शिव सेना
उद्धव बाळासाहेब ठाकरे

MHT - CET MOCK

(Physics, Chemistry & Mathematics)

Answer key and solutions will be available on (https://yuvasenacet.com)

Scan me

शिव सेना
उद्धव बाळासाहेब ठाकरे

MHT - CET MOCK TEST - 2025

QUESTION BOOKLET

Subjects : Physics, Chemistry & Mathematics

Test Booklet Code	Roll No.	Test Booklet No.
A		1 2 3 4 (Write this number on your Answer Sheet)

Duration : 3 Hours

Total Marks: 200

Candidate's Signature

Invigilator's Signature

Instructions to Candidates

1. This Question Booklet contains 150 Objective Type Questions (Single Best Response Type) in the subjects of Physics (50), Chemistry (50) and Mathematics (50).
2. The Question Booklet and Answer Sheets are issued to examinees separately at the beginning of the examination session.
3. Choice and sequence for attempting questions will be as per the convenience of the candidate.
4. Candidate should carefully read the instructions printed on the Question Booklet and Answer Sheet and make the correct entries on the Answer Sheet. Special care should be taken to fill Question Booklet No. and Roll No. accurately. The correctness of entries has to be cross-checked by the invigilators. **The candidate must sign on the Answer Sheet and Question Booklet.**
5. Read each question carefully.
6. Determine the correct answer from out of the four available options given for each question.
7. Fill the appropriate circle completely like this ●, for answering the particular question, with Black/Blue ball point pen only, in the Answer Sheet.
8. Each answer with correct response shall be awarded **one (1) mark** in Physics and Chemistry and **two (2) marks** in Mathematics**.** There is **no Negative Marking**.
9. Use of whitener or any other material to erase/hide the circle once filled is not permitted. Avoid overwriting and/or striking of answers once marked.
10. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Question Booklet/ Answer Sheet.
11. **Rough work should not be done on the Answer Sheet.**
12. Use of Electronic/Manual Calculator is prohibited.
13. No candidate is allowed to leave the examination hall till the examination session is over.

***[Note:** MHT-CET 2025 examination will be conducted **Online (Computer Based Test)** and the instructions may vary accordingly.]*

1. The strength of the magnetic field at a point distant r near a long straight current carrying wire is B. The field at a distance $\frac{r}{2}$ will be

(A) $\frac{B}{2}$ (B) 2B (C) $\frac{B}{4}$ (D) 4B

2. In the unmagnetised state of a ferromagnetic substance, all the domains in it are

(A) parallel to each other. (B) perpendicular to each other.
(C) randomly oriented in all directions. (D) anti parallel to each other.

3. A resistor (R = 300 Ω) is connected in series with a inductor and capacitor of reactance 500 Ω and 200 Ω respectively. The phase difference between the applied e.m.f. and the current will be

(A) 0 (B) 37° (C) 45° (D) 90°

4. A photo sensitive metallic surface emits electrons when X-rays of wavelength 'λ' fall on it. The de-Broglie wavelength of the emitted electrons is (Neglect the work function of the surface, m is mass of the electron. h = Planck's constant, c = velocity of light)

(A) $\sqrt{\frac{2mc}{h\lambda}}$ (B) $\sqrt{\frac{h\lambda}{2mc}}$
(C) $\sqrt{\frac{mc}{h\lambda}}$ (D) $\sqrt{\frac{h\lambda}{mc}}$

5. In a CE amplifier, the input ac signal to be amplified is applied across

(A) forward biased emitter-base junction (B) reverse biased collector-base junction
(C) reverse biased emitter-base junction (D) forward biased collector-base junction

6. Behaviour of an ideal blackbody is similar to

(A) group of classical oscillators which emit waves of same frequency.
(B) group of classical oscillators which emit waves of different frequencies.
(C) group of quantum oscillators which emit waves of same frequency.
(D) group of quantum oscillators which emit waves of different frequencies.

7. A ray of light is incident on the surface of a glass plate of refractive index 1.55 at the polarizing angle. The angle of refraction is

(A) 0° (B) 147°11′ (C) 32°49′ (D) 57°10′

8. On colliding in a closed container, the gas molecules

(A) transfer momentum to the walls (B) lose their momentum completely.
(C) lose their kinetic energy (D) perform Brownian motion.

9. In an elastic collision, block A of mass m moving with speed u collides with block B of mass 3m, which is initially at rest. After the collision, block A comes to rest. What is the coefficient of restitution?

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) 3

10. In the case of a simple harmonic oscillator, when the particle reaches its extreme position, which of the following is correct?

(A) kinetic energy is minimum, potential energy is maximum.

(B) both kinetic and potential energies are maximum.

(C) kinetic energy is maximum, potential energy is minimum.

(D) both kinetic and potential energies are minimum.

11. The angular resolution of telescope of objective lens having diameter 5 cm for $\lambda = 4000$ Å is (in radians)

(A) 9.76×10^{-6} (B) 5.9×10^{-6} (C) 8.9×10^{-6} (D) 7.32×10^{-6}

12. The relation between time of ascent t_a and time of descent t_d is

(A) $t_a - t_d$ (B) $t_a < t_d$ (C) $t_a > t_d$ (D) $t_a - 2t_d$

13. If Young's double slit experiment is done with white light, which of the following statements will be true?

(A) All the bright fringes will be coloured.

(B) All the bright fringes will be white.

(C) The central fringe will be white.

(D) No stable interference pattern will be visible.

14. The radius of earth is 6400 km. Its capacitance will be

(A) zero (B) 7.1×10^{-4} F (C) 6.4×10^{-4} F (D) 6.4×10^{6} F

15. Infinite charges of magnitude 5 C each are lying at x = 1, 2, 4, 8, …. metre on x-axis. The value of intensity of electric field at point $x = \infty$ due to these charges will be

(A) 12×10^{9} N/C (B) zero (C) 6×10^{10} N/C (D) 4×10^{10} N/C

16. A large open tank has two holes in the wall. One is a square hole of side L at a depth y from the top and the other is a circular hole of radius R at a depth 4y from the top. When the tank is completely filled with water, the quantity of water flowing out per second from both the holes are the same. Then R is equal to

(A) $2\pi L$ (B) $\frac{L}{\sqrt{2\pi}}$ (C) L (D) $\frac{L}{2\pi}$

17. The de-Broglie wavelength of a neutron at 27 °C is λ. What will be its de-Broglie wavelength at 927 °C?

(A) $\frac{\lambda}{2}$ (B) $\frac{\lambda}{3}$ (C) $\frac{\lambda}{4}$ (D) $\frac{3\lambda}{2}$

18. Two spheres of same mass are such that one of them is solid and other is hollow but their moments of inertia about respective diameters are same. The ratio of their radii is given by

