EAMCET

ENGINEERING ENTRANCE EXAM

SOLVED PAPER–2005

PHYSICS

1. Names of units of some physical quantities are given in List-I and their dimensions formulae are given in List-II. Match the correct pairs in the lists :

	List-I		List-II
A.	Pa-s	(i)	$[L^2T^{-2}K^{-1}]$
B.	$Nm\text{-}K^{-1}$	(ii)	$MLT^{-3}K^{-1}]$
C.	$J\,kg^{-1}\,K^{-1}$	(iii)	$[ML^{-1}T^{-1}]$
D.	$Wm^{-1}\,K^{-1}$	(iv)	$[ML^2T^{-2}K^{-1}]$

	A	B	C	D		A	B	C	D
(a)	(iv)	(iii)	(i)	(ii)	(b)	(iii)	(ii)	(iv)	(i)
(c)	(iii)	(i)	(iv)	(ii)	(d)	(iii)	(iv)	(i)	(ii)

2. At a given instant of time the position vector of a particle moving in a circle with a velocity $3\hat{i}-4\hat{j}+5\hat{k}$ is $\hat{i}+9\hat{j}-3\hat{k}$. Its angular velocity at that time is :

(a) $\frac{(13\hat{i}+29\hat{j}-31\hat{k})}{\sqrt{146}}$

(b) $\frac{(13\hat{i}-29\hat{j}-31\hat{k})}{146}$

(c) $\frac{(13\hat{i}+29\hat{j}-31\hat{k})}{\sqrt{146}}$

(d) $\frac{(13\hat{i}+29\hat{j}+31\hat{k})}{146}$

3. A body projected vertically upwards crosses a point twice in its journey at a height h just after t_1 and t_2 seconds. Maximum height reached by the body is :

(a) $\frac{g}{4}(t_1+t_2)^2$ (b) $g\left(\frac{t_1+t_2}{4}\right)^2$

(c) $2g\left(\frac{t_1+t_2}{4}\right)^2$ (d) $\frac{g}{4}(t_1\,t_2)$

4. The equation of trajectory of a projectile is $y=10\,x-\left(\frac{5}{9}\right)x^2$

If we assume $g=10\,ms^{-2}$, the range of projectile (in metre) is :

(a) 36 (b) 24

(c) 18 (d) 9

5. The machine gun fires 240 bullets per minute. If the mass of each bullet is 10 g and the velocity of the bullets is 600 ms^{-1}, the power (in kW) of the gun is :

(a) 43200 (b) 432

(c) 72 (d) 7.2

6. The centre of mass of three particles of masses 1 kg, 2 kg and 3 kg is at (2, 2, 2). The position of the fourth mass of 4 kg to be placed in the system as that the new centre of mass is at (0, 0, 0) is :

(a) (– 3, – 3, – 3)

(b) (– 3, 3, – 3)

(c) (2, 3, – 3)

(d) (2, – 2, 3)

7. Consider the following statements *A* and *B* and identify the correct answer :

(A) : In an elastic collision, if a body suffers a head on collision with another of same mass at rest, the first body comes to rest while the other starts moving with the velocity of the first one.

(B) : Two bodies of equal mass suffering a head on elastic collision merely exchanges their velcities :

(a) both *A* and *B* are true

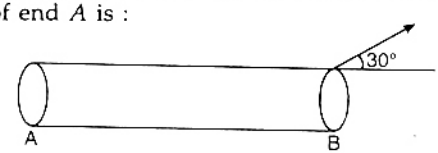
(b) both *A* and *B* are false

(c) *A* is true but *B* is false

(d) *A* is false but *B* is true

8. The minimum force required to move a body up an inclined plane is three times the minimum force required to prevent it from sliding down the plane. If the coefficient of friction between the body and the inclined plane is $\frac{1}{2\sqrt{3}}$, the angle of the inclined plane is :
(a) 60° (b) 45° (c) 30° (d) 15°

9. The instantaneous velocity of a point B of the given rod of length 0.5 m is 3 m/s in the represented direction. The angular velocity of the rod for minimum velocity of end A is :



(a) 1.5 rad/s (b) 5.2 rad/s
(c) 2.5 rad/s (d) none of these

10. Identify the increasing order of the angular velocities of the following :
1. earth rotating about its own axis
2. hour's hand of a clock
3. second's hand of a clock
4. flywheel of radius 2 m making 300 rpm
(a) 1, 2, 3, 4 (b) 2, 3, 4, 1
(c) 3, 4, 1, 2 (d) 4, 1, 2, 3

11. Degenerate electron pressure will not be sufficient to prevent core collapse of 'white dwarf' if its mass becomes n times of solar mass. Value of n is :
(a) 0.5 (b) 0.8 (c) 1 (d) 1.4

12. A body of mass m is suspended to an ideal spring of force constant k. The expected change in the position of the body due to an additional force F acting vertically downwards is :
(a) $\frac{3F}{2k}$ (b) $\frac{2F}{k}$ (c) $\frac{5F}{2k}$ (d) $\frac{4F}{k}$

13. The radii and Young's moduli of two uniform wires A and B are in the ratio 2 : 1 and 1 : 2 respectively. Both wires are subjected to the same longitudinal force. If the increase in length of the wire A is one percent, the percentage increase in length of the wire B is :
(a) 1.0 (b) 1.5 (c) 2.0 (d) 3.0

14. The heat evolved for the rise of water when one end of the capillary tube of radius r is immersed vertically into water is : (Assume surface tension = T and density of water to be ρ)
(a) $\frac{2\pi T}{\rho g}$ (b) $\frac{\pi T^2}{\rho g}$
(c) $\frac{2\pi T^2}{\rho g}$ (d) none of these

15. An iron sphere of mass 20×10^{-3} kg falls through a viscous liquid with terminal velocity $0.5\ ms^{-1}$. The terminal velocity (in ms^{-1}) of another iron sphere of mass 54×10^{-2} kg is :
(a) 4.5 (b) 3.5 (c) 2.5 (d) 1.5

16. The relation between the coefficient of real expansion (γ_r) and coefficient of apparent expansion (γ_a) of a liquid and the coefficient of linear expansion (α_g) of the material of the container is :
(a) $\gamma_r = \alpha_g + \gamma_a$ (b) $\gamma_r = \alpha_g + 3\gamma_a$
(c) $\gamma_r = 3\alpha_g + \gamma_a$ (d) $\gamma_r = 3(\alpha_g + \gamma_a)$

