in a liquid of density d, surface tension T and angle of contact θ, then the pressure difference just below the two surface, one in the beaker and the other in the capillary tube, is

(a) $\dfrac{2T}{r}$ (b) $\dfrac{T}{r \cos\theta}$

(c) $\dfrac{2T \cos\theta}{r}$ (d) $\dfrac{T \cos\theta}{r}$

70. One mole of monoatomic gas $\left(\gamma = \dfrac{5}{3}\right)$ is mixed with one mole of diatomic gas $\left(\gamma = \dfrac{7}{5}\right)$ what will be the value of γ for the mixture ?

(a) 1.45   (b) 1.4

(c) 1.54   (d) 1.5

71. A pendulum bob has a speed of 3 m/sec at its lowest position. The pendulum is 0.5 m long. The speed of the bob, when length makes an angle of 60° to the vertical, is

(a) 2 m/s   (b) 1/2 m/s

(c) 1/3 m/s   (d) 2.5 m/s

72. An object of mass 40 kg and having the velocity 4 m/s collides with another object m = 60 kg having velocity 2 m/s. The collision is perfectly inelastic. The loss in energy is

(a) 110 J   (b) 48 J

(c) 392 J   (d) 440 J

73. A motor-cyclist moving with a velocity of 72 km/hr on a flat road takes a turn on the road at a point where the radius of curvature of the road is 20 metre. The acceleration due to gravity is 10 m/s². In order to avoid sliding, he must not bend with respect to the vertical plane by an angle greater than

(a) 8 = tan⁻¹ 4   (b) 8 = tan⁻¹25.92

(c) 8 = tan⁻¹ 2   (d) 8 = tan⁻¹ 6

74. Three equal resistors are connected as shown in the figure. The maximum power consumed by each resistor is 18 watt. Then maximum power consumed by the combination is

(a) 36 watt

(b) 18 watt

(c) 27 watt

(d) 54 watt
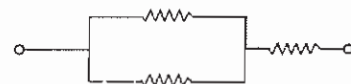
75. A long vertical wire in which a current produces a neutral point with the earth magnetic field at a distance of 5 cm from the wire. If the horizontal component of the earth's magnetic induction is 0.18 gauss, then the current in the wire is

   (a) 0.036 A　　　　　　(b) 0.9 A

   (c) 0.45 A　　　　　　(d) 4.5 A

76. The optical length of an astronomical teloscope with magnifying power of 10, for normal vision is 44 cm. What is focal length of the objective ?

   (a) 4 cm　　　　　　　(b) 40 cm

   (c) 44 cm　　　　　　(d) 440 cm

77. The energy of the ground electronic state of hydrogen atom is –13.6eV. The energy of the first excited state will be

   (a) – 52.4 eV

   (b) – 27.2 eV

   (c) – 68 eV

   (d) – 3.4 eV

78. A block of mass m_1 rests on a horizontal table. A string tied to this block is passed over a frictional pulley fixed at one end of the table and another block of mass m_2 is hung to the other end of the spring. The acceleration (a) of the system is
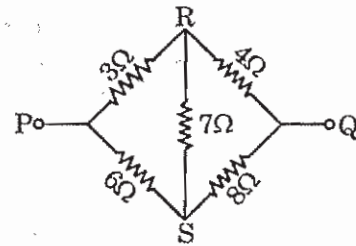
   (a) $\dfrac{m_1 m_2 g}{m - m_2}$

   (b) $\dfrac{m_2 g}{m_1 + m_2}$

   (c) $\dfrac{m_1 g}{m_1 + m_2}$

   (d) g

79. Impedance of circuit when a resistance R and a inductor of inductance L are connected in series in an A.C. circuit of frequency v, is

   (a) $\sqrt{R^2 + 2\pi^2 v^2 L^2}$

   (b) $\sqrt{R^2 + 4\pi^2 v^2 L^2}$

   (c) $\sqrt{R + 4\pi^2 v^2 L^2}$

   (d) $\sqrt{R + 2\pi^2 v^2 L^2}$

80. In the given figure, equivalent resistance between P and Q will be

   (a) $\dfrac{14}{9} \Omega$

   (b) $\dfrac{9}{14} \Omega$

   (c) $\dfrac{14}{3} \Omega$

   (d) $\dfrac{3}{14} \Omega$

81. The electric field required to keep a water drop of mass m just to remain suspended, when charged with one electron is