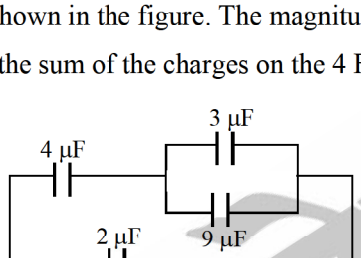
(A) 5 : 3 (B) 3 : 5 (C) $\sqrt{5}:\sqrt{3}$ (D) 1 : 1

19. The ratio of the magnetic field at the centre of a current carrying circular wire and the magnetic field at the centre of a semi-circular coil made from the same length of wire will be

(A) 2 : 1 (B) 4 : 1 (C) 1 : 2 (D) 1 : 4

20. A combination of capacitors is set up as shown in the figure. The magnitude of the electric field, due to a point charge Q (having a charge equal to the sum of the charges on the 4 F and 9 F capacitors), at a point distant 30 m from it, would equal:

(A) 360 N/C
(B) 420 N/C
(C) 480 N/C
(D) 240 N/C



21. Relative permeability of metal is 400, then its magnetic susceptibility will be

(A) 500×10^{7} (B) 300×10^{-7} (C) 401 (D) 399

22. Two solenoids A and B of equal number of turns have their lengths and radii in the same ratio 1 : 2. The ratio of the self-inductance of A to that of B will be

(A) 1 : 1 (B) 2 : 1 (C) 1 : 4 (D) 1 : 2

23. The refractive index of the material of an equilateral prism is 1.2. The angle of minimum deviation due to the prism would be

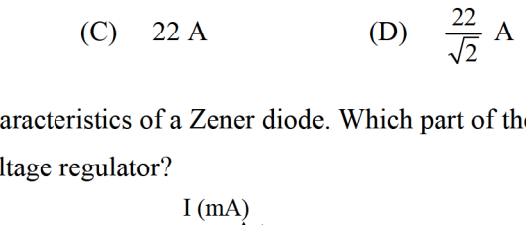
(A) 30° (B) between 0° and 30°
(C) 60° (D) between 30° and 45°

24. The reactance of the coil is 10 Ω and its resistance is 10 Ω. It is connected to an A.C. source of e.m.f. 220 V. The peak value of the current in the circuit is

(A) 44 A (B) $22\sqrt{2}$ A (C) 22 A (D) $\frac{22}{\sqrt{2}}$ A

25. The graph given below represents the I – V characteristics of a Zener diode. Which part of the characteristics curve is most relevant for its operation as a voltage regulator?

(A) ab
(B) bc
(C) cd
(D) de



26. Half-life of a radioactive substance is 20 minutes. The time interval between 20% and 80% decay will be
(A) 20 minutes (B) 30 minutes (C) 40 minutes (D) 60 minutes

27. The maximum vertical distance through which a full dressed astronaut can jump on the earth is 0.5 m. Estimate the maximum vertical distance through which he can jump on a planet with mean density $1/4^{th}$ that of earth and radius half that of the earth.
(A) 1.5 m (B) 4 m (C) 3 m (D) 7.5 m

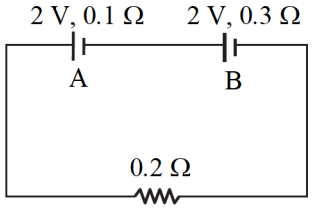
28. A manometer connected to a closed tap reads 4.5×10^5 pascal. When tap is opened the reading of manometer falls to 4×10^5 pascal. The velocity of flow is
(A) $7\ m\ s^{-1}$ (B) $8\ m\ s^{-1}$ (C) $9\ m\ s^{-1}$ (D) $10\ m\ s^{-1}$

29. Two planets revolve round the sun in orbits of average radii R_1 and R_2 respectively. The ratio of their frequencies of revolution n_1 and n_2 can be expressed as:
(A) $\frac{R_1}{R_2}=\left(\frac{n_1}{n_2}\right)^{3/2}$ (B) $\frac{R_1}{R_2}=\left(\frac{n_2}{n_1}\right)^{3/2}$ (C) $\frac{R_1}{R_2}=\left(\frac{n_1}{n_2}\right)^{2/3}$ (D) $\frac{R_1}{R_2}=\left(\frac{n_2}{n_1}\right)^{2/3}$

30. An electron in hydrogen atom jumps from orbit n_2 to orbit of n_1. The maximum energy is emitted for following condition
(A) $n_2 = n_1 + 1$ (B) $n_2 < n_1$ (C) $n_2 > n_1$ (D) $n_2 = \infty$

31. A car with a horn of frequency 500 Hz travels towards a large wall with a speed of 30 m/s. velocity of sound is 330 m/s. The frequency of echo of sound of horn as heard by the driver is
(A) 600 Hz (B) 560 Hz (C) 520 Hz (D) 650 Hz

32. The internal resistances of two cells shown are 0.1 Ω and 0.3 Ω. If R = 0.2 Ω, the potential difference across the
(A) cell B will be zero and A will be less than 2 V.
(B) cell A will be zero and B will be greater than 2 V.
(C) cells A and B will be 2 V.
(D) cell A will be > 2 V and B will be < 2 V.



33. The number of turns in the primary coil of a transformer is 1000 A. A power of 2 kW is fed to it by a current of 0.1 A. The number of turns in the secondary coil in order to produce a voltage of 400 V in it, will be
(A) 10 (B) 20 (C) 30 (D) 40

34. A scientist says that the efficiency of his heat engine which operates at source temperature 127°C and sink temperature 27°C is 24%, then
(A) it is impossible. (B) it is possible.
(C) it is possible only if the engine is ideal. (D) data is incomplete.

35. A particle of mass 0.2 kg moves with simple harmonic motion of amplitude 2 cm. If the total energy of the particle is 4×10^{-5} J, then the time period of the motion is

(A) 2π seconds (B) $\frac{\pi}{3}$ seconds (C) π seconds (D) $\frac{\pi}{2}$ seconds

36. The equation of a sound wave travelling along negative X-direction is given by, $y = 0.04 \sin \pi (600t + 1.5x)$ m. The shortest distance between two particles having phase difference of $\pi/4$ at the same instant is

(A) 2.66 m (B) 1.5 m (C) 4.33 m (D) 0.2 m

37. The moment of inertia of a thin uniform rod rotating about the perpendicular axis passing through one end is 'I'. The same rod is bent into a ring and its moment of inertia about the diameter is 'I_1'. The ratio $\frac{I}{I_1}$ is

(A) $\frac{4\pi}{3}$ (B) $\frac{8\pi^2}{3}$ (C) $\frac{5\pi}{3}$ (D) $\frac{8\pi^2}{5}$

38. A slit of width 'a' is illuminated by red light of wavelength 4200 Å. If the first diffraction minimum falls at 30°, then the value of 'a' is _____.