17. The difference between volume and pressure coefficients of an ideal gas is :
(a) $\frac{1}{273}$ (b) 273 (c) $\frac{2}{273}$ (d) zero

18. The ratio of specific heats of a gas is γ. The change in internal energy of one mole of the gas, when the volume changes from V to $2V$ at constant pressure P is :
(a) $\frac{\gamma - 1}{PV}$ (b) PV
(c) $\frac{PV}{\gamma - 1}$ (d) $\frac{PV}{\gamma}$

19. The tyre of a motor car contains air at 15°C. If the temperature increases to 35°C, the approximate percentage increase in pressure is (ignore to expansion of tyre) :
(a) 7 (b) 9 (c) 11 (d) 13

20. Two identical bodies have temperatures 277°C and 67°C. If the surroundings temperature is 27°C, the ratio of loss of heats of the two bodies during the same interval of time is (approximately) :
(a) 4 : 1 (b) 8 : 1
(c) 12 : 1 (d) 19 : 1

21. A vehicle sounding a whistle of frequency 256 Hz is moving on a straight road, towards a hill with a velocity of $10\ ms^{-1}$. The number of beats per second observed by a person travelling in the vehicle is :
(Velocity of sound $= 330\ ms^{-1}$)
(a) zero (b) 10 (c) 14 (d) 16

22. A transverse wave propagating on a stretched string of linear density 3×10^{-4} kg-m^{-1} is represented by the equation
$$y = 0.2 \sin (15x + 60t)$$
where x is in metres and t is in seconds. The tension in the string (in newton) is :
(a) 0.24 (b) 0.48 (c) 1.20 (d) 1.80

23. **Assertion (A) :** Propagation of light through an optical fibre is due to total internal reflection taking place at the core-clad interface.
Reason (R) : Refractive index of the material of the core of the optical fibre is greater than that of air.
(a) both (*A*) and (*R*) are true and (*R*) is the correct explanation of (*A*)
(b) both (*A*) and (*R*) are true but (*R*) is not the correct explanation of (*A*)
(c) (*A*) is true but (*R*) is false
(d) (*A*) is false but (*R*) is true

24. The focal length of an equi-convex lens is greater than the radius of curvature of any of the surfaces. Then the refractive index of the material of the lens is :
(a) greater than zero but less than 1.5
(b) greater than 1.5 but less than 2.0
(c) greater than 2.0 but less than 2.5
(d) greater than 2.5 but less than 2.0

25. Fraunhofer lines are produced by the absorption of light in :
(a) the chromosphere of the sun
(b) the photosphere of the sun
(c) sodium (d) hydrogen

26. A light ray of wavelength λ is passing through a pin hole of diameter D and the effect is observed on a screen placed at a distance L from the pin hole. The approximations of geometrical optics are applicable if :
(a) $D \leq \lambda$ (b) $\frac{L\lambda}{D^2} = 1$
(c) $\frac{L\lambda}{D^2} << 1$ (d) $\frac{L\lambda}{D^2} >> 1$

27. With a standard rectangular bar magnet of length (l), breadth (b; $b << l$) and magnetic moment M, the time period of the magnet in a vibration magnetometer is 4 s. If the magnet is cut normal to its length into four equal pieces, the time period (in seconds) with one of the pieces is :
(a) 16 (b) 2 (c) 1 (d) 1/4

28. If two identical bar magnets, each of length l, pole strength m and magnetic moment M are placed perpendicular to each other with their unlike poles in contact, the magnetic moment of the combination is :
(a) $\frac{M}{\sqrt{2}}$ (b) $lm(\sqrt{2})$
(c) $2\ lm(\sqrt{2})$ (d) $2M$

29. A 4 μF capacitor is charged by a 200 V battery. It is then disconnected from the supply and is connected to another uncharged 2 μF capacitor. During the process, loss of energy (in J) is :
(a) 3.43×10^{-2} (b) 2.67×10^{-2}
(c) 2.67×10^{-4} (d) 3.43×10^{-4}

30. Two charges 2 C and 6 C are separated by a finite distance. If a charge of – 4 C is added to each of them, the initial force of 12×10^3 N will change to :
(a) 4×10^3 N (repulsion)
(b) 4×10^2 N (repulsion)
(c) 6×10^3 N (attraction)
(d) 4×10^3 N (attraction)

31. A 6 V cell with 0.5 Ω internal resistance, a 10 V cell with 1 Ω internal resistance and a 12 Ω external resistance are connected in parallel. The current (in ampere) through the 10 V cell is :
(a) 0.60 (b) 2.27
(c) 2.87 (d) 5.14

32. In a meter bridge a 30 Ω resistance is connected in the left gap and a pair of resistances P and Q in the right gap. Measured from the left, the balance point is 37.5 cm, when P and Q are in series and 71.4 cm when they the parallel. The values of P and Q (in Ω) are :
(a) 40 10 (b) 35 15
(c) 30 20 (d) 25 25

33. Consider the following statements *A* and *B* and identify the correct answers given below :
A : Peltier coefficient is numerically equal to the potential difference across the junctions of the thermocouple through which current is flowing.
B : According to Thomson, energy is neither absorbed nor evolved at the junction of a thermocouple but is observed or evolved only along the lengths of both the conductors.
(a) both *A* and *B* are true
(b) both *A* and *B* are false
(c) *A* is true but *B* is false
(d) *A* is false but *B* is true

34. An inductance 1 H is connected in series with an AC source of 220 V and 50 Hz. The inductive reactance (in ohm) is :
(a) 2π (b) 50π (c) 100π (d) 1000π

35. Two parallel rails of a railway track insulated from each other and with the ground are connected to a millivoltmeter. The distance between the rails is one metre. A train is travelling with a velocity of 72 km/h along the track. The reading of the millivoltmeter (in mV) is : (Vertical component of the earth's magnetic induction is 2×10^{-5} T)
(a) 1.44 (b) 0.72 (c) 0.4 (d) 0.2

36. Magnetic field induction at the centre of a circular coil of radius 5 cm and carrying a current 0.9 A is (in SI units)
(ε_0 = absolute permittivity of air in SI units; velocity of light $= 3 \times 10^8\ ms^{-1}$)
(a) $\frac{1}{\varepsilon_0 10^{16}}$ (b) $\frac{10^{16}}{\varepsilon_0}$ (c) $\frac{\varepsilon_0}{10^{16}}$ (d) $10^{16}\varepsilon_0$

