

WB JEE

Engineering Entrance Exam

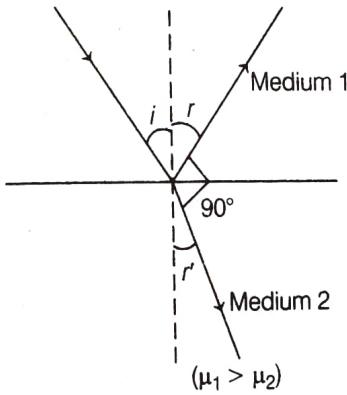
Practice Set 1

Physics

Category I (Q. Nos. 1 to 30)

*Carry 1 marks each and only one option is correct.
In case of incorrect answer or any combination of
more than one answer, 1/4 mark will be deducted.*

1. A ray of light is incident on a transparent glass slab of refractive index 1.62. If the reflected and refracted rays are mutually perpendicular, then what is the angle of incidence?



- (a) 58.3° (b) 85.3°
 (c) 60° (d) 65°

2. For a substance, the average life for α -emission is 1620 yr and for β -emission is 405 yr. After how much time, the $\frac{1}{4}$ th of the material remains after α and β -emission?

- (a) 1500 yr
 (b) 300 yr
 (c) 449 yr
 (d) 810 yr

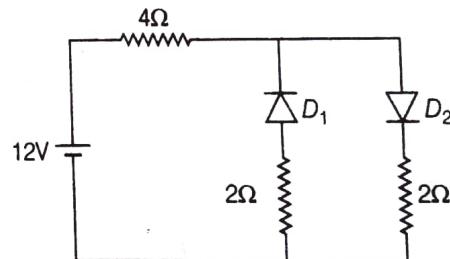
3. When the momentum of a proton is changed by an amount p_0 , the corresponding change in the de-Broglie wavelength is found to be 0.25%. Then, the original momentum of the proton was

- (a) p_0 (b) $100 p_0$
 (c) $400 p_0$ (d) $4 p_0$

4. Difference between n th and $(n + 1)$ th Bohr's radius H-atom is equal to its $(n - 1)$ th Bohr's radius. The value of n is

- (a) 1 (b) 2 (c) 3 (d) 4

5. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



6. A truth table is given below. Which of the following has this type of truth table?

A	B	Y
0	0	1
1	0	0
0	1	0
1	1	0

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- (a) NOR gate
(c) AND gate

- (b) OR gate
(d) NAND gate

7. The correct dimensional formula for pressure is given by

- (a) $[ML^{-1}T^{-1}]$
(c) $[ML^2T^{-2}]$
- (b) $[ML^{-1}T^{-2}]$
(d) $[MLT^{-2}]$

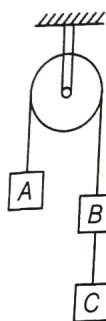
8. The velocity of transverse wave in a string is

$$v = \sqrt{\frac{T}{M}}, \text{ where } T \text{ is the tension in the string}$$

and M is mass per unit length. If $T = 3.0 \text{ kgf}$, mass of string is 2.5 g and length of string is 1.00 m , then the percentage error in the measurement of velocity is

- (a) 0.5 (b) 0.7 (c) 2.3 (d) 3.6

9. Three equal weight A , B and C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weight B and C is



- (a) zero (b) 13 N (c) 3.3 N (d) 19.6 N

10. The displacement of a body along X -axis depends on time as $\sqrt{x} = t + 1$, then the

- velocity of a body
(a) increase with time (b) decrease with time
(c) independent of time (d) None of these

11. A heavy particle is projected from a point at the foot of a flying plane, inclined at an angle 45° to the horizontal, in the vertical plane containing the line of greatest slope through the point. If $\theta (> 45^\circ)$ is the inclination with the horizontal of the initial direction of projection, for what value of $\tan \phi$ will the particle strike the plane?

- (a) $\tan \theta = 1$
(c) $\sin \theta = \frac{1}{2}$
- (b) $\tan \theta = 2$
(d) $\sin \theta = \frac{1}{\sqrt{2}}$

12. The planet neptune travels around the sun with a period of 165 yr . What is the radius of orbit approximately, if the orbit is considered as circular?
(a) $20R_1$ (b) $30R_1$ (c) $25R_1$ (d) $35R_1$

13. A steel wire of length 4 m and diameter 5 mm is stretched by 5 kg-wt . The increase in its length, if the Young's modulus of steel wire is $2.4 \times 10^{12} \text{ dyne cm}^{-2}$ is
(a) 0.003 m (b) 0.0041 cm
(c) 0.00041 cm (d) 0.005 cm

14. The terminal velocity of a copper ball of radius 2 mm falling through a tank of oil at 20°C is 6.5 cms^{-1} . The viscosity of the oil at 20°C is [Take, density of oil $= 1.5 \times 10^3 \text{ kgm}^{-3}$, density of copper $= 8.9 \times 10^3 \text{ kgm}^{-3}$]
(a) $3.3 \times 10^{-1} \text{ kg m}^{-1}\text{s}^{-1}$ (b) $6.3 \times 10^{-2} \text{ kg m}^{-1}\text{s}^{-1}$
(c) $9.2 \times 10^{-3} \text{ kg m}^{-1}\text{s}^{-1}$ (d) $9.9 \times 10^{-1} \text{ kg m}^{-1}\text{s}^{-1}$

15. A black body at 227°C radiates heat at a rate of $7 \text{ cal/cm}^2\text{s}$. At a temperature of 727°C , the rate of heat radiated in the same units will be
(a) 112 (b) 105 (c) 101 (d) 89

16. A flask contains argon and chlorine in the ratio of $2 : 1$ by mass. The temperature of the mixture is 27°C . Root mean square speed v_{rms} of the molecules of the two gases is
[Take, atomic mass of argon = 39.9 u , molecular mass of chlorine = 70.9 u]
(a) 1.33 (b) 3.3
(c) 2.2 (d) 0.22

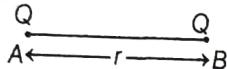
17. Two moles of an ideal gas is contained in a cylinder fitted with a frictionless movable piston. Exposed to the atmosphere, at an initial temperature T_0 . The gas is slowly heated, so that its volume becomes four times the initial value.
(a) $2RT_0$ (b) $4RT_0$ (c) $6RT_0$ (d) zero

18. The diameter of each plate of an air capacitor is 4 cm . To make the capacity of this parallel plate capacitor equal to that of a sphere of diameter 20 cm . The distance between the plates will be
(a) $1 \times 10^{-3} \text{ cm}$
(b) 1 cm
(c) $4 \times 10^{-3} \text{ m}$
(d) $1 \times 10^{-3} \text{ m}$

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19. A copper ball 1 cm in diameter is immersed in oil with a density 800 kg m^{-3} . What is the charge of the ball, if in a homogeneous electric field, it is suspended in oil? The electric field is directed vertically upwards and its intensity $E = 3600 \text{ V cm}^{-1}$. The density of copper is 8600 kg m^{-3}
- (a) $1.10 \times 10^{-7} \text{ C}$ (b) $1.10 \times 10^{-8} \text{ C}$
 (c) $1.11 \times 10^{-7} \text{ C}$ (d) $1.11 \times 10^{-8} \text{ C}$

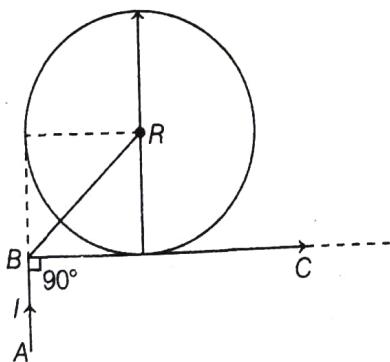
20. Two charges of magnitude 'Q' are located at distance 'r' as shown in figure. A third charge q is placed on the line joining the above two charges such that all the three charges are in equilibrium.