(A) 4.2×10^{-4} mm (B) 0.21 micron (C) 4250 Å (D) 2.1×10^{-4} cm

39. A coil of 50 square loops each of side length 10 cm is placed normal to a magnetic flux which increases at the rate of 1.0 T s^{-1}. The induced e.m.f. in volt is ($\cos 0° = 1$)

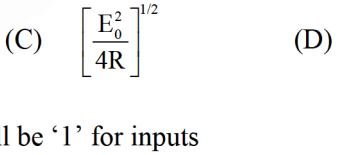
(A) 0.1 (B) 0.5 (C) 1 (D) 5

40. An e.m.f $E = E_0 \cos\omega t$ is applied to a circuit containing 'L' and 'R' in series. If $X_L = R$ then the power dissipated in the circuit is

(A) $\frac{E_0^2}{R}$ (B) $\frac{E_0^2}{4R}$ (C) $\left[\frac{E_0^2}{4R}\right]^{1/2}$ (D) $\frac{4R}{E_0^2}$

41. In the following digital logic circuit, the output Y will be '1' for inputs

(A) A = 0, B = 0
(B) A = 0, B = 1
(C) A = 1, B = 0
(D) A = 1, B = 1



42. Two narrow tubes of diameters 'd_1' and 'd_2' are joined together to form a U tube open at both ends. If U tube contains water, the difference in water levels in the limb is (T is the surface tension of water, angle of contact = zero and density of water = ρ, g = acceleration due to gravity)

(A) $\frac{2T}{\rho g}\left[\frac{d_1 + d_2}{d_1 d_2}\right]$ (B) $\frac{4T}{\rho g}\left[\frac{d_2 - d_1}{d_1 d_2}\right]$ (C) $\frac{2T}{\rho g}\left[\frac{d_2 - d_1}{d_1 d_2}\right]$ (D) $\frac{4T}{\rho g}\left[\frac{d_1 d_2}{d_1 + d_2}\right]$

43. The equiconvex lens is made from glass of refractive index 1.5. If the radius of each surface is changed from 5 cm to 6 cm then the power

(A) remains unchanged.

(B) increases by 3.30 dioptre approximately.

(C) decreases by 3.33 dioptre approximately.

(D) decreases by 5.5 dioptre approximately.

44. The ratio of the angular acceleration of the hour hand of a clock to that of its second hand is

(A) 1 : 1 (B) 0 (C) 1 : 60 (D) 1 : 12

45. The rms velocity of a particle is v at pressure P. If the pressure increases by three times and temperature increases by four times, then rms velocity will become

(A) v (B) 2v (C) $\frac{2}{3}$ v (D) $\frac{3}{2}$ v

46. A 5 m^3 container is initially divided into two equal sections, with one side containing an ideal gas at a temperature of 500 K, and the other side being a vacuum. The container is insulated from its surroundings. Upon removing the partition, the gas expands to occupy the entire volume of the container. What will be the temperature of the gas after it has expanded?

(A) 450 K (B) 500 K (C) 600 K (D) 150 K

47. The length and diameter of a metal wire used in sonometer is doubled. The fundamental frequency will change from 'n' to

(A) $\frac{n}{4}$ (B) 2n (C) 3n (D) $\frac{n}{3}$

48. The work done in rotating a dipole placed parallel to the electric field through 180° is 'W'. So the work done in rotating it through 60° is ($\cos 0° = 1$, $\cos 60° = \frac{1}{2}$, $\cos 180° = -1$)

(A) 4W (B) 3W (C) $\frac{W}{2}$ (D) $\frac{W}{4}$

49. A galvanometer of resistance 'G' is converted into an ammeter of resistance $\frac{G}{30}$ by connecting a shunt 'S' to it. The part of main current passing through the shunt is

(A) 70 % (B) 80 % (C) 30 % (D) 96.6 %

50. Let 'W_1' be the work done in blowing a soap bubble of radius 'r' from a heated soap solution. The soap solution is now cooled down to room temperature and second soap bubble of radius 'r/3' is blown from it. If 'W_2' is the work done in forming this bubble, then

(A) $W_1 > 9W_2$ (B) $W_1 = 9W_2$ (C) $W_1 = 6W_2$ (D) $W_1 > 6W_2$

51. Gases such as CO_2 and NH_3 are more soluble in water than N_2, because _____.

(A) both have low boiling points

(B) both are able to form hydrogen bonds with water

(C) they undergo chemical reaction with water

(D) they displace air from water

52. Resonance effect is NOT observed in _____.

(A) $CH_3 - CH = O$ (B) $CH_2 = CH - OCH_3$

(C) C_6H_6 (D) $CH_2 = CH - NO_2$

53. The rate for the 1st order reaction is 0.69×10^{-2} mol L^{-1} min^{-1} and the initial concentration is 0.1 mol L^{-1}. The half life period is _____.

(A) 1200 s (B) 0.33 s (C) 600 s (D) 1 s

54. Conjugate base for Bronsted acids H_2O and HF are _____.

(A) H_3O^+ and F^-, respectively (B) OH^- and F^-, respectively

(C) H_3O^+ and H_2F^+, respectively (D) OH^- and H_2F^+, respectively

55. Which of the following is the CORRECT order of increasing strengths of carboxylic acids?

(A) $CH_2FCOOH < CH_3COOH < CH_2ClCOOH < CCl_3COOH$

(B) $CH_3COOH < CH_2ClCOOH < CH_2FCOOH < CCl_3COOH$

(C) $CH_2ClCOOH < CH_2FCOOH < CCl_3COOH < CH_3COOH$

(D) $CCl_3COOH < CH_2ClCOOH < CH_2FCOOH < CH_3COOH$

56. Which of the following complexes is an outer orbital complex?

(Atomic numbers: Mn = 25; Fe = 26; Co = 27; Ni = 28)

(A) $[Co(NH_3)_6]^{3+}$ (B) $[Mn(CN)_6]^{4-}$

(C) $[Fe(CN)_6]^{4-}$ (D) $[Ni(NH_3)_6]^{2+}$

57. Which of the following nanoparticles is effectively used in photocatalysis?

(A) Platinum metal (B) Palladium metal

(C) Zinc oxide (D) Gold metal

58. Which of the following reaction involves retention of diazo group?

(A) $C_6H_5N_2^+Cl^- \xrightarrow[CuCl]{HCl}$ (B) $C_6H_5N_2^+Cl^- \xrightarrow[OH^-]{C_6H_5OH}$

(C) $C_6H_5N_2^+Cl^- \xrightarrow[HBr]{Cu\ powder}$ (D) $C_6H_5N_2^+Cl^- \xrightarrow[H_2O]{H_3PO_2}$

59. Which of the following sulfur oxoacids has the lowest oxidation state of sulfur?

(A) H_2SO_4 (B) H_2SO_3 (C) $H_2S_2O_7$ (D) H_2S

60. Which of the following has lowest s-character in the hybrid orbitals of the central atom?

(A) NH_3 (B) CO_2 (C) H_2O (D) PCl_5

61. An element crystallizes in a body-centered cubic (BCC) lattice. How many tetrahedral voids are present in 0.25 mol of the element?