37. According to Moseley's law, the frequency (ν) of the K_α line and the atomic number Z of the element have the relation (A and B are constants) :
(a) $\frac{\nu}{(Z-A)} = B$ (b) $\frac{\sqrt{\nu}}{(Z-A)} = B$
(c) $\nu (Z-A) = B$ (d) $\nu (Z-A)^2 = B$

38. A particle of mass 1×10^{-26} kg and charge 1.6×10^{-19} C travelling with a velocity $1.28 \times 10^6\ ms^{-1}$ along the positive *X*-axis enters a region in which a uniform electric field $\vec{E}$ and a uniform magnetic field of induction $\vec{B}$ are present. If $\vec{E} = -102.4 \times 10^3\ \hat{k}\ NC^{-1}$ and $B = 8 \times 10^{-2}\ \hat{j}\ Wbm^{-2}$, the direction of motion of the particles is :
(a) along the positive *X*-axis
(b) along the negative *X*-axis
(c) at 45° to the positive *X*-axis
(d) at 135° to the positive *X*-axis

39. Particles and their anti-particles have :
(a) the same masses but opposite spins
(b) the same masses but opposite magnetic moments
(c) the same masses and same magnetic moments
(d) opposite spins and some magnetic moments

40. An *n-p-n* transistor power amplifier in C-E configuration gives :
(a) voltage amplification only
(b) currents amplification only
(c) both current and voltage amplifications
(d) only power gain of unity

CHEMISTRY

1. In Fischer-Ringe's method of separation of nobles gas mixture from air, ... is used :
(a) 90% CaC_2 + 10% $CaCl_2$
(b) coconut charcoal
(c) soda lime + potash solution
(d) 90% $CaCO_3$ + 10% urea

2. A complex compound of Co^{3+} with molecular formula $CoCl_x \cdot yNH_3$ gives a total of 3 ions when dissolved in water. How many Cl^- ions satisfy both primary and secondary valencies in this complex ?
(a) 3 (b) 1
(c) 4 (d) zero

3. The chemicals and the reaction conditions required for the preparation of ethane are :
(a) C_2H_5I, Zn-Cu, C_2H_5OH
(b) CH_3Cl, Na, H_2O
(c) KOOC–CH = CH – COOK, electrolysis
(d) CH_3CO_2Na, NaOH, CaO, Δ

4. Observe the following statements regarding purification of bauxite :
I. During Hall's process, silica is removed as Si (vapour).
II. Bauxite ore contaminated with Fe_2O_3 is purified in Baeyer's process.
III. During Serpeck's process, AlN is formed.
The correct answer is.
(a) I, II and III are correct
(b) Only I and II are correct
(c) Only I and III are correct
(d) Only II and III are correct

5. Sodium is heated in air at 300°C to form X.X absorbs CO_2 and forms Na_2CO_3 and Y. Which of the following is Y ?
(a) H_2 (b) O_2 (c) H_2O_2 (d) O_3

6. Identify A and B in the following reactions :
$$A \xrightarrow[\Delta]{\text{aq. NaOH}} C_2H_5OH \xleftarrow{AgOH} B$$
(a) $A = C_2H_2$, $B = C_2H_6$
(b) $A = C_2H_5Cl$, $B = C_2H_4$
(c) $A = C_2H_4$, $B = C_2H_5Cl$
(d) $A = C_2H_5Cl$, $B = C_2H_5Cl$

7. Which one of the following reactions does not form gaseous product ?
(a) $PbO_2 + H_2O_2 \rightarrow$
(b) Acidified $KMnO_4 + H_2O_2 \rightarrow$
(c) $PbS + H_2O_2 \rightarrow$
(d) $Cl_2 + H_2O_2 \rightarrow$

8. Which of the following is an example for heterogeneous catalysis reaction ?
(a) $2SO_2(g) + O_2(g) \xrightarrow{NO(g)} 2SO_3(g)$
(b) Hydrolysis of aqueous sucrose solution in the presence of aqueous mineral acid
(c) $2H_2O_2(l) \xrightarrow{Pt(s)} 2H_2O(l) + O_2(g)$
(d) Hydrolysis of liquid in the presence of aqueous mineral acid

9. In which of the following reactions the product is an ether ?
(a) $C_6H_6 + CH_3COCl$/anhydrous $AlCl_3$
(b) $C_2H_5Cl + aq.$ KOH
(c) $C_6H_6 + C_6H_5COCl$/anhydrous $AlCl_3$
(d) $C_2H_5Cl + C_2H_5ONa$

10. The atomic numbers of elements X, Y and Z are 19, 21 and 25 respectively. The number of electrons present in the M shell of these elements follow the order :
(a) Z > X > Y (b) X > Y > Z
(c) Z > Y > X (d) Y > Z > X

11. Which of the following, compounds is the reactant in Rosenmund's reduction ?
(a) CH_3CO_2H (b) CH_3CHO
(c) CH_3CH_2Cl (d) CH_3COCl

12. An electron is moving in Bohr's fourth orbit. Its de-Broglie wave length is λ. What is the circumference of the fourth orbit ?
(a) $\frac{2}{\lambda}$ (b) 2λ (c) 4λ (d) $\frac{4}{\lambda}$

13. The half-lives of two radioactive nuclides A and B are 1 and 2 min respectively. Equal weights of A and B are taken separately and allowed to disintegrate for 4 min. What will be the ratio of weights of A and B disintegrated ?
(a) 1 : 1 (b) 5 : 4
(c) 1 : 2 (d) 1 : 3

14. 3-hydroxybutanal is formed when (X) reacts with (Y) in dilute (Z) solution. What are X, Y and Z ?
(a) $\underset{X}{CH_3CHO}$, $\underset{Y}{(CH_3)_2CO}$, $\underset{Y}{NaOH}$
(b) CH_3CHO, CH_3CHO, NaCl
(c) $(CH_3)_2CO$, $(CH_3)_2CO$, HCl
(d) CH_3CHO, CH_3CHO, NaOH

15. Identify the correct order in which the covalent radius of the following elements increases :
(I) Ti (II) Ca (III) Sc
(a) (I), (II), (III) (b) (III), (II), (I)
(c) (II), (I), (III) (d) (I), (III), (II)

16. Which of the following is a linear molecule ?
(a) $BeCl_2$ (b) H_2O
(c) SO_2 (d) CH_4

17. 'Natalite' is used as :
(a) anaesthetic (b) substitute for petrol
(c) insecticide (d) preservative