   (a) $\dfrac{em}{g}$　　　　　(b) $\dfrac{mg}{e}$

   (c) emg　　　　　　(d) mg

82. Which of the following phenonmenon shows the transverse nature of light ?

   (a) Photo-electric effect

   (b) Interference

   (c) Polarization

   (d) Diffraction

83. The angle for which maximum height and horizontal range are same for a projectile is

   (a) 32°

   (b) 48°

   (c) 76°

   (d) 84°

84. Two particles of equal mass revolving in circular paths of radii r_1 and r_2 respectively with the same angular velocity. The ratio of their centripetal force will be

   (a) $\dfrac{r_1}{r_2}$　　　　　(b) $\dfrac{r_2}{r_1}$

   (c) $\sqrt{\dfrac{r_2}{r_1}}$　　　　(d) $\left(\dfrac{r_2}{r_1}\right)^2$

85. Three bulbs of 40 W, 60 W and 100 W are arranged in series with 220 V, which bulb has minimum resistance ?

   (a) 100 W

   (b) 40 W

   (c) 60 W

   (d) equal in all bulbs

CHEMISTRY

86. Isotopes have
    (a) same number of neutrons
    (b) same number of positron
    (c) same number of protons
    (d) same number of nucleus

87. 4.6 kJ heat is liberated on burning 0.5 gm of sulphur. The enthalpy of formation of SO_2 is [molecular weight of S = 32, O = 16]
    (a) + 294.4 kJ   (b) –294.4 kJ
    (c) +462.4 kJ   (d) –462.4 kJ

88. At 25°C the pH value of a solution is 6, the solution is
    (a) neutral   (b) acidic
    (c) alkaline   (d) basic

89. The incorrect statement regarding vitamins is
    (a) they help in digestion
    (b) their deficiency causes disease
    (c) they are vital for life
    (d) they were named by "funic"

90. Nitrobenzene on nitration produce
    (a) o-dinitrobenzene (b) m-dinitrobenzene
    (c) p-dinitrobenzene (d) none of these

91. The volume of 1.0 gm of hydrogen in litres at NTP is
    (a) 6.8 lit   (b) 10.44 lit
    (c) 11.2 lit   (d) 14.56 lit

92. The specific rate constant of a first order reaction depends on
    (a) time
    (b) temperature
    (c) concentration of product
    (d) concentration of the reactants

93. $CO + H_2 \xrightarrow[\text{Co or Ni}]{\substack{43K. \\ 1-1\ atmosphere}}$ mixture of hydrocarbons
                                                    + H_2O
    The above reaction is
    (a) Bergius process
    (b) Fischer-Tropsch process
    (c) Kolbe's process
    (d) none of these

94. The law which explains the law of conservation of mass is
    (a) Avogadro's law
    (b) Berzelius hypothesis
    (c) Hund's rule
    (d) Dalton's law

95. Anhydrous Na_2CO_3 is also known as
    (a) fusion mixture   (b) soda ash
    (c) washing soda   (d) salt soda

96. The type of linkage present in protein molecule is
    (a) ether linkage   (b) peptide linkage
    (c) stycosidic linkage (d) ester linkage

97. Two molecules of an ideal gas expand spontaneously into a vacuum. The work done is
    (a) 2 J   (b) 4 J
    (c) 8 J   (d) zero

98. In an aqueous solution hydrogen will not reduce
    (a) Ag^+ (b) Cu^{2+}
    (c) Zn^{2+} (d) Fe^{3+}

99. The volume occupied by 9.0 gm of nitrogen gas at 300 K and 750 mm Hg pressure is
    (a) 5.854   (b) 6.7432
    (c) 8.8462   (d) 8.0125

100. Toluene and chromyl chloride reacts to produce
    (a) benzoic acid   (b) benzaldehyde
    (c) chlorotoluene   (d) benzyl chloride

101. The atomic radius decreases in a period due to
    (a) increase in nuclear attraction
    (b) decrease in nuclear attraction
    (c) increase in nuclear of electrons
    (d) decrease in number of electrons

102. The change in entropy for the fusion of 1 mole of ice is [melting point of ice = 273 K, molar enthalpy of fusion for ice = 6.0 kJ mol^{-1}]
    (a) 11.73 $JK^{-1}mol^{-1}$ (b) 18.84 $JK^{-1}mol^{-1}$
    (c) 21.97 $JK^{-1}mol^{-1}$ (d) 24.47 $JK^{-1}mol^{-1}$