(A) 1.2×10^{23} (B) 4.8×10^{23} (C) 2.4×10^{23} (D) 3.0×10^{23}

62. The equilibrium constant K_p for the reaction,

$PbCO_{3(s)} \longrightarrow PbO_{(s)} + CO_{2(g)}$ is 8.0×10^{-6}. Calculate $\Delta G°$ for the reaction at 25 °C.

(A) 2.908×10^4 J (B) 4.123×10^3 J (C) 2.908×10^3 J (D) 4.123×10^4 J

63. The rate constant (k′) of one of the reaction is found to be 1.5 times that of the rate constant (k″) of another reaction. Then the relationship between the corresponding activation energies of the two reactions (E'_a and E''_a) can be represented as _____.

(A) $E'_a > E''_a$ (B) $E'_a < E''_a$ (C) $E'_a = E''_a$ (D) $E'_a > 4\,E''_a$

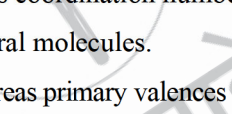
64. Which of the following statements is INCORRECT about Werner's theory?

(A) The ionizable sphere consists of entities which satisfy the primary valency.

(B) Secondary valence is the same thing as coordination number.

(C) Primary valences are satisfied by neutral molecules.

(D) Secondary valences are directional whereas primary valences are non-directional.

65. The CORRECT IUPAC nomenclature for  is _____.

(A) 2-ethylbutan-2-ol (B) 3-methylpentan-3-ol

(C) 3-ethyl-3-methylpentan-3-ol (D) 3-ethylmethylpropan-3-ol

66. The product (X) formed in the following reaction is _____.

$Ph–CH = CH_2 + HBr \xrightarrow{H_2O_2}$ (X)

Major

(A) $Ph–CH(Br)CH_3$: Anti-Markovnikov's product

(B) $Ph(CH_2)_2–Br$: Anti-Markovnikov's product

(C) $Ph–CH(Br)CH_3$: Markovnikov's product

(D) $Ph(CH_2)_2–Br$: Markovnikov's product

67. What structural feature of saturated fats leads to their solid state at room temperature?

(A) Presence of double bonds (B) Strong van der Waals forces

(C) Weak intermolecular interactions (D) High content of polyphenols

68. At what temperature, the sample of neon gas would be heated for its pressure to become three times the initial value, if the initial volume of gas is reduced by 35% at 77 °C?

(A) 77 °C (B) 105 °C

(C) 409.5 °C (D) 682.5 °C

69. How many Coulombs of electricity are required for the oxidation of one mol of water to dioxygen?

(A) 9.65×10^4 C (B) 1.93×10^4 C

(C) 1.93×10^5 C (D) 9.65×10^5 C

70. Match List I with List II.

	List I (Types of polymerization)		List II (Characteristics)
i.	Addition polymerization	a.	Monomers with bifunctional groups
ii.	Condensation polymerization	b.	Involves ring opening reactions
iii.	Copolymerization	c.	No elimination of small molecules
iv.	Ring opening polymerization	d.	Involves two or more monomers

(A) i – c, ii – a, iii – b, iv – d (B) i – a, ii – b, iii – c, iv – d

(C) i – c, ii – a, iii – d, iv – b (D) i – c, ii – d, iii – b, iv – a

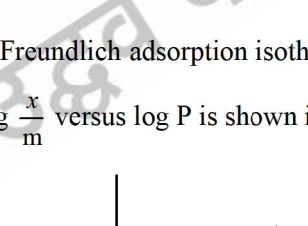
71. Which carbohydrate is characterized by a polymer of β-D-glucopyranose units?

(A) Starch (B) Cellulose (C) Glycogen (D) Sucrose

72. The volume occupied by 11.2 g of N_2 at STP is _____.

(A) 0.1 L (B) 0.896 L (C) 8.96 L (D) 89.6 L

73. Adsorption of a gas follows Freundlich adsorption isotherm. x is the mass of the gas adsorbed on mass m of the adsorbent. The plot of $\log \frac{x}{m}$ versus log P is shown in the given graph. $\frac{x}{m}$ is proportional to _____.

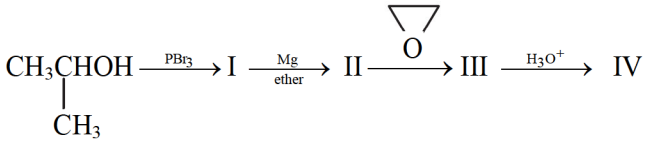


(A) P^2 (B) P^3 (C) $P^{2/3}$ (D) $P^{3/2}$

74. If the van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74, the degree of dissociation is:

(A) 0.87 (B) 0.91 (C) 0.74 (D) 0.97

75. The final product (IV) in the following sequence of reactions is _____.



(A) $CH_3 - \underset{\underset{CH_3}{|}}{CH}OCH_2CH_2OH$

(B) $CH_3 - \underset{\underset{CH_3}{|}}{CH}CH_2CH_2Br$

(C) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2CH_2OH$

(D) $CH_3 - \underset{\underset{CH_3}{|}}{CH}OCH_2CH_3$

76. Ziegler-Natta catalyst is _____.

(A) $Co(CO)_8$

(B) $(Ph_3P)_3RhCl$

(C) $Al(C_2H_5)_3 + TiCl_4$

(D) Co-Th alloy

77. For the reaction $2A + B \longrightarrow C$, the values of initial rate at different reactant concentrations are given in the table below. The rate law for the reaction is _____.

[A] (mol L^{-1})	[B] (mol L^{-1})	Initial rate (mol L^{-1} s^{-1})
0.05	0.05	0.075
0.10	0.05	0.15
0.20	0.10	1.2

(A) Rate = $k[A]^2[B]^2$

(B) Rate = $k[A][B]$

(C) Rate = $k[A][B]^2$

(D) Rate = $k[A]^2[B]$

78. W grams of a gas expand isothermally and reversibly at a given temperature T from volume V_1 to V_2. The magnitude of work will be _____. (assuming these gases as ideal gases)

(A) $NH_3 > SO_2 > Cl_2 > H_2$

(B) $SO_2 > H_2 > NH_3 > Cl_2$

(C) $Cl_2 > NH_3 > SO_2 > H_2$

(D) $H_2 > NH_3 > SO_2 > Cl_2$

79. In Bohr's model, the atomic radius of the first orbit is γ, then the atomic radius of the fourth orbit, is _____.

(A) $\gamma/4$ (B) γ (C) 4γ (D) 16γ

80. Cyclohexene on oxidation by $KMnO_4$ in dilute H_2SO_4 gives _____.

(A) adipic acid

(B) phthalic acid

(C) hexanoic acid

(D) propanoic acid

81. Observe the following α-amino acid structures:

i. $Me_2CH–CH(NH_2)–COOH$

ii. $HOOC–(CH_2)_2–CH(NH_2)–COOH$

iii. $PhCH_2–CH(NH_2)–COOH$

iv. $H_2N–(CH_2)_4–CH(NH_2)–COOH$

v. $HOOC–CH_2–CH(NH_2)–COOH$

Which of the following is CORRECT?