18. Which of the following is correct ?
(a) The number of electrons present in the valence shell of S in SF_6 is 12
(b) The rates of ionic reactions are very slow
(c) According to VSEPR theory, $SnCl_2$ is a linear molecule
(d) The correct order of ability to form ionic compounds among Na^+, Mg^{2+} and Al^{3+} is $Al^{3+} > Mg^{2+} > Na^+$

19. x grams of calcium carbonate was completely burnt in air. The weight of the solid residue formed is 28 g. What is the value of x (in grams) ?
(a) 44 (b) 200 (c) 150 (d) 50

20. In the reaction,

$$\underset{\text{(Vapour)}}{C_2H_5OH} \xrightarrow[300°C]{Cu} X$$

The molecular formula of X is :
(a) C_4H_6O (b) $C_4H_{10}O$
(c) C_2H_4O (d) C_2H_6

21. A and B are ideal gases. The molecular weights of A and B are in the ratio of 1 : 4. The pressure of a gas mixture containing equal weights of A and B is P atm. What is the partial pressure (in atm) of B in the mixture ?
(a) $\frac{P}{5}$ (b) $\frac{P}{2}$
(c) $\frac{P}{2.5}$ (d) $\frac{3P}{4}$

22. The vapour pressure of water at 23°C is 19.8 mm. 0.1 mole of glucose is dissolved in 178.2 g of water. What is the vapour pressure (in mm) of the resultant solution ?
(a) 19.0 (b) 19.602 (c) 19.402 (d) 19.202

23. Which of the following is not correct ?
(a) Chlorophyll is responsible for the synthesis of carbohydrates in plants
(b) The compound formed in the addition of oxygen to haemoglobin is called oxyhaemoglobin
(c) Acetyl salicylic acid is known as aspirin
(d) The metal ion present in vitamin B_{12} is Mg^{2+}

24. **Assertion (A) :** The pH of a buffer solution containing equal moles of acetic acid and sodium acetate is 4.8 (pK_a of acetic acid is 4.8).
Reason (R) : The ionic product of water at 25°C is 10^{-14} $mol^2 . L^{-2}$. The correct answer is :
(a) Both (A) and (R) are true and (R) is the correct explanation of (A)
(b) Both (A) and (R) are true and (R) is not the correct explanation of A
(c) (A) is true but (R) is not true
(d) (A) is not true but (R) is true

25. What is the quantity of electricity (in Coulombs) required to deposit all the silver from 250 mL of 1 M $AgNO_3$ solution ?
(a) 2412.5 (b) 24125
(c) 4825.0 (d) 48250

26. Which of the following is not an air pollutant ?
(a) N_2 (b) N_2O
(c) NO (d) CO

27. Which of the following is not correct ?
(a) Aqueous solution of NaCl is an electrolyte
(b) The units of electrochemical equivalent are g- Coulomb
(c) In the Nernst equation, n represents the number of electrons transferred in the electrode reaction
(d) Standard reduction potential of hydrogen electrode is zero volt

28. Observe the following reaction :

$$2A + B \longrightarrow C$$

The rate of formation of C is 2.2×10^{-3} mol L^{-1} min^{-1}. What is the value of $-\frac{d[A]}{dt}$ (in mol $L^{-1}min^{-1}$) ?
(a) 2.2×10^{-3} (b) 1.1×10^{-3}
(c) 4.4×10^{-3} (d) 5.5×10^{-3}

29. Which of the following compounds is soluble in benzene but almost insoluble in water ?
(a) C_2H_5OH (b) CH_3CO_2H
(c) CH_3CHO
(d) $C_6H_5NO_2$

30. At 550 K, the K_c for the following reaction is 10^4 mol^{-1} L

$$X(g) + Y(g) \rightleftharpoons Z(g)$$

At equilibrium, it was observed that :

$$[X] = \frac{1}{2}[Y] = \frac{1}{2}[Z].$$

What is the value of [Z] (in mol L^{-1}) at equilibrium ?

(a) 2×10^{-4} (b) 10^{-4}

(c) 2×10^4 (d) 10^4

31. Which of the following is not correct ?

(a) Dissolution of NH_4Cl in excess of water is an endothermic process

(b) Neutralisation process is always exothermic

(c) The absolute value of enthalpy (H) can be determined experimentally

(d) The heat of reaction at constant volume is denoted by ΔE

32. Which of the following is a pair of functional isomers ?

(a) CH_3COCH_3, CH_3CHO

(b) $C_2H_5CO_2H$, $CH_3CO_2CH_3$

(c) $C_2H_5CO_2H$, $CHCO_2C_2H_5$

(d) CH_3CO_2H, CH_3CHO

33. The pH of a solution of H_2O_2 is 6.0. Some chlorine gas is bubbled into this solution. Which of the following is correct ?

(a) The pH of resultant solution becomes 8.0

(b) Hydrogen gas is liberated from resultant solution

(c) The pH of resultant solution becomes less than 6.0 and oxygen gas is liberated

(d) Cl_2O is formed in the resultant solution

34. In which of the following reactions, MgO is not formed ?

(a) $Mg + CO_2 \longrightarrow$

(b) $Mg + \text{dil. } HNO_3 \longrightarrow$

(c) $Mg + NO \xrightarrow{\Delta}$

(d) $Mg + B_2O_3 \longrightarrow$

35. The compound prepared by a substitution reaction of benzene is :

(a) acetophenone

(b) glyoxal

(c) cyclohexane

(d) hexabromo cyclohexane

36. Which of the following is not correct ?

(a) SiO_2 is used as acid flux

(b) The distance between the layers in graphite is 3.35×10^{-3} cm

(c) SiO_2 reacts with Na_2CO_3 and liberates CO.

(d) The hybridisation of C in graphite is sp^2

37. Which of the following is not correct ?

(a) Ammonia is used as refrigerant

(b) A mixture of $Ca(CN)_2$ and C is known as nitrolim

(c) A mixture of $Ca(H_2PO_4)_2$ and $CaSO_4.2H_2O$ is known as superphosphate of lime

(d) Hydrolysis of NCl_3 gives NH_3 and HOCl

38. Match the following lists :

	List-I		List-II
(A)	Benzene	1.	Phosgene
(B)	Ethylene	2.	Silver mirror
(C)	Acetaldehyde	3.	Mustard gas
(D)	Chloroform	4.	$(4n+2)\pi$ electrons
		5.	Carbylamine

The correct answer is

	A	B	C	D		A	B	C	D
(a)	4	3	2	1	(b)	3	2	1	4
(c)	2	4	5	3	(d)	5	1	4	3

39. Which of the following is not correct ?

(a) Iodine oxidises sodium thiosulphate to sodium tetrathionate

(b) Sodium thiousulphate is soluble in water

(c) Ozone is used to identify the presence of unsaturation in alkenes

(d) Sodium thiosulphate reacts with iodine to form sodium sulphate

40. Which one of the following pairs of reactants does not form oxygen when they react with each other ?

(a) F_2, NaOH solution (hot, conc.)