103. The solutions which have same osmotic concentrations are known as
    (a) normal   (b) isotonic
    (c) hypotonic   (d) hypertonic

104. On reduction secondary amine is given by
    (a) methyl isocyanide (b) methyl cyanide
    (c) nitrobenzene   (d) nitrotoluene

105. Schiff's reagent is
    (a) red litmus
    (b) rosaniline hydrochloride
    (c) methyl orange
    (d) 2, 4 dinitrophenyl hydrazine

106. In nuclear reactors the moderator is
    (a) D_2O (b) H_2O
    (c) H_2O_2 (d) H_2SO_4

107. 0.2595 gm of a substance containing organic compound in a quantitative analysis gives 0.35 gm of barium sulphate. The percentage of sulphur is
    (a) 10.84%   (b) 14.64%
    (c) 16.66%   (d) 18.52%

108. Phenol and NH_3 reacts in presence of $ZnCl_2$ at 300°C to produce
    (a) tertiary amine   (b) secondary amine
    (c) primary amine   (d) all the above

109. Molality does not change with
    (a) temperature   (b) concentration
    (c) pressure   (d) all of these

110. The pH of N/10 HCl is
    (a) 3   (b) 4
    (c) 2   (d) 1

111. The solubility of AgCl in moles per litre when its solubility product is 1.56×10^{-10} at 25°C, is
    (a) 0.576×10^{-5} mol/litre
    (b) 1.056×10^{-4} mol/litre
    (c) 1.249×10^{-8} mol/litre
    (d) 1.478×10^{-6} mol/litre

112. The amphoteric oxide is
    (a) CrO_3 (b) CrO_5
    (c) Cr_2O_3 (d) CrO

113. Tartarametic is
    (a) sodium potassium tartrate
    (b) tartaric acid
    (c) potassium antimony tartrate
    (d) potassium acid tartrate

114. The noble gas which is not found in atmosphere is
    (a) Ar   (b) Kr
    (c) Ne   (d) Rn

115. Slow oxidation of $CHCl_3$ in air leads to the formation of
    (a) formic acid
    (b) carbonyl chloride
    (c) formyl chloride
    (d) trichloroacetic acid

116. For the manufacture of NH_3 by the following reaction
    $$N_2 + 3H_2 \rightleftharpoons 2NH_3 + 21.9 \text{ kCal},$$
    the favourable conditions are
    (a) low temperature, low pressure and catalyst
    (b) high temperature, high pressure and catalyst
    (c) low temperature, high pressure and catalyst
    (d) high temperature, low pressure and catalyst

117. 4 gm castic soda is dissolved in 100 cc of solution. The normality of solution is
    (a) 0   (b) 0.5
    (c) 1   (d) 1.5

118. Both BF_3 and NF_3 are covalent but BF_3 molecule is non-polar while NF_3 is polar because
    (a) atomic size of boron is smaller than nitrogen
    (b) BF_3 is planar but NF_3 is pyramidal
    (c) boron is a metal while nitrogen is a gas
    (d) BF bond have no dipole moment while NF bond have dipole moment.

119. Carbon monoxide is a poisonous gas the antidote used for this poisoning is
    (a) pure oxygen   (b) carbonic acid
    (c) carborundum   (d) carbogen

120. $AlCl_3$ fumes in moist air because it is
    (a) covalent
    (b) volatile
    (c) hygroscopic
    (d) former of HCl in moist air

121. Phenol is more readily soluble in
    (a) NaOH solution
    (b) dil. HCl
    (c) both NaOH and HCl
    (d) $NaHCO_3$ solution

122. Law of electrolysis was given by
    (a) Faraday   (b) Ostwald
    (c) Arrhenus   (d) Lamark

123. 10 gm. of glucose is dissolved in 150 gm of water. The mass percentage of glucose is
    (a) 2.50%   (b) 6.25%
    (c) 8.75%   (d) 10%

124. The molecularity of a reaction is
    (a) always two
    (b) same as its order
    (c) different than the order
    (d) may be same or different as compound to order

125. Benzene does not undergo addition reaction easily because
    (a) it has six hydrogen atoms
    (b) it has a cyclic structure
    (c) double bonds present in benzene are strong
    (d) resonance stabilized system is to be preserved