(A) Neutral α-amino acids: i, iii
Acidic α-amino acids: ii, v
Basic α-amino acids: iv

(B) Neutral α-amino acids: i, v
Acidic α-amino acids: ii, iv
Basic α-amino acids: iii

(C) Neutral α-amino acids: v
Acidic α-amino acids: i, iii
Basic α-amino acids: ii, iv

(D) Neutral α-amino acids: i, iv
Acidic α-amino acids: iii,v
Basic α-amino acids: ii

82. The CORRECT order of decreasing second ionization enthalpy of Ti(22), V(23), Cr(24) and Mn(25) is _____.

(A) Mn > Cr > Ti > V

(B) Ti > V > Cr > Mn

(C) Cr > Mn > V > Ti

(D) V > Mn > Cr > Ti

83. Identify CORRECT decreasing order of ionic radii of lanthanoids.

(A) La > Ce > Pr > Nd

(B) Nd > La > Ce > Pr

(C) Pr > La > Nd > Ce

(D) Ce > La > Nd > Pr

84. In the reaction:

$$CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3 \xrightarrow{\text{alc KOH}} A \xrightarrow[\text{Peroxide}]{\text{HBr}} B$$

$$B \xrightarrow{CH_3ONa} C;\ C \text{ is } \_\_\_\_\_.$$

(A) diethyl ether

(B) methyl n-propyl ether

(C) isopropyl alcohol

(D) propylene glycol

85. Λ_0 for NaCl, HCl and NaA are 126.4, 425.9 and 100.5 S cm^2 mol^{-1} respectively. If the conductivity of 0.004 M HA is 5×10^{-4} S cm^{-1}, degree of dissociation of HA is _____.

(A) 0.31 (B) 0.50 (C) 0.75 (D) 0.25

86. A gas absorbs 160 J heat and expands by 250 cm^3 against a constant external pressure 2×10^5 N m^{-2}. What is ΔU of the system?

(A) 210 J (B) 110 J (C) 450 J (D) –300 J

87. Arrange the following compounds in the decreasing order of their solubility in water:

i. n-Butane ii. Butan-1-ol iii. Butan-1-amine

(A) ii > iii > i (B) ii > i > iii (C) iii > ii > i (D) i > iii > ii

88. Which of the following statements correctly explains the reactivity of potassium (K) and magnesium (Mg)?

(A) K has lower ionization energy, allowing it to lose an electron more easily than Mg.

(B) Mg is more reactive because it forms a divalent cation, while K forms a monovalent cation.

(C) Both K and Mg have similar reactivity since they belong to the s-block.

(D) Mg reacts more slowly because it has a higher atomic mass than K.

89. For the redox reaction,

$$x\mathrm{MnO_4^-} + y\mathrm{C_2O_4^{2-}} + z\mathrm{H^+} \longrightarrow m\mathrm{Mn^{2+}} + n\mathrm{CO_2} + p\mathrm{H_2O}$$

The ratio of $x : y =$ _____.

(A) 1 : 3 (B) 2 : 5 (C) 3 : 5 (D) 2 : 3

90. $\mathrm{R - Mg - Br + H_2O \longrightarrow RH_{(gas)}}$. Gas occupies 1.4 L g^{-1} of RH at S.T.P.

Hence, R – Mg – Br is _____.

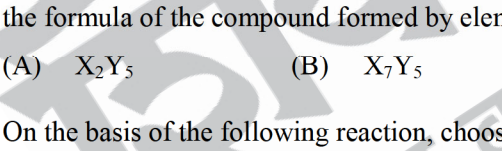
(A) $\mathrm{CH_3CH_2MgBr}$ (B) $\mathrm{C_6H_5MgBr}$

(C) $\mathrm{CH_3CH_2CH_2MgBr}$ (D) $\mathrm{CH_3MgBr}$

91. Atoms of element X form hcp lattice and those of the element Y occupy 70% of tetrahedral voids. What is the formula of the compound formed by elements X and Y?

(A) $\mathrm{X_2Y_5}$ (B) $\mathrm{X_7Y_5}$ (C) $\mathrm{X_5Y_7}$ (D) $\mathrm{X_7Y_2}$

92. On the basis of the following reaction, choose the CORRECT option for reagent A.

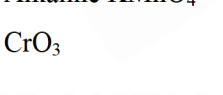


(A) Alkaline $\mathrm{KMnO_4}$ (B) Zn-Hg, conc. HCl

(C) $\mathrm{CrO_3}$ (D) dil. NaOH, Δ

93. Acetaldehyde is NOT obtained in which of the following reactions?

(A) $\mathrm{CH_2 = CH - CH_2 - CH = CH_2} \xrightarrow[\text{ii) Zn,H}_2\text{O}]{\text{i) O}_3}$

(B) $\mathrm{CH_3CH}$  $\xrightarrow[\text{ii) Zn,H}_2\text{O}]{\text{i) O}_3}$

(C) $\mathrm{HC \equiv CH + H_2O} \xrightarrow[1\%\,\mathrm{HgSO_4}]{40\%\,\mathrm{H_2SO_4}}$

(D) $\mathrm{CH_3COCl + H_2} \xrightarrow{\text{Pd-BaSO}_4}$

94. 0.6 g of a solute is dissolved in 0.1 L of a solvent which develops an osmotic pressure of 1.23 atm at 27 °C. The molecular mass of the solute is _____.

(A) 149.5 g/mol (B) 120.15 g/mol (C) 430 g/mol (D) 112.32 g/mol

95. pH of a saturated solution of $Ba(OH)_2$ is 12. The solubility product (K_{sp}) of $Ba(OH)_2$ is _____.