What is the magnitude, sign and position of the charge?

- (a) $Q/4$ and it is located exactly midway A and B
 (b) $-Q/4$ and it is located exactly midway A and B
 (c) $Q/2$ and it is located exactly midway A and B
 (d) None of the above
21. The magnetic moment of an electron orbiting in a circular orbits of radius r with a speed v is equal to
- (a) $evr/2$ (b) evr
 (c) $er/2v$ (d) None of these

22. The magnetic field at the centre of the circular loop as shown in figure, when a single wire is bent to form a circular loop and also extends to form straight section is



- (a) $\frac{\mu_0 I}{2R}$ (b) $\frac{\mu_0 I}{2R} \left(1 + \frac{1}{\pi\sqrt{2}}\right)$
 (c) $\frac{\mu_0 I}{2R} \left(1 - \frac{1}{\pi\sqrt{2}}\right)$ (d) $\frac{\mu_0 I}{R} \left(1 - \frac{1}{\pi\sqrt{2}}\right)$

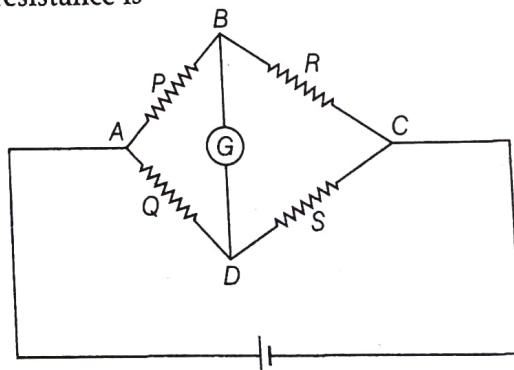
23. A proton, a deuteron and an α -particle moving with same kinetic energy enter a region of uniform magnetic field moving at right angles to the direction of field. Ratio of radii of circular paths travelled by these particle is

- (a) $\sqrt{2} : \sqrt{2} : 1$ (b) $1 : \sqrt{2} : 1$
 (c) $\sqrt{2} : 1 : 1$ (d) $1 : \sqrt{2} : \sqrt{2}$

24. A vertical wire carries a current in upward direction. An electron beam sent horizontally towards the wire will be deflected
- (a) upwards (b) downwards
 (c) towards left (d) towards right

25. The supply voltage to room is 120 V. The resistance of the lead wires is 6Ω . A 60 W bulb is already switched ON. What is the decrease of voltage across the bulb, when a 240 W heater is switched ON in parallel to the bulb?
- (a) 2.9 V (b) 13.3 V (c) zero (d) 10.04 V

26. In the Wheatstone's network figure $P = 10\Omega$, $Q = 20\Omega$, $R = 15\Omega$, $S = 30\Omega$. The current passing through battery of negligible resistance is



- (a) 0.36 A (b) 0 A (c) 0.18 A (d) 0.72 A

27. A coil of inductance 300 mH and resistance 2Ω is connected to a source of voltage 2 V. The current reaches half of its steady state value in
- (a) 0.3 s (b) 0.1 s (c) 0.15 s (d) 0.05 s

28. In Young's double slit experiment, intensity at a point is $(1/4)$ of the maximum intensity, angular position of this point is
- (a) $\sin^{-1}(\lambda/4d)$ (b) $\sin^{-1}(\lambda/2d)$
 (c) $\sin^{-1}\left(\frac{\lambda}{3d}\right)$ (d) $\sin^{-1}\left(\frac{\lambda}{d}\right)$

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29. An object is placed at 10 cm in front of a concave mirror of radius of curvature 15 cm. Which one of the following statement regarding the nature of image is true?
- Image is small, imaginary and inverted
 - Image is magnified, real and inverted
 - Image is magnified, false and straight
 - Image is small, imaginary and straight
30. In a single slit diffraction experiment, first minima for $\lambda_1 = 660$ nm coincides with first maxima for wavelength λ_2 , then λ_2 will be equal to
- 240 nm
 - 345 nm
 - 440 nm
 - 330 nm

Category II (Q. Nos. 31 to 35)

Carry 2 marks each and only one option is correct. In case of incorrect answer or any combination of more than one answer, 1/2 mark will be deducted.

31. The equivalent inductance of two inductors is 2.4 H when connected in parallel and 10 H when connected in series. What is the value of inductances of the individual inductors?
- 2 H, 8 H
 - 4 H, 6 H
 - 3 H, 7 H
 - 5 H, 5 H
32. Two syringes of different cross-sections (without needles) filled with water are connected with a tightly fitted rubber tube filled with water. Diameters of the smaller piston and longer piston are 1 cm and 3 cm respectively. If the smaller piston is pushed in through 6 cm, how much does the longer piston move out?
- 0.37 cm
 - 0.67 cm
 - 37 cm
 - 67 cm

33. In an experiment on the specific heat of a metal, a 0.20 kg block of the metal at 150°C is dropped in a copper calorimeter (of water equivalent 0.025 kg) containing 150 cc of water at 27°C. The final temperature is 40°C. Calculate the specific heat of the metal. If heat losses to the surroundings are not negligible, is our answer greater or smaller than the actual value of specific heat of the metal?
- 0.02
 - 0.2
 - 0.01
 - 0.1

34. A plane electromagnetic wave of frequency 25 MHz travels in free space along the x -direction. At a particular point in space and time, $E = 6.3 \hat{j} \text{ Vm}^{-1}$, the value of magnetic field B at that point is (in tesla)

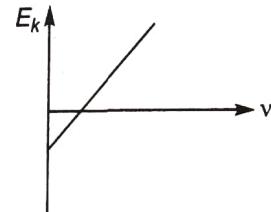
- 6.3 kT
- $6.3 \times 10^{-8} \text{ kT}$
- $2.1 \times 10^{-8} \text{ kT}$
- 2.1 kT

35. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series $L-C-R$ circuit in which $R = 3\Omega$, $L = 25.48 \text{ mH}$ and $C = 796 \mu\text{F}$. Then, the phase difference between the voltage across the source and the current is
- 53.1°
 - 42.4°
 - 28.3°
 - 0°

Category III (Q. Nos. 36 to 40)

Carry 2 marks each and one or more option(s) is/are correct. If all correct answers are not marked and also no incorrect answer is marked then score = $2 \times \text{number of correct answers marked} \div \text{actual number of correct answers}$. If any wrong option is marked or if any combination including a wrong option is marked, the answer will be considered wrong, but there is no negative marking for the same and zero marks will be awarded.