INTELLIGENCE, LOGIC & REASONING

126. Two arms of a watch show time of 3:30 in a mirror. What is the actual time in watch?
    (a) 12 : 30   (b) 8 : 30
    (c) 4 : 30   (d) 9 : 30

127. If in a certain code MAGAZINE is coded as AMAGIZEN. then ENVELOPE will be coded as
    (a) ENEVOLEP   (b) NEVEOLEP
    (c) NEEVOLEP   (d) NEEVOLPE

128. If in a certain code STUDENT is coded as TSDUNET, then TEACHER will be coded as
    (a) ETCAEHR   (b) REHACTA
    (c) ETCHAER   (d) ATECHER

129. Hoof: Horse :: ? : Man
    (a) Leg   (b) Arm
    (c) Hand   (d) Foot

130. If B says that his mother is the only daughter of A's mother. How is A related to B ?
    (a) Uncle
    (b) Father
    (c) Brother
    (d) Grand-father

Direction (Q. 131) : *Find out the wrong number in given series.*

131. 100, 97, 90, 86, 76, 71, 62, 55
    (a) 55   (b) 62
    (c) 76   (d) 86

132. If a match starts between India and England at 10:00 a.m. in London, then at what time it will be telecaste in India ?
    (a) 2:30 a.m.   (b) 3:30 p.m.
    (c) 6:00 p.m.   (d) 10:00 a.m.

133. If 35698 is coded as 53766, then 67284 will be coded as
    (a) 84332   (b) 86263
    (c) 84352   (d) 85352

Directions (Q. 134 – 135) : *Find the number which will come next in the series.*

134. 3, 14, 47, 443, 1334,....................:
    (a) 89   (b) 119
    (c) 137   (d) 146

135. 2, 5, 11, 23,....................:
    (a) 42   (b) 47
    (c) 36   (d) 34

ENGLISH LANGUAGE & COMPREHENSION

Directions (Q.136 – 139) : *Read the following passage carefully and answer the questions given below in the passage. Certain words/phrases in the passage are given in bold to locate them while answering some of the questions.*

In this life, there are no gains without pains. Life indeed would be dull if there were no difficulties. Games lose their zest if there is no real struggle and if the result is a foregone conclusion. Both the winner and the loser enjoy a game most its closely contested to the last. No victory is a real triumph unless the foe is worthy of the steel. Whether we like it or not. Life is one continuous competitive examination.

136. Which of the following represents the central idea of the passage ?
    (a) life is full of pain and suffering
    (b) struggle or without struggle life is an enjoyable game.
    (c) life is an unending struggle
    (d) suffering is not really necessary for achievement in life

137. Which of the following statement is not true?

   (a) hardships add to the interest of life.

   (b) a game becomes really interesting if one knows beforehand how it is going to end up.

   (c) games become dull if there are not fully contested.

   (d) the spectators as well as the teams enjoy a game only if there is struggle for the result.

138. Which of the following nearly seems up the meaning of the first sentence?

   (a) hard labour on mains part usually ends in suffering

   (b) even after undergoing suffering, man can hardly achieve anything

   (c) man can not achieve anything unless he suffers for it

   (d) achievement in life is disproportionate of the suffering one undergoes for it

139. The statement the foe is worthy of the steel, in the last but one sentence means that

   (a) the other fellow is capable of defending himself

   (b) the opposite team is equipped with deadly arms

   (c) the enemy shows a lot of fact and flexibility

   (d) the enemy is capable of showing determined hardine and resistance

Directions (Q. 140 – 141) : *Choose the synonyms of given words from set of the words.*

140. SHORTFALL

   (a) shortage   (b) infringement

   (c) over stepping   (d) violation

141. RAISING

   (a) uplift   (b) humiliation

   (c) leveling   (d) depression

Directions (Q. 142 – 143) : *Choose the antonyms of given words from set of the words.*

142. HOMAGE

   (a) good

   (b) creative

   (c) insult

   (d) dull

143. DENSITY

   (a) compactness   (b) bulk

   (c) solidity   (d) thinness

Directions (Q. 144 – 146) : *In the following items each passage consist of six sentences. The first and sixth sentences are given in the beginning and ending are labelled 1 and 6 respectively. The middle four sentences in each have been removed and jumbled up. These are labelled as P, Q, R and S. You are required to find the proper order for the four sentences and mark accordingly.*

144. 1 : Chankya, by his foresight and strength of character, built up the Mauryan Empire.