(b) F_2, H_2O

(c) Cl_2, NaOH solution (cold, dilute)

(d) $CaOCl_2$, H_2SO_4 (dilute, small amount)

1. $\{x \in R : [x - |x|] = 5\}$ is equal to :
   (a) R, the set of all real numbers
   (b) ϕ, the empty set
   (c) $\{x \in R : x < 0\}$
   (d) $\{x \in R : x \geq 0\}$

2. The function $f : C \to C$ defined by
   $f(x) = \frac{ax + b}{cx + d}$
   for $x \in C$ where $bd \neq 0$ reduces to a constant function, if :
   (a) $a = c$ (b) $b = d$
   (c) $ad = bc$ (d) $ab = cd$

3. If N denotes the set of all positive integers and if $f : N \to N$ is defined by $f(n) =$ the sum of positive divisors of n then, $f(2^k . 3)$, where k is a positive integers, is :
   (a) $2^{k+1} - 1$ (b) $2(2^{k+1} - 1)$
   (c) $3(2^{k+1} - 1)$ (d) $4(2^{k+1} - 1)$

4. $x = \frac{1}{2}\left(\sqrt{3} + \frac{1}{\sqrt{3}}\right)$ then $\frac{\sqrt{x^2 - 1}}{x - \sqrt{x^2 - 1}}$ is equal to :
   (a) 1 (b) 2 (c) 3 (d) $\frac{1}{2}$

5. If $a, b, c \neq 0$ and belong to the set {0, 1, 2, 3 ....., 9}, then
   $\log_{10}\left(\frac{a + 10b + 10^2 c}{10^{-4} a + 10^{-3} b + 10^{-2} c}\right)$ is equal to :
   (a) 1 (b) 2 (c) 3 (d) 4

6. $\{n(n+1)(2n+1) : n \in Z\} \subset$
   (a) $\{6k : k \in Z\}$ (b) $\{12k : k \in Z\}$
   (c) $\{18k : k \in Z\}$ (d) $\{24k : k \in Z\}$

7. A three digit number n is such that the last two digits of it are equal and differ from the first. The number of such n's is :
   (a) 64 (b) 72 (c) 81 (d) 900

8. If $(1 + x)^{15} = a_0 + a_1 x + \ldots + a_{15} x^{15}$, then $\sum_{r=1}^{15} r \frac{a_r}{a_{r-1}}$ is equal to :
   (a) 110 (b) 115 (c) 120 (d) 135

9. The coefficient of $x^3 y^4 z^5$ in the expansion of $(xy + yz + xz)^6$ is :
   (a) 70 (b) 60
   (c) 50 (d) none of these

10. If $|x| < \frac{1}{2}$, then the coefficient of x^r in the expansion of $\frac{1 + 2x}{(1 - 2x)^2}$, is :
    (a) $r\,2^r$ (b) $(2r - 1)\,2^r$
    (c) $r\,2^{2r+1}$ (d) $(2r + 1)\,2^r$

11. If $\frac{x^3}{(2x - 1)(x + 2)(x - 3)} = A + \frac{B}{2x - 1} + \frac{C}{x + 2} + \frac{D}{x - 3}$ then A is equal to :
    (a) $\frac{1}{2}$ (b) $-\frac{1}{50}$ (c) $-\frac{8}{25}$ (d) $\frac{27}{25}$

12. $\sum_{n=1}^{\infty} \frac{2n^2 + n + 1}{n!}$ is equal to :
    (a) $2e - 1$ (b) $2e + 1$
    (c) $6e - 1$ (d) $6e + 1$

13. If $|a| < 1, b = \sum_{k=1}^{\infty} \frac{a^k}{k}$ then a is equal to :
    (a) $\sum_{k=1}^{\infty} \frac{(-1)^k b^k}{k}$ (b) $\sum_{k=1}^{\infty} \frac{(-1)^{k-1} b^k}{k!}$
    (c) $\sum_{k=1}^{\infty} \frac{(-1)^k b^k}{(k-1)!}$ (d) $\sum_{k=1}^{\infty} \frac{(-1)^{k-1} b^k}{(k+1)!}$

14. If x is real, then the minimum value of $\frac{x^2}{x^2} \frac{-x+1}{+x+1}$, is :
    (a) $\frac{1}{3}$ (b) 3 (c) $\frac{1}{2}$ (d) 1

15. $E_1 : a + b + c = 0$, if 1 is a root of $ax^2 + bx + c = 0$.
    $E_2 : b^2 - a^2 = 2ac$, if $\sin\theta, \cos\theta$ are the roots of $ax^2 + bx + c = 0$.
    Which of the following is true ?
    (a) E_1 is true, E_2 is true
    (b) E_1 is true, E_2 is false
    (c) E_1 is false, E_2 is true
    (d) E_1 is false, E_2 is false

16. The roots of the equation $x^3 - 3x - 2 = 0$ are :
    (a) $-1, -1, 2$ (b) $-1, 1, -2$
    (c) $-1, 2, -3$
    (d) $-1, -1, -2$

17. If α, β, γ are the roots of $x^3 + 2x^2 - 3x - 1 = 0$, then $\alpha^{-2} + \beta^{-2} + \gamma^{-2} =$
(a) 12 (b) 13 (c) 14 (d) 15

18. If $m[-3 \quad 4] + n[4 \quad -3] = [10 \quad -11]$ then $3m + 7n$ is equal to :
(a) 3 (b) 5 (c) 10 (d) 1

19. $\text{adj}\begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix}$
then $[a \quad b]$ is equal to :
(a) $[-4 \quad 1]$ (b) $[-4 \quad -1]$
(c) $[4 \quad 1]$ (d) $[4 \quad -1]$

20. If $A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix}$ then $A^3 - A^2$ is equal to :
(a) $2A$ (b) $2I$ (c) A (d) I