36. The maximum KE (E_k) of the emitted photoelectrons against frequency of the incident radiation is plotted as shown in figure. This graph help in determining the following quantities.

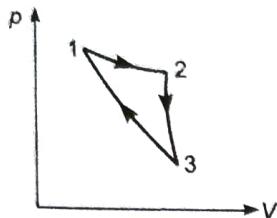


- Planck's constant
- Charge on an electron
- Threshold frequency
- Work function of cathode metal

37. Consider a cycle followed by an engine as shown in figure
- 1 to 2 is isothermal
2 to 3 is adiabatic
3 to 1 is adiabatic

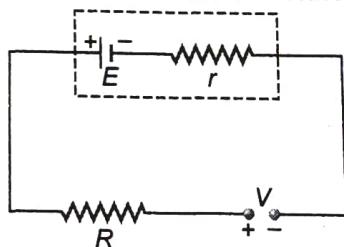
Such a process does not exist because

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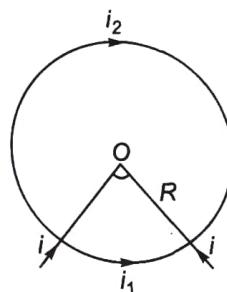
- (a) heat is completely converted to mechanical energy in such a process, which is not possible.
 (b) mechanical energy is completely converted to heat in this process, which is not possible.
 (c) curves representing two adiabatic processes don't intersect.
 (d) curves representing an adiabatic process and an isothermal process don't intersect.
- 38.** A projectile has the same range R for two angles of projections. If T_1 and T_2 be the times of flight in the two cases, then (using θ as the angle of projection corresponding to T_1)
 (a) $T_1 T_2 \propto R$ (b) $T_1 T_2 \propto R^2$
 (c) $T_1/T_2 = \tan\theta$ (d) $T_1/T_2 = 1$

- 39.** A battery of emf E and internal resistance r is connected with an external voltage source (generator) through a resistance R as shown in figure. Choose the correct statements.



- (a) In order to charge the battery, the output voltage V of the generator must be greater than E
 (b) In order to charge the battery, the output voltage V of the generator must be at least twice of E
 (c) The charging current i through the circuit is given by $i = \frac{V - E}{(R + r)}$
 (d) The charging current i through the circuit is given by $i = \frac{V}{(R + r)}$

- 40.** Magnetic field intensity B at the centre of the circular loop is



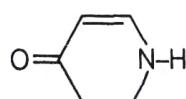
- (a) zero
 (b) $\frac{\mu_0(2\pi - \theta)i}{4\pi R}$
 (c) $\frac{\mu_0i\theta}{4\pi R}$
 (d) $\frac{\mu_0i^2(\pi - \theta)}{4\pi R}$

Chemistry

Category I (Q. Nos. 41 to 70)

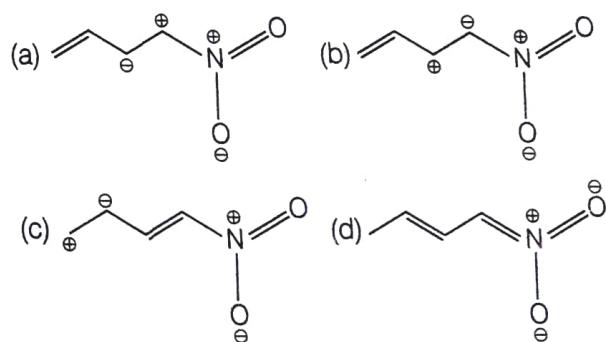
Carry 1 marks each and only one option is correct.
 In case of incorrect answer or any combination of more than one answer, 1/4 mark will be deducted.

- 41.** In the following structure, which is the better site of protonation?



- (a) Nitrogen (b) Oxygen
 (c) Double bond (d) All of the above

- 42.** Among the following, the least stable resonance structure is



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43. Correct order of nucleophilicity is

- (a) $\text{CH}_3^- < \text{NH}_2^- < \text{OH}^- < \text{F}^-$
- (b) $\text{F}^- < \text{OH}^- < \text{CH}_3^- < \text{NH}_2^-$
- (c) $\text{OH}^- < \text{NH}_2^- < \text{F}^- < \text{CH}_3^-$
- (d) $\text{F}^- < \text{OH}^- < \text{NH}_2^- < \text{CH}_3^-$

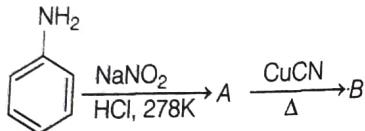
44. If $\frac{\hbar}{2\pi}$ is written as \hbar direc- \hbar , the orbital angular momentum of a d -subshell will be

- (a) $\frac{\hbar}{\sqrt{6}}$
- (b) $\frac{\hbar}{\sqrt{2}}$
- (c) $\sqrt{6} \hbar$
- (d) $2\sqrt{6} \hbar$

45. In which case racemic mixture is obtained on mixing its mirror image in 1 : 1 molar ratio?

- (a) $[\text{Ni}(\text{dmg})_2]$
- (b) $[\text{Cr}(\text{en})_3]^{3+}$
- (c) *cis* - $[\text{Cu}(\text{gly})_2]$
- (d) All of these

46. In the chemical reactions



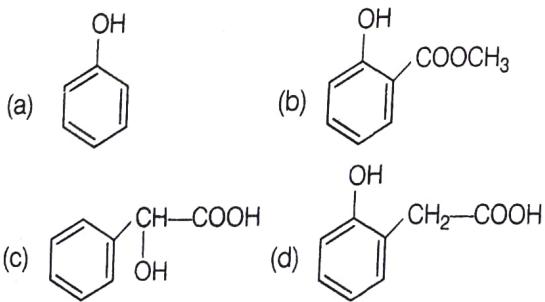
Compound A and B respectively are

- (a) fluorobenzene and phenol
- (b) benzene diazonium chloride and benzonitrile
- (c) phenol and bromobenzene
- (d) nitrobenzene and chlorobenzene

47. The term anomers of glucose refers to

- (a) isomers of glucose that differ in configurations at carbons one and four (C - 1 and C - 4)
- (b) a mixture of (D)- glucose and (L)- glucose
- (c) enantiomers of glucose
- (d) isomers of glucose that differ in configuration at carbon one (C - 1)

48. A compound liberates CO_2 with NaHCO_3 and also gives colour with neutral FeCl_3 solution. The compound can be



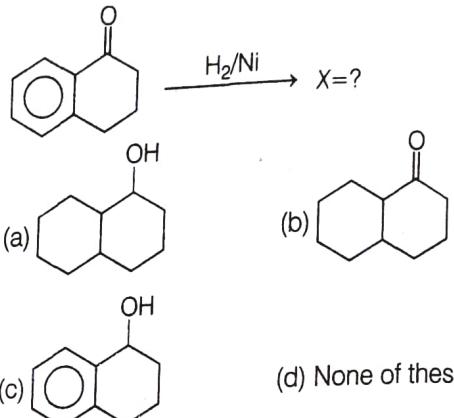
49. The equilibrium constant for the reaction, $\text{H}_2(g) + \text{S}(s) \rightleftharpoons \text{H}_2\text{S}(g)$ is 18.5 at 925 K and 9.25 at 1000 K respectively. The enthalpy of the reaction is