(A) 0.25×10^{-3} (B) 0.125×10^{-6} (C) 0.5×10^{-3} (D) 0.5×10^{-6}

96. The standard electrode potential (E°) values of Mg^{2+}/Mg, Au^{+}/Au and Pb^{2+}/Pb are –2.37 V, 1.68 V and –0.126 V, respectively. The CORRECT increasing order of reducing power of the metal is:

(A) Au < Pb < Mg (B) Pb < Au < Mg (C) Au < Mg < Pb (D) Mg < Pb < Au

97. Which of the following reactions does not lead to the formation of alkanes?

(A) Wurtz reaction
(B) Sabatier-Senderens reaction
(C) Decarboxylation of carboxylic acids
(D) Oxidation of alkenes with hot, conc. $KMnO_4$

98. Which of thc following is fcrromagnctic matcrial?

(A) Dioxygen (B) Chromium(IV) oxide
(C) Benzene (D) Dihydrogen monoxide

99. In which of the following, solubility of AgCl is least?

(A) 0.1 M $CaCl_2$ (B) 0.1 M $AlCl_3$ (C) 0.1 M KCl (D) pure water

100. About a racemic mixturc, somc statcmcnts arc givcn bclow:

(i) It is a mixture of (d) and (*l*) isomers in equimolar proportion.
(ii) It is optically inactive.
(iii) It may be laevo-rotatory or dextro-rotatory.
(iv) It rotates the plane of polarized light towards left.

The FALSE statements are _____.

(A) (ii), (iii) and (iv) (B) (ii) and (iii)
(C) (iii) and (iv) (D) (i) and (iii)

101. The value of $\lim\limits_{x\to 1}\left[\dfrac{x^2 + x\sqrt{x} - 2}{x - 1}\right]$

(A) $\frac{7}{2}$ (B) $\frac{7}{3}$ (C) 7 (D) $\frac{2}{7}$

102. The principal solutions of the equation $\sec x + \tan x = 2\cos x$ are

(A) $\frac{\pi}{6}, \frac{5\pi}{6}$ (B) $\frac{\pi}{6}, \frac{\pi}{20}$ (C) $\frac{\pi}{6}, \frac{2\pi}{3}$ (D) $\frac{\pi}{6}, \frac{\pi}{12}$

103. If $y = (x \log x)^{\log(\log x)}$, then $\frac{dy}{dx} =$

(A) $(x\log x)^{\log(\log x)}\left\{\frac{1}{x\log x}\left[\log x + \log(\log x)\right] + \log(\log x)\left(\frac{1}{x} + \frac{1}{x\log x}\right)\right\}$

(B) $(x\log x)^{x\log x}\log(\log x)\left[\frac{2}{\log x} + \frac{1}{x}\right]$

(C) $(x\log x)^{x\log x}\frac{\log(\log x)}{x}\left[\frac{1}{\log x} + 1\right]$

(D) None of these

104. $\int \frac{x^3 \sin\left[\tan^{-1}\left(x^4\right)\right]}{1+x^8} dx =$

(A) $\frac{1}{4}\cos[\tan^{-1}(x^4)] + c$ (B) $\frac{1}{4}\sin[\tan^{-1}(x^4)] + c$

(C) $\frac{-1}{4}\cos[\tan^{-1}(x^4)] + c$ (D) $\frac{1}{4}\sec[\tan^{-1}(x^4)] + c$

105. The solution of the differential equation $(2x - 4y + 3)\frac{dy}{dx} + (x - 2y + 1) = 0$ is

(A) $\log[(2x - 4y) + 3] = x - 2y + c$ (B) $\log[2(2x - 4y) + 3] = 2(x - 2y) + c$

(C) $\log[2(x - 2y) + 5] = 2(x + y) + c$ (D) $\log[4(x - 2y) + 5] = 4(x + 2y) + c$

106. The eccentricity of the hyperbola $16x^2 - 3y^2 - 32x - 12y - 44 = 0$ is

(A) $\sqrt{\frac{19}{3}}$ (B) $\sqrt{\frac{13}{19}}$ (C) $\frac{\sqrt{19}}{3}$ (D) $\frac{13}{\sqrt{19}}$

107. If $\cos 2B = \frac{\cos(A + C)}{\cos(A - C)}$. Then tan A, tan B, tan C are in

(A) Geometric Progression. (B) Arithmetic Progression.

(C) Harmonic Progression. (D) Arithmetico-Geometric Progression.

108. If $|\bar{a}| = 2$, $|\bar{b}| = 3$, $|\bar{c}| = 5$ and each of the angles between the vectors $\bar{a}$ and $\bar{b}$, $\bar{b}$ and $\bar{c}$, $\bar{c}$ and $\bar{a}$ is 60°, then the value of $|\bar{a} + \bar{b} + \bar{c}|$ is

(A) $\sqrt{69}$ (B) $\sqrt{70}$ (C) $\sqrt{80}$ (D) $\sqrt{39}$

109. The function which is neither decreasing nor increasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ is

(A) cosec x (B) tan x (C) x^2 (D) $|x - 1|$

110. The p.m.f of random variate X is

$$P(X) = \begin{cases} \frac{2x}{n(n+1)}, & x = 1,2,3,\ldots\ldots, n \\ 0 \quad , \text{otherwise} \end{cases}$$

Then E(X) =

(A) $\frac{n+1}{3}$ (B) $\frac{2n+1}{3}$ (C) $\frac{n+2}{3}$ (D) $\frac{2n-1}{3}$

111. If $\int e^{x^2} \cdot x^3 \, dx = e^{x^2} f(x) + C$, (where C is a constant of integration.) and f(1) = 0, then value of f(2) will be

(A) $\frac{3}{2}$ (B) $\frac{1}{2}$ (C) $\frac{-3}{2}$ (D) $\frac{-1}{2}$

112. Let the straight line x = b divide the area enclosed by $y = (1 - x)^2$, $y = 0$ and $x = 0$ into two parts R_1 $(0 \le x \le b)$ and R_2 $(b \le x \le 1)$ such that $R_1 - R_2 = \frac{1}{4}$. Then b equals

(A) $\frac{3}{4}$ (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) $\frac{1}{4}$

113. The unit vector which is orthogonal to the vector $3\hat{i} + 2\hat{j} + 6\hat{k}$ and coplanar with the vectors $2\hat{i} + \hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + \hat{k}$ is

(A) $\frac{8\hat{i} - 3\hat{j} + 3\hat{k}}{\sqrt{82}}$ (B) $\frac{-8\hat{i} - 3\hat{j} + 3\hat{k}}{\sqrt{82}}$

(C) $\frac{-8\hat{i} + 3\hat{j} + 3\hat{k}}{\sqrt{82}}$ (D) $-\frac{8\hat{i} + 3\hat{j} + 3\hat{k}}{\sqrt{82}}$

114. If the imaginary part of $\frac{2z+1}{iz+1}$ is –2, then the locus of the point representing z in the complex plane is