21. If $\alpha_1, \alpha_2, \alpha_3$ respectively denote the moduli of the complex number $-i, \frac{1}{3}(1+i)$ and $-1+i$, then their increasing order is :
(a) $\alpha_1, \alpha_2, \alpha_3$ (b) $\alpha_3, \alpha_2, \alpha_1$
(c) $\alpha_2, \alpha_1, \alpha_3$ (d) $\alpha_3, \alpha_1, \alpha_2$

22. If α is a non-real root of $x^6 = 1$, then $\frac{\alpha^5 + \alpha^3 + \alpha + 1}{\alpha^2 + 1}$ is equal to :
(a) α^2 (b) 0 (c) $-\alpha^2$ (d) α

23. If $\cos\theta - 4\sin\theta = 1$ then $\sin\theta + 4\cos\theta$ is equal to :
(a) ± 1 (b) 0 (c) ± 2 (d) ± 4

24. The extreme values of
$4\cos(x^2)\cos\left(\frac{\pi}{3} + x^2\right)\cos\left(\frac{\pi}{3} - x^2\right)$
over R, are :
(a) $-1, 1$ (b) $-2, 2$ (c) $-3, 3$ (d) $-4, 4$

25. If $\frac{\tan 3A}{\tan A} = a$ then $\frac{\sin 3A}{\sin A}$ is equal to :
(a) $\frac{2a}{a+1}$ (b) $\frac{2a}{a-1}$ (c) $\frac{a}{a+1}$ (d) $\frac{a}{a-1}$

26. If $A + C = 2B$ then $\frac{\cos C - \cos A}{\sin A - \sin C}$ is equal to :
(a) $\cot B$ (b) $\cot 2B$
(c) $\tan 2B$ (d) $\tan B$

27. $A + B = C \Rightarrow \cos^2 A + \cos^2 B + \cos^2 C - 2\cos A \cos B \cos C$ is equal to :
(a) 1 (b) 2 (c) 0 (d) 3

28. If $\cos 2x = (\sqrt{2}+1)\left(\cos x - \frac{1}{\sqrt{2}}\right)$, $\cos x \neq \frac{1}{2}$ then $x \in$:
(a) $\left\{2n\pi \pm \frac{\pi}{3} : n \in Z\right\}$
(b) $\left\{2n\pi \pm \frac{\pi}{6} : n \in Z\right\}$
(c) $\left\{2n\pi \pm \frac{\pi}{2} : n \in Z\right\}$
(d) $\left\{2n\pi \pm \frac{\pi}{4} : n \in Z\right\}$

29. $\sin^{-1}\frac{4}{5} + 2\tan^{-1}\frac{1}{3}$ is equal to :
(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) 0

30. $2\tanh^{-1}\frac{1}{2}$ is equal to :
(a) 0 (b) log 2
(c) log 3 (d) log 4

31. In a ΔABC, $a(\cos^2 B + \cos^2 C) + \cos A$ $(c\cos C + b\cos B)$ is equal to :
(a) a (b) b (c) c (d) $a + b + c$

32. In a ΔABC, $\Sigma(b+c)\tan\frac{A}{2}\tan\left(\frac{B-C}{2}\right)$ is equal to :
(a) a (b) b (c) c (d) 0

33. Two sides of a triangle are given by the roots of the equation $x^2 - 5x + 6 = 0$ and the angle between the sides is $\frac{\pi}{3}$. Then the perimeter of the triangle is :
(a) $5 + \sqrt{2}$ (b) $5 + \sqrt{3}$
(c) $5 + \sqrt{5}$ (d) $5 + \sqrt{7}$

34. A tower, of x metres high, has a flagstaff at its top. The tower and the flagstaff subtend equal angles at a point distant y metres from the foot of the tower. Then the length of the flagstaff (in metres), is :
(a) $\frac{y(x^2 - y^2)}{(x^2 + y^2)}$ (b) $\frac{x(y^2 + x^2)}{(y^2 - x^2)}$
(c) $\frac{x(x^2 + y^2)}{(x^2 - y^2)}$ (d) $\frac{x(x^2 - y^2)}{(x^2 + y^2)}$

35. If the vector $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$ and $\vec{b}$ are collinear and $|\vec{b}| = 21$, then $\vec{b}$ is equal to :
(a) $\pm(2\hat{i} + 3\hat{j} + 6\hat{k})$
(b) $\pm 3(2\hat{i} + 3\hat{j} + 6\hat{k})$
(c) $(\hat{i} + \hat{j} + \hat{k})$
(d) $\pm 21(2\hat{i} + 3\hat{j} + 6\hat{k})$

36. If $\vec{a}$ and $\vec{b}$ are unit vectors, then the vector $(\vec{a} + \vec{b}) \times (\vec{a} \times \vec{b})$ is parallel to the vector :
(a) $\vec{a} - \vec{b}$ (b) $\vec{a} + \vec{b}$
(c) $2\vec{a} - \vec{b}$ (d) $2\vec{a} + \vec{b}$

37. I : Two non-zero, non-collinear vectors are linearly independent.
II : Any three coplanar vectors are linearly dependent.
Which of the above statements is/are true ?
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

38. Observe the following lists :

List I		List II	
(A)	$[\vec{a}\,\vec{b}\,\vec{c}]$	1.	$\lvert\vec{a}\rvert\,\lvert\vec{b}\rvert\cos(\vec{a}\,\vec{b})$
(B)	$(\vec{c} \times \vec{a}) \times \vec{b}$	2.	$(\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{b})\vec{c}$
(C)	$\vec{a} \times (\vec{b} \times \vec{c})$	3.	$\vec{a}.\vec{b} \times \vec{c}$
(D)	$\vec{a}.\vec{b}$	4.	$\lvert\vec{a}\rvert\,\lvert\vec{b}\rvert$
		5.	$(\vec{b}.\vec{c})\vec{a} - (\vec{a}.\vec{b})\vec{c}$

Then the correct match for List I from List II is :

	A	B	C	D		A	B	C	D
(a)	1	2	3	4	(b)	3	5	2	1
(c)	3	5	5	1	(d)	3	2	1	5

39. Observe the following statements :
A : Three vectors are coplanar if one of them is expressible as a linear combination of the other two.
R : Any three coplanar vectors are linearly dependent.
Then which of the following is true ?
(a) Both *A* and *R* are true and *R* is the correct explanation of *A*
(b) Both *A* and *R* are true but *R* is not the correct explanation of *A*
(c) *A* is true, but *R* is false
(d) *A* is false, but *R* is true