- | | |
|-------------------------------|-------------------------------|
| (a) 2 kJ mol^{-1} | (b) $+71 \text{ kJ mol}^{-1}$ |
| (c) -71 kJ mol^{-1} | (d) 75 kJ mol^{-1} |

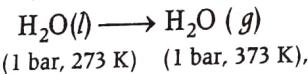
50. NaOH is a strong base. What will be pH of $5.0 \times 10^{-2} \text{ M NaOH}$ solution? ($\log 2 = 0.3$)

- (a) 13.70
- (b) 12.70
- (c) 14.00
- (d) 13.00

51.



52. For the process,



The correct set of thermodynamic parameters is

- (a) $\Delta G = 0, \Delta S = +\text{ve}$
- (b) $\Delta G = 0, \Delta S = -\text{ve}$
- (c) $\Delta G = +\text{ve}, \Delta S = 0$
- (d) $\Delta G = -\text{ve}, \Delta S = +\text{ve}$

53. Which has the smallest bond angle ($X-S-X$) in the given molecules?

- (a) OSBr_2
- (b) OSCl_2
- (c) OSF_2
- (d) OSI_2

54. For an isomerisation reaction $A \rightleftharpoons B$, the temperature dependence of equilibrium constant is given by

$$\log_e K = 4.0 - \frac{2000}{T}$$

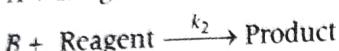
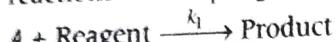
The value of ΔS° at 300 K is therefore,

- | | |
|------------|-------------|
| (a) $4R$ | (b) $5R$ |
| (c) $400R$ | (d) $2000R$ |

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- (a) tetrathiocyanato-S-cobalt (II) and bis(dimethyl glyoximate) nickel (II)
- (b) tetrathiocyanato-S-cobaltate (II) and bis(dimethyl glyoxime) nickel (II)
- (c) tetrathiocyanato-S-cobaltate (III) and bis(dimethyl glyoximato) nickel (II)
- (d) tetrathiocyanato-S-cobaltate (II) and bis(dimethyl glyoximato) nickel (II)

70. In the following first order competing reactions where $t_1 = t_2$



The ratio of $\frac{k_1}{k_2}$ if only 50% of B and 94% of

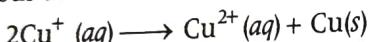
A have been reacted is

- (a) 0.06
- (b) 0.246
- (c) 2.06
- (d) 4.06

Category II (Q. Nos. 71 to 75)

Carry 2 marks each and only one option is correct.
In case of incorrect answer or any combination of more than one answer, 1/2 mark will be deducted.

71. In aqueous solution of Cu^+ disproportionates as



What is the E° value for this reaction if

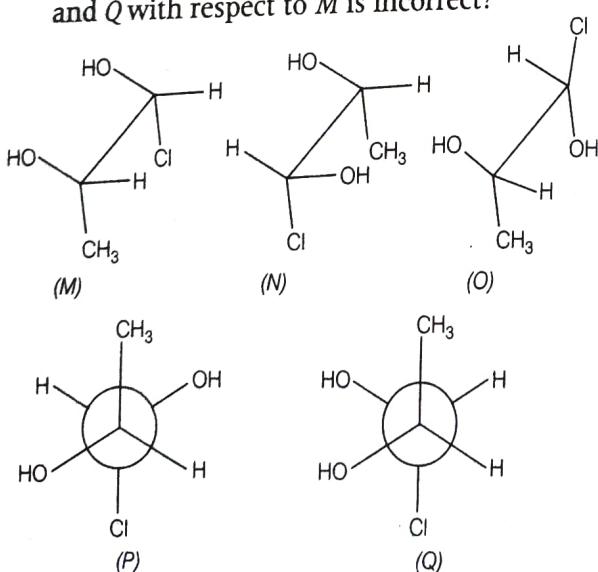
$$E_{\text{Cu}^{2+}/\text{Cu}^+}^\circ = 0.15 \text{ V} \text{ and } E_{\text{Cu}^{2+}/\text{Cu}}^\circ = 0.34 \text{ V}$$

- (a) 0.48 V
- (b) 0.28 V
- (c) 0.38 V
- (d) 0.18 V

72. How many optical isomers are possible on monochlorination of 2-methyl butane?

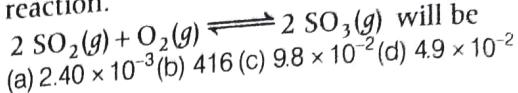
- (a) 2
- (b) 4
- (c) 6
- (d) 8

73. Which of the given statements about N, O, P and Q with respect to M is incorrect?



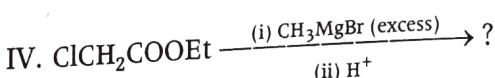
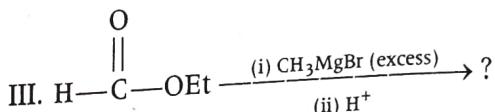
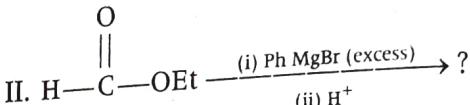
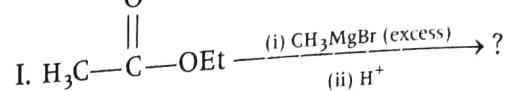
- (a) M and N are non-mirror image stereoisomers
- (b) M and O are identical
- (c) M and P are enantiomers
- (d) M and Q are identical

74. The equilibrium constant, K_c for the reaction $\text{SO}_3(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g})$ is 4.9×10^{-2} . The value of K_C for the reaction.



- (a) 2.40×10^{-3}
- (b) 416
- (c) 9.8×10^{-2}
- (d) 4.9×10^{-2}

75. Read the following reactions



In which set of reactions the product will be 3° alcohol

- (a) I, II
- (b) I, II, III
- (c) I, IV
- (d) II, IV

Category III (Q. Nos. 76 to 80)

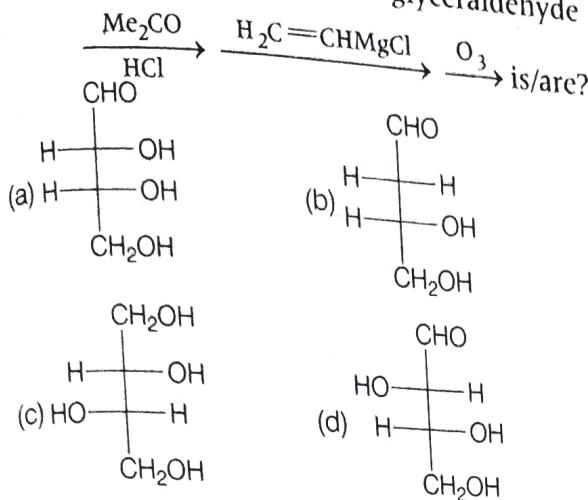
Carry 2 marks each and one or more option(s) is/are correct. If all correct answers are not marked and also no incorrect answer is marked then score = $2 \times \text{number of correct answers marked} \div \text{actual number of correct answers}$. If any wrong option is marked or if any combination including a wrong option is marked, the answer will be considered wrong, but there is no negative marking for the same and zero marks will be awarded.