(A) a circle (B) a parabola

(C) a straight line (D) an ellipse

115. If A is non-singular matrix of order 3 such that (A – 2I) (A – 4I) = 0, then $\frac{1}{6}A + \frac{4}{3}A^{-1}$ is

(where I is a unit matrix of order 3 and 0 is a null matrix of order 3)

(A) 2I (B) 0 (C) 6I (D) I

116. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, then $x^2 + y^2 + z^2 =$

(A) $1 + 2xyz$ (B) $1 - 2xyz$ (C) $1 - xyz$ (C) $2xyz$

117. The combined equation of lines passing through the origin each of which making an angle of 30° with the line $3x + 2y - 11 = 0$ is

(A) $3x^2 + 48xy + 23y^2 = 0$ (B) $23x^2 + 48xy + 3y^2 = 0$

(C) $2x^2 + 24xy + 23y^2 = 0$ (D) $23x^2 + 24xy + 3y^2 = 0$

118. The value of c for the function $f(x) = \log x$ on $[1, e]$ if LMVT can be applied, is

(A) $e - 2$ (B) $e + 1$ (C) $e - 1$ (D) e

119. The integral $\int_{\frac{-1}{2}}^{\frac{1}{2}} \left([x] + \log_e \left(\frac{1+x}{1-x} \right) \right) dx$, where $[x]$ represent greatest integer function, equals

(A) $-\frac{1}{2}$ (B) $\log_e \left(\frac{1}{2} \right)$ (C) $\frac{1}{2}$ (D) $2\log_e \left(\frac{1}{2} \right)$

120. A body cools from 100° C to 60° C in 20 minutes. The temperature of the surrounding being 20°C. The body will cool down to 30° C in

(A) 20 minutes (B) 40 minutes

(C) 60 minutes (D) 80 minutes

121. The equation of the concentric circle, with the circle C_1 having equation $x^2 + y^2 - 6x - 4y - 12 = 0$ and having four times area compared to the area of C_1, is

(A) $x^2 + y^2 - 6x - 4y - 37 = 0$ (B) $x^2 + y^2 - 6x - 4y + 37 = 0$

(C) $x^2 + y^2 - 6x - 4y - 87 = 0$ (D) $x^2 + y^2 - 6x - 4y + 87 = 0$

122. If Statement I : A family becomes literate if the woman in it is literate.
Statement II: If a family becomes literate, then the woman in it is literate. Then

(A) Statement II is a negation of statement I. (B) Statement II is an inverse of statement I.

(C) Statement II is a converse of statement I. (D) Statement II is a contrapositive of statement I.

123. Let A, B, C, D be any four points in space such that $\left| \overline{AB} \times \overline{CD} + \overline{BC} \times \overline{AD} + \overline{CA} \times \overline{BD} \right| = \lambda$(area of ΔABC), then the value of λ is

(A) 2 (B) 4 (C) 8 (D) 16

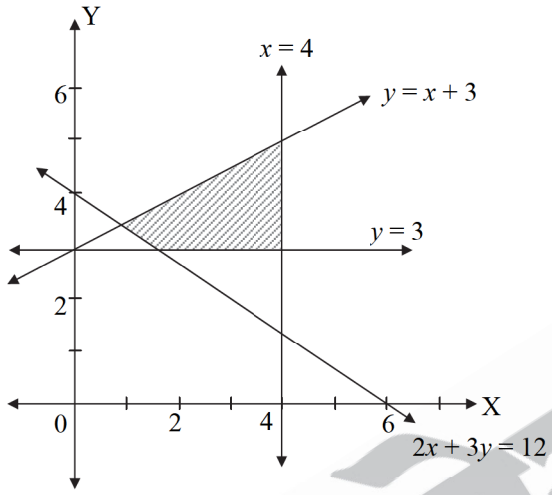
124. Let $p(x)$ be a real polynomial of least degree which has a local maximum at $x = 1$ and a local minimum at $x = 3$. If $p(1) = 6$ and $p(3) = 2$, then $p'(0)$ is

(A) 8 (B) 9 (C) 3 (D) 6

125. The three ships namely A, B and C sail from India to Africa. If the odds in favour of the ships reaching safely are 2 : 5, 3 : 7 and 6 : 11 respectively, then probability of all of them arriving safely is

(A) $\frac{18}{595}$ (B) $\frac{11}{34}$ (C) $\frac{196}{217}$ (D) $\frac{1}{595}$

126. The shaded area in the figure given below is a solution set of a system of inequations. The minimum value of objective function $3x + 5y$, subject to the linear constraints given by this system of inequations is



(A) 19.5 (B) 21 (C) 15 (D) 19.8

127. If $\int \frac{2e^{x} + 3e^{-x}}{3e^{x} + 4e^{-x}} dx = Ax + B \log(3e^{2x} + 4) + C$, then values of A and B are respectively (where C is a constant of integration.)

(A) $\frac{3}{4}, \frac{1}{24}$ (B) $\frac{4}{3}, -24$ (C) $\frac{1}{4}, \frac{1}{24}$ (D) $\frac{3}{4}, \frac{-1}{24}$

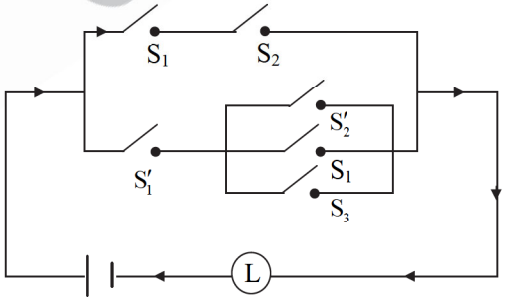
128. If the line $3x + 4y = p$ makes a triangle of area 24 square units with the co-ordinate axes, then the value of p is

(A) ±12 (B) ±20 (C) ±24 (D) ±48

129. If $f(x) = \frac{3x+4}{5x-7}$ and $g(x) = \frac{7x+4}{5x-3}$, then $f(g(x)) =$

(A) $\frac{x^3+1}{x^2+2}$ (B) $41x$ (C) $g(f(x))$ (D) $\frac{5x-7}{41}$

130. The symbolic from of the following circuit is



(where p, q and r represents switches s_1, s_2 and s_3 which are closed respectively)

(A) $(p \wedge q) \vee \sim p \vee [\sim p \vee p \vee r] \equiv t$ (B) $[(p \vee q) \wedge \sim p] \vee [\sim p \vee q \vee r)] \equiv t$

(C) $(p \wedge q) \vee [\sim p \wedge (\sim q \vee p \vee r)] \equiv t$ (D) $(p \vee q) \wedge [\sim p \vee (\sim q \wedge p \wedge r)] \equiv t$

131. If $\left[\bar{a}\ \bar{b}\ \bar{c}\right] = 4$, then the volume (in cubic units) of the parallelopiped with $\bar{a}+2\bar{b}$, $\bar{b}+2\bar{c}$ and $\bar{c}+2\bar{a}$ as coterminal edges, is