40. A coin and six faced die, both unbiassed, are thrown simultaneously. The probability of getting a head on the coin and an odd number on the die, is :
(a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{2}{3}$

41. A number n is chosen at random from $S = \{1, 2, 3, \ldots, 50\}$. Let $A = \left\{n \in S : n + \frac{50}{n} > 27\right\}$, $B = \{n \in S : n$ is a prime$\}$ and $C = \{n \in S : n$ is a square$\}$. Then correct order of their probabilities is :
(a) $P(A) < P(B) < P(C)$
(b) $P(A) > P(B) > P(C)$
(c) $P(B) < P(A) < P(C)$
(d) $P(A) > P(C) > P(B)$

42. Box *A* contains 2 black and 3 red balls, while Box *B* contains 3 black and 4 red balls. Out of these two boxes one is selected at random; and the probability of choosing Box *A* is double that of Box *B*. If a red ball is drawn from the selected box, then the probability that it has come from Box *B*, is :
(a) $\frac{21}{41}$ (b) $\frac{10}{31}$ (c) $\frac{12}{31}$ (d) $\frac{13}{41}$

43. If the range of a random variable X is $\{0, 1, 2, 3, 4, \ldots\ldots\}$ with $P(X = k) = \frac{(k+1)a}{3^k}$ for $k \geq 0$, then a is equal to :
(a) $\frac{2}{3}$ (b) $\frac{4}{9}$ (c) $\frac{8}{27}$ (d) $\frac{16}{81}$

44. For a binomial variate X with $n = 6$, if $P(X = 2) = 9\,P(X = 4)$, then its variance is :
(a) $\frac{8}{9}$ (b) $\frac{1}{4}$ (c) $\frac{9}{8}$ (d) 4

45. If a point P moves such that its distances from the point A (1, 1) and the line $x + y + 2 = 0$ are equal, then the locus of P is :
(a) a straight line
(b) a pair of straight lines
(c) a parabola (d) an ellipse

46. The area (in square units) of the triangle formed by the lines $x = 0, y = 0$ and $3x + 4y = 12$, is :
(a) 3 (b) 4 (c) 6 (d) 12

47. If PM is the perpendicular from P (2, 3) onto the line $x + y = 3$, then the co-ordinates of M are :
(a) (2, 1) (b) (– 1, 4) (c) (1, 2) (d) (4, – 1)

48. The equation of the straight line perpendicular to $5x - 2y = 7$ and passing through the point of intersection of the lines $2x + 3y = 1$ and $3x + 4y = 6$, is :
(a) $2x + 5y + 17 = 0$ (b) $2x + 5y - 17 = 0$
(c) $2x - 5y + 17 = 0$ (d) $2x - 5y = 17$

49. The area of the triangle formed by the pair of straight lines
$(ax + by)^2 - 3(bx - ay)^2 = 0$
and $ax + by + c = 0$, is :
(a) $\frac{c^2}{a^2 + b^2}$ (b) $\frac{c^2}{2(a^2 + b^2)}$
(c) $\frac{c^2}{\sqrt{2}(a^2 + b^2)}$ (d) $\frac{c^2}{\sqrt{3}(a^2 + b^2)}$

50. The product of the perpendicular distances from the origin on the pair of straight lines $12x^2 + 25xy + 12y^2 + 10x + 11y + 2 = 0$, is :
(a) $\frac{1}{25}$ (b) $\frac{2}{25}$ (c) $\frac{3}{25}$ (d) $\frac{4}{25}$

51. The direction cosines of the line passing through P (2, 3, – 1) and the origin are:
(a) $\frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$
(b) $\frac{2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$
(c) $\frac{-2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$
(d) $\frac{2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{-1}{\sqrt{14}}$

52. The point collinear with (1, – 2, – 3) and (2, 0, 0) among the following is :
(a) (0, 4, 6) (b) (0, – 4, – 5)
(c) (0, – 4, – 6) (d) (0, – 4, 6)

53. The equation of the circle whose diameter is the common chord of the circles
$x^2 + y^2 + 2x + 3y + 2 = 0$
and $x^2 + y^2 + 2x - 3y - 4 = 0$ is :
(a) $x^2 + y^2 + 2x + 2y + 2 = 0$
(b) $x^2 + y^2 + 2x + 2y - 1 = 0$
(c) $x^2 + y^2 + 2x + 2y + 1 = 0$
(d) $x^2 + y^2 + 2x + 2y + 3 = 0$

54. If $x - y + 1 = 0$ meets the circle $x^2 + y^2 + y - 1 = 0$ at A and B, then the equation of the circle with AB as diameter is :
(a) $2(x^2 + y^2) + 3x - y + 1 = 0$
(b) $2(x^2 + y^2) + 3x - y + 2 = 0$
(c) $2(x^2 + y^2) + 3x - y + 3 = 0$
(d) $x^2 + y^2 + 3x - y + 1 = 0$

55. If $y = 3x$ is a tangent to a circle with centre (1, 1), then the other tangent drawn through (0, 0) to the circle is :
(a) $3y = x$ (b) $y = -3x$
(c) $y = 2x$ (d) $y = -2x$

56. The parabola with directrix $x + 2y - 1 = 0$ and focus (1, 0) is :
(a) $4x^2 - 4xy + y^2 - 8x + 4y + 4 = 0$
(b) $4x^2 + 4xy + y^2 - 8x + 4y + 4 = 0$
(c) $4x^2 + 5xy + y^2 + 8x - 4y + 4 = 0$
(d) $4x^2 - 4xy + y^2 - 8x - 4y + 4 = 0$

57. The line among the following which touches the parabola $y^2 = 4ax$, is :
(a) $x + my + am^3 = 0$
(b) $x - my + am^2 = 0$
(c) $x + my - am^2 = 0$
(d) $y + mx + am^2 = 0$

58. The cartesian form of the polar equation $\theta = \tan^{-1} 2$ is :
(a) $x = 2y$ (b) $y = 2x$ (c) $x = 4y$ (d) $y = 4x$

59. Which of the following equations gives a circle ?
(a) $r = 2 \sin \theta$ (b) $r^2 \cos 2\theta = 1$
(c) $r(4 \cos \theta + 5 \sin \theta) = 3$
(d) $5 = r(1 + \sqrt{2} \cos \theta)$