76. The following statement(s) is/are correct

- (a) A plot of $\log(X)$ versus time is linear for a first order reaction $X \rightarrow P$
- (b) A plot of $\log K_p$ versus $\frac{1}{T}$ is linear
- (c) A plot of P versus $\frac{1}{V}$ is linear at constant temperature
- (d) A plot of $\log P$ versus $\frac{1}{T}$ is linear at constant

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77. The product of the reaction D-glyceraldehyde



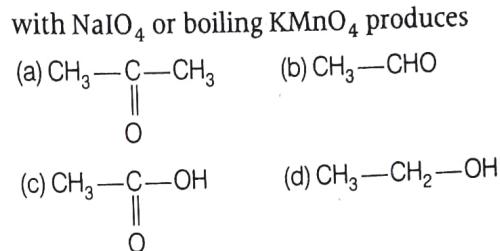
78. Which of the following compounds may give blood red colouration while performing Lassaigne's test for nitrogen?

- (a) $(\text{NH}_2)_2\text{C}=\text{O}$ (b) $(\text{NH}_2)_2\text{C}=\text{S}$
 (c) $\rho-\text{NH}_2\text{C}_6\text{H}_4\text{SO}_3\text{H}$ (d) $\text{C}_6\text{H}_5\text{SO}_3\text{H}$

79. Which of the following options are correct for $[\text{Fe}(\text{CN})_6]^{3-}$ complex?

- (a) d^2sp^3 hybridisation (b) sp^3d^2 hybridisation
 (c) Diamagnetic (d) Paramagnetic

80. The reaction of $\text{CH}_3-\underset{\text{CH}_3}{\overset{|}{\text{C}}}=\text{CHCH}_3$,



Mathematics

Category I (Q. Nos. 1 to 50)

Only one answer is correct. Correct answer will fetch full marks 1. Incorrect answer or any combination of more than one answer will fetch -1/4 marks.

1. If $A = \{x : 2\cos^2 x + \sin x \leq 2\}$ and

$$B = \left\{ x : \frac{\pi}{2} \leq x \leq \frac{3\pi}{2} \right\}, \text{ then } A \cap B \text{ is equal to}$$

$$(a) \left\{ x : \frac{\pi}{2} \leq x \leq \frac{5\pi}{6} \right\} \quad (b) \left\{ x : \pi \leq x \leq \frac{3\pi}{2} \right\}$$

$$(c) \left\{ x : \frac{\pi}{2} \leq x \leq \frac{5\pi}{6} \text{ or } \pi \leq x \leq \frac{3\pi}{2} \right\}$$

(d) None of the above

2. For any integer n , the argument of

$$z = \frac{(\sqrt{3} + i)^{4n+1}}{(1 - i\sqrt{3})^{4n}}$$

$$(a) \frac{\pi}{6} \quad (b) \frac{\pi}{3} \quad (c) \frac{2\pi}{3} \quad (d) \text{All of these}$$

3. Ten coins are tossed. The probability of getting atleast 8 tails is

$$(a) \frac{3}{256} \quad (b) \frac{7}{128} \quad (c) \frac{5}{256} \quad (d) \frac{1}{64}$$

4. Mean of 9 observations is 100 and mean of 6 observations is 80, then the mean of 15 observation is

- (a) 29 (b) 92 (c) 184 (d) 90

5. If $[x]$ denotes the greatest integer less than or equal to x , then $[\log_{10} 87213]$ is equal to

- (a) 3 (b) 4 (c) 5 (d) 6

6. If an error of 1° is made in measuring the angle of a sector of radius 60 cm, then the approximate error in its area is

- (a) $2.5 \pi \text{ cm}^2$ (b) $10 \pi \text{ cm}^2$ (c) $50 \pi \text{ cm}^2$ (d) $25 \pi \text{ cm}^2$

$$7. \lim_{x \rightarrow 0^-} \frac{[x] + [x^2] + [x^3] + \dots + [x^{2n+1}] + n+1}{1 + [x^2] + |x| + 2x},$$

$$n \in \mathbb{N} \quad (a) 0 \quad (b) 1 \quad (c) 2n+1 \quad (d) n$$

8. $\int \sqrt{\sec x - 1} dx$ is equal to

$$(a) -2 \log \left(\cos \frac{x}{2} + \sqrt{\cos^2 \frac{x}{2} - \frac{1}{2}} \right) + C$$

$$(b) 2 \log \left(\cos \frac{x}{2} + \sqrt{\cos^2 \frac{x}{2} - \frac{1}{2}} \right) + C$$

$$(c) \log \left(\cos \frac{x}{2} + \sqrt{\cos^2 \frac{x}{2} - \frac{1}{2}} \right) + C$$

(d) None of the above

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9. If $f\left(\frac{3x-4}{3x+4}\right) = x+2$, then $\int f(x) dx$ is equal to

(a) $e^{x+2} \ln \left| \frac{3x-4}{3x+4} \right| + C$ (b) $\frac{2}{3} \ln|x-1| + \frac{2}{3}x + C$

(c) $-\frac{8}{3} \ln|x-1| + \frac{2}{3}x + C$ (d) None of these

10. The number of four-letter words that can be formed using the letters of the word 'MEDITERRANEAN' such that E is the first letter and R the last is

(a) $\frac{13!}{3!2!}$ (b) 61 (c) 59 (d) $\frac{13!}{3!2!2!}$

11. The general solution of the differential

equation $\frac{dy}{dx} = y \tan x - y^2 \sec x$ is

(a) $\sec y = (c + \tan y)x$ (b) $\sec x = (c + \tan x)y$
 (c) $\tan x = (c + \sec x)y$ (d) None of these

12. The term independent of x in the expansion

of $(1+x+2x^4)\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is

(a) $\frac{-1}{27}$ (b) $\frac{11}{27}$ (c) $\frac{19}{54}$ (d) $\frac{7}{18}$

13. Locus of mid-point of the portion between the axes of $x \cos \alpha + y \sin \alpha = p$, where p is constant, is

(a) $x^2 + y^2 = \frac{4}{p^2}$ (b) $x^2 + y^2 = \frac{2}{p^2}$

(c) $x^2 + y^2 = 2p^2$ (d) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$

14. The line $2x+y=1$ touches a hyperbola and passes through the point of intersection of a directrix and the X -axis. The equation of the hyperbola is