   P : they were men of iron

   Q : therefore, they were impervious to criticism and had implicit confidence in themselves.

   R : both of them were ware guided by stern realism and would tolerate no deviations from the objectives which they pursued relentlessly.

   S : similarly, Patel refashioned a compact India out of the fragments left by the British.

   6 : It is not true as some people said that Sardar Patel was not particular about the means as long as he achieved his end.

   (a) SQRP   (b) SRQP

   (c) SRPQ   (d) PQSR

145. 1 : Much of our adult behaviour and our attitudes are determined by our upbringing.

   P : but the process does not stop here.

   Q : in particular by the effects of that small part of society which is our family

   R : as we grow, we are constantly increasingly affected by new forces such as the social pressure of our friends and the larger world of society.

   S : the family and our early life have profound effect on our later life.

   6 : physiologists have studied these forces in depth.

   (a) SRPQ

   (b) PRSQ

   (c) QPSR

   (d) QSPR

146. 1 : There is nothing strange in the fact that so many foreign students should wish to learn English.

P : If any valuable book is written in another language an English translation of its is sure to be speedily published

Q : anyone who masters the English tongue acquires a key

R : most books found to be generally useful are written in English.

S : the English speaking want no monopoly of knowledge

6 : this key will open to him whatever is valuable in the literature of the world

(a) PSQR

(b) SQRP

(c) RPSQ

(d) PQSR

Directions (Q. 147 – 148) : *Choose the correct form of adjective from the given choices.*

147. She is the..................of the two sisters.

(a) tall   (b) taller

(c) tallest   (d) tallish

148. .... staff members attended the meeting.

(a) a few   (b) few

(c) any   (d) the few

Directions (Q. 149 – 150) : *In the following sentences, choose the most appropriate preposition.*

149. People were alarmed ....the tiger.

(a) at   (b) in

(c) on   (d) for

150. He lives........................Pune.

(a) towards   (b) from

(c) in   (d) to

ANSWERS

MATHEMATICS

1. (c)	2. (a)	3. (c)	4. (b)	5. (b)	6. (c)	7. (c)	8. (a)	9. (b)	10. (a)
11. (a)	12. (a)	13. (a)	14. (b)	15. (a)	16. (d)	17. (a)	18. (a)	19. (a)	20. (b)
21. (a)	22. (a)	23. (c)	24. (b)	25. (d)	26. (d)	27. (c)	28. (d)	29. (b)	30. (b)
31. (c)	32. (a)	33. (c)	34. (b)	35. (d)	36. (c)	37. (a)	38. (c)	39. (c)	40. (a)
41. (b)	42. (d)	43. (d)	44. (a)	45. (d)					

PHYSICS

46. (c)	47. (b)	48. (d)	49. (b)	50. (c)	51. (a)	52. (c)	53. (d)	54. (b)	55. (d)
56. (d)	57. (c)	58. (a)	59. (b)	60. (a)	61. (a)	62. (c)	63. (a)	64. (c)	65. (c)
66. (d)	67. (b)	68. (b)	69. (c)	70. (d)	71. (a)	72. (b)	73. (c)	74. (c)	75. (d)
76. (b)	77. (d)	78. (b)	79. (b)	80. (c)	81. (b)	82. (c)	83. (c)	84. (a)	85. (a)

CHEMISTRY

86. (c)	87. (b)	88. (b)	89. (a)	90. (b)	91. (c)	92. (c)	93. (b)	94. (d)	95. (b)
96. (b)	97. (d)	98. (c)	99. (d)	100. (b)	101. (a)	102. (c)	103. (b)	104. (a)	105. (b)
106. (a)	107. (d)	108. (c)	109. (a)	110. (d)	111. (c)	112. (c)	113. (c)	114. (d)	115. (b)
116. (a)	117. (c)	118. (b)	119. (d)	120. (d)	121. (a)	122. (a)	123. (b)	124. (c)	125. (d)

INTELLIGENCE, LOGIC & REASONING

126. (d)	127. (c)	128. (a)	129. (d)	130. (a)	131. (a)	132. (b)	133. (d)	134. (d)	135. (b)

ENGLISH LANGUAGE & COMPREHENSION

136. (c)	137. (b)	138. (c)	139. (a)	140. (a)	141. (a)	142. (c)	143. (d)	144. (c)	145. (d)
146. (c)	147. (c)	148. (b)	149. (a)	150. (c)					