60. $\lim_{x \to 0} x^2 \sin \frac{\pi}{x}$ is equal to :
(a) 1 (b) 0
(c) does not exist (d) ∞

61. If $f : R \to R$ is defined by
$$f(x) = \begin{cases} \frac{x-2}{x^2 - 3x + 2} & \text{if } x \in R - \{1, 2\} \\ 2 & \text{if } x = 1 \\ 1 & \text{if } x = 2 \end{cases}$$
then $\lim_{x \to 2} \frac{f(x) - f(2)}{x - 2} =$
(a) 0 (b) – 1 (c) 1 (d) $-\frac{1}{2}$

62. If $f: R \to R$ is defined by

$$f(x) = \begin{cases} \frac{x+2}{x^2+3x+2} & \text{if} \quad x \in R - \{-1, -2\} \\ -1 & \text{if} \quad x = -2 \\ 0 & \text{if} \quad x = -1 \end{cases}$$

then f is continuous on the set :

(a) R (b) $R - \{-2\}$

(c) $R - \{-1\}$ (d) $R - \{-1, -2\}$

63. If $f: R \to R$ is an even function which is twice differentiable on R and $f''(\pi) = 1$, then $f''(-\pi)$ is equal to :

(a) -1 (b) 0 (c) 1 (d) 2

64. Observe the following statements :

I. $f(x) = ax^{41} + bx^{-40} \Rightarrow \frac{f''(x)}{f(x)} = 1640\, x^{-2}$

II. $\frac{d}{dx} \tan^{-1}\left(\frac{2x}{1-x^2}\right) = \frac{1}{1+x^2}$

Which of the following is correct ?

(a) I is true, but II is false

(b) Both I and II are true

(c) Neither I nor II is true

(d) I is false, but II is true

65. If $f(x) = 10 \cos x + (13 + 2x) \sin x$ then $f''(x) + f(x)$ is equal to :

(a) $\cos x$ (b) $4 \cos x$

(c) $\sin x$ (d) $4 \sin x$

66. If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ then $\frac{dy}{dx}$ is equal to :

(a) $\frac{1}{(1+x)^2}$ (b) $-\frac{1}{(1+x)^2}$

(c) $\frac{1}{1+x^2}$ (d) $\frac{1}{1-x^2}$

67. A stone thrown upwards, has its equation of motion $s = 490t - 4.9t^2$. Then the maximum height reached by it, is :

(a) 24500 (b) 12500

(c) 12250 (d) 25400

68. The radius of a circular plate is increasing at the rate of 0.01 cm/sec when the radius is 12 cm. Then the rate at which the area increases, is :

(a) 0.24 π sq. cm/sec

(b) 60 π sq. cm/sec

(c) 24 π sq. cm/sec

(d) 1.2 π sq. cm/sec

69. Observe the following statements :

A : $f(x) = 2x^3 - 9x^2 + 12x - 3$ is increasing outside the interval (1, 2)

R : $f'(x) < 0$ for $x \in (1, 2)$.

Then which of the following is true ?

(a) Both A and R are true, and R is not the correct reason for A

(b) Both A and R are true, and R is the correct reason for A

(c) A is true but R is false

(d) A is false but R is true

70. If $u = \sin^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{y}{x}\right)$, then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is :

(a) 0 (b) 1

(c) 2 (d) none of these

71. If $\int \frac{\sin x}{\cos x\,(1+\cos x)}\,dx = f(x) + c$ then $f(x)$ is equal to :

(a) $\log\left|\frac{1+\cos x}{\cos x}\right|$ (b) $\log\left|\frac{\cos x}{1+\cos x}\right|$

(c) $\log\left|\frac{\sin x}{1+\sin x}\right|$ (d) $\log\left|\frac{1+\sin x}{\sin x}\right|$

72. $\int \frac{x^{49} \tan^{-1}(x^{50})}{(1+x^{100})}\,dx = k\,(\tan^{-1}(x^{50}))^2 + c$ then k is equal to :

(a) $\frac{1}{50}$ (b) $-\frac{1}{50}$ (c) $\frac{1}{100}$ (d) $-\frac{1}{100}$

73. $\int_0^{\pi/2} \frac{200 \sin x + 100 \cos x}{\sin x + \cos x}\,dx$ is equal to :

(a) 50 π (b) 25 π (c) 75 π (d) 150 π

74. $\int_0^{\pi} \frac{\theta \sin\theta}{1+\cos^2\theta}\,d\theta$ is equal to :

(a) $\frac{\pi^2}{2}$ (b) $\frac{\pi^3}{3}$

(c) π^2 (d) $\frac{\pi^2}{4}$

75. If $\int \sin^{-1}\left(\frac{2x}{1+x^2}\right)dx = f(x) - \log(1+x^2) + c$ then $f(x)$ is equal to :

(a) $2x \tan^{-1} x$ (b) $-2x \tan^{-1} x$

(c) $x \tan^{-1} x$ (d) $-x \tan^{-1} x$

76. The area (in square units) bounded by the curves $y^2 = 4x$ and $x^2 = 4y$ in the plane is :
(a) $\frac{8}{3}$ (b) $\frac{16}{3}$ (c) $\frac{32}{3}$ (d) $\frac{64}{3}$

77. If $dx + dy = (x + y)(dx - dy)$ then $\log(x + y)$ is equal to :
(a) $x + y + c$ (b) $x + 2y + c$
(c) $x - y + c$ (d) $2x + y + c$
(In the above, c denotes a constant)

78. If $x^2y - x^3\frac{dy}{dx} = y^4 \cos x$ then $x^3 y$ is equal to :
(a) $\sin x$ (b) $2 \sin x + c$
(c) $-3 \sin x + c$ (d) $3 \cos x + c$

79. Observe the following statements :
I. If $dy + 2xy\,dx = 2e^{-x^2}dx$ then $ye^{x^2} = 2x + c$
II. If $ye^{-x^2} - 2x = c$ then $dx = (2e^{-x^2} - 2xy)\,dy$
Which of the following is a correct statement ?
(a) Both I and II are true
(b) Neither I nor II is true
(c) I is true, II is false
(d) I is false, II is true

80. If $\frac{dy}{dx} = \frac{y + x\tan\frac{y}{x}}{x}$ then $\sin\frac{y}{x}$ is equal to :
(a) cx^2 (b) cx (c) cx^3 (d) cx^4

Answers

PHYSICS

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

CHEMISTRY

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

MATHEMATICS

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