(a) $\frac{x^2}{1} - \frac{y^2}{2} = 3$ (b) $\frac{x^2}{1} - \frac{y^2}{3} = 1$

(c) $\frac{x^2}{3} - \frac{y^2}{2} = 1$ (d) None of these

15. $\begin{vmatrix} 10! & 11! & 12! \\ 11! & 12! & 13! \\ 12! & 13! & 14! \end{vmatrix}$ equals

(a) $2(11! 12! 13!)$ (b) $2(11! 12!)$
 (c) $2(10! 11! 12!)$ (d) $2(10! 11!)$

16. If $AB = A$ and $BA = B$, then A^2, B^2 is equal to

- (a) A, B (b) $-A, -B$
 (c) $2A, B$ (d) None of these

17. The function $f : (-\infty, -1] \rightarrow (0, e^5]$ defined by

$f(x) = e^{x^3 - 3x + 2}$ is

- (a) Many one and onto (b) Many one and into
 (c) One-one and onto (d) One-one and into

18. If $f(x) = 64x^3 + \frac{1}{x^3}$ and a, b are the roots of

$4x + \frac{1}{x} = 3$, then

- (a) $f(a) = f(b)$ (b) $f(a) = 11$
 (c) $f(b) = 8$ (d) None of these

19. A line segment of length 63 having direction ratios as 3, -2, 6. If it makes an obtuse angle with X -axis, components of line vector are

- (a) 27, 18, -54 (b) -27, -18, -54
 (c) 27, -18, -54 (d) -27, 18, -54

20. If $\sin \alpha, \sin \beta$ and $\cos \alpha$ are in GP, then roots of $x^2 + 2x \cot \beta + 1 = 0$ are always

- (a) imaginary
 (b) imaginary and negative
 (c) real
 (d) greater than one

21. If $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3 + 3x^2 - 7$,

then $\lim_{\alpha \rightarrow 0} \frac{f(1-\alpha) - f(1)}{\alpha^3 + 3\alpha}$ is

- (a) $-\frac{53}{5}$ (b) $\frac{53}{3}$ (c) $-\frac{53}{3}$ (d) $-\frac{55}{3}$

22. A tangent PT is drawn to the circle $x^2 + y^2 = 4$ at the point $P(\sqrt{3}, 1)$. A straight line L , perpendicular to PT is a tangent to the circle $(x-3)^2 + y^2 = 1$. A possible equation of L is

- (a) $x - \sqrt{3}y = 1$ (b) $x + \sqrt{3}y = 1$
 (c) $x - \sqrt{3}y = -1$ (d) $x + \sqrt{3}y = 5$

23. There are five different green dyes, four different blue dyes and three different red dyes. The total number of combination of dyes that can be chosen taking atleast one green and one blue dye is

- (a) 3720 (b) 2 (c) 3256 (d) 3255

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24. The locus of the points of intersection of tangents at the extremities of the chords of the ellipse having the equation $x^2 + 2y^2 = 6$ which touch the ellipse $x^2 + 4y^2 = 4$ is
 (a) $x^2 + y^2 = 6$ (b) $x^2 + y^2 = 4$
 (c) $x^2 + y^2 = 9$ (d) $x^2 + 2y^2 = 10$

25. The solution of the differential equation $\frac{dy}{dx} + 1 = e^{x+y}$ is

$$(a) xe^{x+y} + y = c \quad (b) x + e^{x+y} = c \\ (c) -xe^{x+y} + y = c \quad (d) x + e^{-(x+y)} = c$$

26. $49^n + 16n - 1$ is divisible by

$$(a) 29 \quad (b) 64 \quad (c) 17 \quad (d) 5$$

27. The value of $\lim_{x \rightarrow -\infty} \left[\frac{x^4 \sin\left(\frac{1}{x}\right) + x^2}{1 + |x|^3} \right]$ is
 (a) 1 (b) ∞ (c) 0 (d) -1

28. The inclination of the straight line through the point $(-3, 6)$ and mid-point of line joining points $(4, -5)$ and $(-2, 9)$ is

$$(a) \frac{3\pi}{4} \quad (b) \frac{\pi}{3} \quad (c) \frac{\pi}{8} \quad (d) \frac{\pi}{4}$$

29. The function

$$f(x) = \sin\left(\frac{\pi x}{n!}\right) - \cos\left(\frac{\pi x}{(n+1)!}\right)$$

- (a) $2(n+1)!$
 (b) periodic, with period $2(n)!$
 (c) non-periodic
 (d) periodic, with $(n+1)$

30. If the intercept made on line $y = mx$ by lines $y = 2$ and $y = 6$ is less than 5, then range of m is

$$(a) \left(-\infty, -\frac{4}{3}\right) \cup \left(\frac{4}{3}, +\infty\right) \quad (b) \left(-\frac{3}{4}, \frac{3}{4}\right) \\ (c) \left(\frac{4}{3}, -\frac{4}{3}\right) \quad (d) \text{None of these}$$

31. $\lim_{n \rightarrow \infty} \frac{(n!)^{1/n}}{n}$ is equal to
 (a) e^2 (b) e^3 (c) e^{-2} (d) $\frac{1}{e}$

32. If $\Delta(x) = \begin{vmatrix} 1 & \cos x & 1 - \cos x \\ 1 + \sin x & \cos x & 1 + \sin x - \cos x \\ \sin x & \sin x & 1 \end{vmatrix}$,

then $\int_0^{\pi/2} \Delta(x) dx$ equals

$$(a) -\frac{1}{4} \quad (b) \frac{-1}{2} \quad (c) 0 \quad (d) \text{None of these}$$

33. If the coordinates of vertices of a triangle are $(4, 7)$ and $(6, 1)$ and the third vertex moves on the line $9x + 7y = 28$, then the locus of the centroid is

$$(a) 9x + 7y + 42 = 0 \quad (b) 9x + 7y - 58 = 0 \\ (c) 7x + 9y - 42 = 0 \quad (d) 7x - 9y + 58 = 0$$

34. $\lim_{n \rightarrow \infty} {}^n C_x \left(\frac{m}{n}\right)^x \left(1 - \frac{m}{n}\right)^{n-x}$ is equal to
 (a) 1 (b) $\frac{m^x \cdot e^m}{x!}$ (c) 0 (d) $\frac{m^x \cdot e^{-m}}{x!}$

35. The domain of $f(x)$ is $(0, 1)$, therefore domain of $f(e^x) + f(\ln|x|)$ is

$$(a) (-e, 1) \quad (b) (e, 1) \\ (c) (-1, e) \quad (d) (-e, -1)$$

36. The last term in the binomial expansion of

$$\left(\sqrt[3]{2} - \frac{1}{\sqrt{2}}\right)^n \text{ is } \left(\frac{1}{3 \cdot \sqrt[3]{9}}\right)^{\log_3 8}.$$

Then the 5th term from the beginning is

$$(a) \frac{1}{2} \cdot {}^{10} C_4 \quad (b) {}^{10} C_5 \quad (c) 2 \cdot {}^{10} C_4 \quad (d) {}^{10} C_6$$

37. The sum of two non-integral roots of

$$\begin{vmatrix} x & 2 & 5 \\ 3 & x & 3 \\ 5 & 4 & x \end{vmatrix} = 0$$

$$(a) -5 \quad (b) 5 \\ (c) -18 \quad (d) 18$$

38. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and

$$\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$$
 are coplanar, if

$$(a) k = 0, -3 \quad (b) k = 0, 3 \\ (c) k = -1, 1 \quad (d) k = -1, 3$$

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39. The normal at an end of a latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through an end of the minor axis if

(a) $e^2 + e = 1$ (b) $e^4 + e^2 = 1$
 (c) $e^3 + e^2 = 1$ (d) $e^3 + e = 1$

40. Consider the family of lines $(x + y - 1) + \lambda(2x + 3y - 5) = 0$ and $(3x + 2y - 4) + \mu(x + 2y - 6) = 0$, equation of a straight line that belongs to both the families is

(a) $x - 2y + 8 = 0$ (b) $2x - y - 8 = 0$
 (c) $x - y + 8$ (d) $2x + y + 8 = 0$

41. If u, v, w, z are positive real numbers such that $u + v + w + z = 2$, then $m = (u + v)(w + z)$ satisfies the relation

(a) $3 < m \leq 4$ (b) $1 \leq m \leq 2$
 (c) $2 \leq m \leq 3$ (d) $0 < m \leq 1$

42. $\int \frac{\operatorname{cosec}^2 x - 2005}{\cos^{2005} x} dx$

(a) $\frac{-\cot x}{(\cos x)^{2005}} + C$ (b) $\frac{\tan x}{(\cos x)^{2005}} + C$
 (c) $\frac{-\tan x}{(\cos x)^{2005}} + C$ (d) $\frac{\cot x}{(\cos x)^{2005}} + C$

43. Domain of $f(x) = \sin^{-1}[2 - 4x^2]$ is; where $[\cdot]$ denotes the greatest integer function is

(a) $(-2, 2)$
 (b) $[-1, 1]$
 (c) $\left[-\frac{\sqrt{3}}{2}, 0\right) \cup \left[0, \frac{\sqrt{3}}{2}\right]$
 (d) None of the above

44. If x_1, x_2, x_3 are roots of

$$\frac{x-a}{b} + \frac{x-b}{a} = \frac{b}{x-a} + \frac{a}{x-b}, \text{ given } (a, b > 0),$$

$x_1 > x_2 > x_3$ and $x_1 - x_2 - x_3 = c$, then a, b, c are in

(a) GP (b) HP
 (c) AP (d) None of these

45. On the parabola $y = x^2$, the point at least distance from the straight line $y = 2x - 4$ is

(a) $(0, 0)$ (b) $(0, 1)$
 (c) $(1, 1)$ (d) $(-1, 0)$

46. Radius of the circle passing through the foci of the ellipse $\frac{x^2}{4} + \frac{4}{7}y^2 = 1$ having centre at

$\left(\frac{1}{2}, 2\right)$ is
 (a) $\sqrt{5}$ (b) $2\sqrt{2}$ (c) 4 (d) $\frac{\sqrt{7}}{2}$

47. If $\int \frac{xe^x}{\sqrt{1+e^x}} dx = f(x) \sqrt{1+e^x} - 2 \log|g(x)| + C$,

then
 (a) $f(x) = 3(x-2)$ (b) $f(x) = x-1$
 (c) $g(x) = \frac{\sqrt{1+e^x}-1}{\sqrt{1+e^x}+1}$ (d) $g(x) = \frac{\sqrt{1+e^x}+1}{\sqrt{1+e^x}-1}$

48. The value of $\lim_{x \rightarrow a} \frac{1 - \cos(ax^2 + bx + c)}{(x - a)^2}$ where

α and β are the roots of $ax^2 + bx + c = 0$ is

(a) $\frac{(a-b)^2}{2}$ (b) $(\alpha - \beta)^2$
 (c) $\frac{1}{2}a^2(\alpha - \beta)^2$ (d) None of these

49. If the graph of $y = ax^3 + bx^2 + cx + d$ is symmetric about the line $x = k$, then the value of $a + k$ is

(a) $\frac{-c}{a}$ (b) $\frac{-c}{2b}$ (c) $c - 2b$ (d) $c + 2d$

50. The equation of circle having centre as its origin and passing through the vertices of an equilateral triangle whose median is of $6a$ is

(a) $x^2 + y^2 = 4a^2$ (b) $x^2 + y^2 = 9a^2$
 (c) $x^2 + y^2 = 16a^2$ (d) None of these

Category II (Q. No. 51 to 65)

Carry 2 marks each and only one option is correct.
 In case of incorrect answer or any combination of more than one answer, 1/2 mark will be deducted.

51. If a, b, c and d are unit vectors, then

$$|a - b|^2 + |b - c|^2 + |c - d|^2 + |d - a|^2 + |c - a|^2 + |b - d|^2$$

does not exceed

(a) 2 (b) 8 (c) 12 (d) 6

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52. If z is a point on the argand plane such that $|z-1|=1$, then $\frac{z-2}{z}$ equals

- (a) $\cot(\arg z)$ (b) $i \tan(\arg z)$
 (c) $\tan(\arg z)$ (d) $i \cot(\arg z)$

53. The largest term common to the sequences 1, 11, 21, 31 to 100 terms and 31, 36, 41, 46 to 100 terms is

- (a) 471 (b) 521
 (c) 421 (d) 371

54. If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$, then $P^T(Q^{2005})P$ equals

- (a) $\begin{bmatrix} 1 & \frac{\sqrt{3}}{2} \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$
 (c) $\begin{bmatrix} 1 & 2005 \\ 1 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} \frac{1}{2} & 2005 \\ \frac{\sqrt{3}}{2} & 1 \end{bmatrix}$

55. If the function $f : [1, \infty) \rightarrow [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is

- (a) $\left(\frac{1}{2}\right)(1 - \sqrt{1 + 4\log_2 x})$
 (b) $\frac{1}{2}x(x-1)$
 (c) $\frac{1}{2}(1 + \sqrt{1 + 4\log_2 x})$
 (d) $\left(\frac{1}{2}\right)^{x(x+1)}$

56. Without changing the direction of coordinate axes, origin is transferred to (α, β) so that the linear terms in $x^2 + y^2 + 2x - 4y + 6 = 0$ are eliminated. The point (α, β) is

- (a) $(-1, 2)$ (b) $(2, -1)$
 (c) $(1, -2)$ (d) $(-1, -2)$

57. If $t_r = \frac{r}{r^4 + r^2 + 1}$ be the r th term of a series,

- then $\lim_{n \rightarrow \infty} \sum_{r=1}^n t_r$ is
 (a) $\frac{1}{2}$ (b) 2 (c) 0 (d) 1

58. The lengths of the intercepts made by any circle on the coordinate axes are equal if the centre lies on line represented by

- (a) $x + y = 1$ (b) $x - y = 1$
 (c) $x + y + 1 = 0$ (d) $x^2 - y^2 = 0$

59. The number of solutions of $|x| = \cos x$ is

- (a) 3 (b) 2 (c) 1 (d) 0

60. The largest term in the sequence

$$a_n = \frac{n^2}{n^3 + 200} \text{ is given by}$$

- (a) $\frac{8}{49}$ (b) $\frac{49}{529}$
 (c) $\frac{8}{89}$ (d) None of these

61. If a, b, c are three non coplanar, non zero vectors then

$(a \cdot a)b \times c + (a \cdot b)c \times a + (a \cdot c)a \times b$ is equal to

- (a) $[c a b]b$ (b) $[a b c]c$
 (c) $[b c a]a$ (d) $[a b c]b$

62. The range of

$$f(x) = \sin^{-1} \left[x^2 + \frac{1}{2} \right] + \cos^{-1} \left[x^2 - \frac{1}{2} \right], \text{ (where}$$

$[\cdot]$ denotes the greatest integer function) is

- (a) $\{\pi\}$ (b) $\left\{\frac{\pi}{4}\right\}$ (c) $\left\{-\frac{1}{2}, 0\right\}$ (d) $\left(0, \frac{\pi}{2}\right)$

63. A rod of length l slides with its end on two perpendicular lines. The locus of point which divides it in the ratio 1 : 2 is

- (a) $9x^2 - 36y^2 = 4l^2$ (b) $36x^2 + 9y^2 = 4l^2$
 (c) $9x^2 + 36y^2 = 4l^2$ (d) $36x^2 + 9y^2 = l^2$

64. The value of $\lim_{x \rightarrow \infty} \left[\frac{\frac{1}{1^x} + \frac{1}{2^x} + \frac{1}{3^x} + \dots + \frac{1}{n^x}}{n} \right]^{nx}$

is

- (a) 0 (b) 1
 (c) $n!$ (d) $(n+1)!$

65. The digit at units place in the number

$$17^{1995} + 11^{1995} - 7^{1995}$$

- (a) 1 (b) 0
 (c) 2 (d) None of these

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Category III (Q. Nos. 66 to 75)

Carry 2 marks each and one or more option(s) is/are correct. If all correct answers are not marked and also no incorrect answer is marked then score = $2 \times$ number of correct answers marked \div actual number of correct answer. If any wrong option is marked or if, any combination including a wrong option is marked, the answer will be considered wrong, but there is no negative marking for the same and zero marks will be awarded.

66. The function $f(x) = \frac{\sin(x+a)}{\sin(x+b)}$ has no maxima

or minima if

- (a) $a + b = n\pi, n \in I$
- (b) $b - a = 2n\pi, n \in I$
- (c) $b - a = (2n+1)\pi, n \in I$
- (d) $b - a = n\pi, n \in I$

67. The function f is such that

$f(xy) = f(x) + f(y), x, y > 0$ and $f'(1) = 2$ and A sq. Unit be the area bounded by the curves $y = f(x), x = 2$ and the X -axis, then

- (a) $f(x) = \log|x|$
- (b) $A = 4 \log\left(\frac{2}{\sqrt{e}}\right)$
- (c) $f(x) = 2\log|x|$
- (d) $A = 2(2\log 2 + 5)$

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

- (a) $A^2 - 4A - 5I_3 = 0$
- (b) $A^{-1} = \frac{1}{5}(A - 4I_3)$
- (c) A^3 is not invertible
- (d) A^2 is invertible

69. If a, b, c, d are four unequal positive numbers which are in AP, then

- (a) $\frac{1}{a} + \frac{1}{d} = \frac{1}{b} + \frac{1}{c}$
- (b) $\frac{1}{a} + \frac{1}{d} < \frac{1}{b} + \frac{1}{c}$
- (c) $\frac{1}{a} + \frac{1}{d} > \frac{1}{b} + \frac{1}{c}$
- (d) $\frac{1}{b} + \frac{1}{c} > \frac{4}{a+d}$

70. Let 'z' be a complex number and 'a' be a real parameter such that $z^2 + az + a^2 = 0$, then
 (a) locus of z is a pair of straight lines

(b) locus to z is a circle

$$(c) \arg(z) = \pm \frac{2\pi}{3}$$

$$(d) |z| = |a|$$

71. If $\sin\beta$ is the geometric mean between $\sin\alpha$ and $\cos\alpha$, then $\cos 2\beta$ is equal to

- (a) $2\cos^2\left(\frac{\pi}{4} - \alpha\right)$
- (b) $2\sin^2\left(\frac{\pi}{4} - \alpha\right)$
- (c) $2\sin^2\left(\frac{\pi}{4} + \alpha\right)$
- (d) $2\cos^2\left(\frac{\pi}{4} + \alpha\right)$

72. A line which makes an acute angle θ with the positive direction of X -axis is drawn through the point $P(3, 4)$ to meet the line $x = 6$ at R and $y = 8$ at S , then

- (a) $PR = 3\sec\theta$
- (b) $PS = 4\operatorname{cosec}\theta$
- (c) $PR + PS = \frac{2(3\sin\theta + 4\cos\theta)}{\sin 2\theta}$
- (d) $\frac{9}{(PR)^2} + \frac{16}{(PS)^2} = 1$

73. If the circle

$x^2 + y^2 + 2gx + 2fy + c = 0$, cuts each of the circle $x^2 + y^2 - 4 = 0$

$x^2 + y^2 - 6x - 8y + 10 = 0$

and $x^2 + y^2 + 2x - 4y - 2 = 0$

at the extremities of a diameter, then

- (a) $gf = 6$
- (b) $g + f = c - 1$
- (c) $c = -4$
- (d) $g^2 + f^2 - c = 17$

74. The domain of function

$$f(x) = \sqrt{\log_{0.4}\left(\frac{x-1}{x+5}\right)} + \frac{1}{x^2 - 36}$$

- (a) $(-\infty, 0) - \{-6\}$
- (b) $(0, \infty) - \{1, 6\}$
- (c) $(1, \infty) - \{6, -6\}$
- (d) $[1, \infty) - \{6\}$

75. The function $f(x) = \left[x^2 \left[\frac{1}{x^2} \right] \right], x \neq 0$ is ($[x]$)

represents the greatest integer $\leq x$)

- (a) continuous at $x = 1$
- (b) discontinuous at $x = -1$
- (c) discontinuous at infinitely many points
- (d) continuous everywhere

Answers

Physics

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

Chemistry

41. (b)	42. (a)	43. (d)	44. (c)	45. (b)	46. (b)	47. (d)	48. (d)	49. (c)	50. (b)
51. (a)	52. (d)	53. (c)	54. (a)	55. (c)	56. (a)	57. (d)	58. (b)	59. (b)	60. (c)
61. (c)	62. (d)	63. (b)	64. (a)	65. (a)	66. (a)	67. (b)	68. (c)	69. (d)	70. (d)
71. (c)	72. (b)	73. (d)	74. (b)	75. (c)	76. (b, d)	77. (a, d)	78. (b, c)	79. (a, d)	80. (a, c)

Mathematics

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

* For detailed solutions visit <http://tinyurl.com/y3z3nwxa> or scan 