(A) 32 (B) 16 (C) 9 (D) 36

132. The length of the perpendicular from the point (0, 2, 3) on the line $\frac{x+3}{5}=\frac{y-1}{2}=\frac{z+4}{3}$, is

(A) $\sqrt{15}$ units (B) $\sqrt{11}$ units (C) $\sqrt{21}$ units (D) $\sqrt{33}$ units

133. The solution of the differential equation $\left(1+e^{-x}\right)\left(1+y^2\right)\frac{dy}{dx}=y^2$ which passes through the point (0, 1) is

(A) $y^2+1=y\left(\log\left(\left(\frac{1+e^{-x}}{2}\right)+2\right)\right)$ (B) $y^2+1=y\left(\log\left(\frac{1+e^{x}}{2}\right)+2\right)$

(C) $y^2=1+y\log\left(\frac{1+e^{x}}{2}\right)$ (D) $y^2=1+y\log\left(\frac{1+e^{-x}}{2}\right)$

134. The number of arrangements of the letters of the word BANANA in which two N's do not appear adjacently is

(A) 40 (B) 60 (C) 80 (D) 100

135. If $a_1, a_2, a_3, \ldots, a_n$ is an A.P. with common difference d, then

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{d}{1+a_2a_3}\right)+\ldots+\tan^{-1}\left(\frac{d}{1+a_{n-1}a_n}\right)\right]=$$

(A) $\left(\frac{(n-1)d}{a_1+a_n}\right)$ (B) $\left(\frac{(n-1)d}{1+a_1a_n}\right)$ (C) $\left(\frac{nd}{1+a_1a_n}\right)$ (D) $\left(\frac{a_n-a_1}{a_n+a_1}\right)$

136. Equation of the plane passing through (1, –1, 2) and perpendicular to the planes $x + 2y - 2z = 4$ and $3x + 2y + z = 6$ is

(A) $6x - 7y - 4z - 5 = 0$ (B) $6x + 7y - 4z + 5 = 0$

(C) $6x - 7y + 4z + 5 = 0$ (D) $6x + 7y + 4z - 5 = 0$

137. Let $f:[-1,3]\to\mathbb{R}$ be defined as

$$\begin{cases} |x|+[x], & -1\leq x<1 \\ x+|x|, & 1\leq x<2 \\ x+[x], & 2\leq x\leq 3 \end{cases}$$

where [t] denotes the greatest integer function. Then f is discontinuous at

(A) only two points (B) only three points

(C) four or more points (D) only one point

138. If one side of a triangle is double the other and the angles opposite to these sides differ by 60°, then the triangle is

(A) Isosceles (B) Right angled (C) Obtuse angled (D) Acute angled

139. Let $y = e^{x^2}$ and $y = e^{x^2} \sin x$ be two given curves. Then the angle between the tangents to the curves at any point of their intersection is

(A) 0 (B) π (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$

140. If m and n are degree and order of $\left(1+y_1^2\right)^{2/3} = y_2$, then the value of $\frac{m+n}{m-n}$ is

(A) 3 (B) 4 (C) 5 (D) 2

141. For an initial screening of an entrance exam, a candidate is given fifty problems to solve. If the probability that the candidate can solve any problem is $\frac{4}{5}$, then the probability, that he is unable to solve less than two problems, is

(A) $\frac{201}{5}\left(\frac{1}{5}\right)^{49}$ (B) $\frac{316}{25}\left(\frac{4}{5}\right)^{48}$ (C) $\frac{54}{5}\left(\frac{4}{5}\right)^{49}$ (D) $\frac{164}{25}\left(\frac{1}{5}\right)^{48}$

142. The principal solutions of the equation $\sqrt{3}\,\text{cosec}\,\theta + 2 = 0$ are

(A) $\frac{\pi}{3}, \frac{2\pi}{3}$ (B) $\frac{2\pi}{3}, \frac{5\pi}{3}$ (C) $\frac{4\pi}{3}, \frac{5\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$

143. The number of solutions of $\cos 2\theta = \sin\theta$ in $(0, 2\pi)$ is

(A) 1 (B) 2 (C) 3 (D) 4

144. The equation of line passing through the point (1, 2, 3) and perpendicular to the lines $\frac{x-2}{3} = \frac{y-1}{2} = \frac{z+1}{-2}$ and $\frac{x}{2} = \frac{y}{-3} = \frac{z}{1}$ is

(A) $\bar{r} = \left(\hat{i}+2\hat{j}+3\hat{k}\right) + \lambda\left(4\hat{i}+7\hat{j}-13\hat{k}\right)$ (B) $\bar{r} = \left(\hat{i}+2\hat{j}+3\hat{k}\right) + \lambda\left(-4\hat{i}+7\hat{j}-13\hat{k}\right)$

(C) $\bar{r} = \left(\hat{i}+2\hat{j}+3\hat{k}\right) + \lambda\left(-4\hat{i}-7\hat{j}-13\hat{k}\right)$ (D) $\bar{r} = \left(\hat{i}+2\hat{j}+3\hat{k}\right) + \lambda\left(4\hat{i}-7\hat{j}-13\hat{k}\right)$

145. If $y = \tan^{-1}\left[\sqrt{\frac{\sqrt{1+x^2}+x}{\sqrt{1+x^2}-x}}\right]$, then $\frac{dy}{dx} =$

(A) $\left(\frac{1}{1+x^2}\right)$ (B) $-\left(\frac{1}{1+x^2}\right)$ (C) $\frac{1}{2}\left(\frac{1}{1+x^2}\right)$ (D) $-\frac{1}{2}\left(\frac{1}{1+x^2}\right)$

146. The value of $\log_e 2 \frac{d}{dx}\left(\log_{\cos x} \text{cosec}\, x\right)$ at $x = \frac{\pi}{4}$ is

(A) $-2\sqrt{2}$ (B) $2\sqrt{2}$ (C) -4 (D) 4

147. $(\bar{a}+\bar{b})\cdot[(\bar{b}+\bar{c})\times(\bar{a}+\bar{b}+\bar{c})] =$

(A) $-[\bar{a}\ \bar{b}\ \bar{c}]$ (B) $[\bar{a}\ \bar{b}\ \bar{c}]$ (C) 0 (D) $2[\bar{a}\ \bar{b}\ \bar{c}]$

148. If the line, $\frac{x-3}{2}=\frac{y+2}{-1}=\frac{z+4}{3}$ lies in the plane, $lx + my - z = 9$, then $l^2 + m^2$ is equal to

(A) 18 (B) 5 (C) 2 (D) 26

149. Let $f(x) = \int \frac{2x}{(x^2+1)(x^2+3)}dx$. If $f(3) = \frac{1}{2}(\log_e 5 - \log_e 6)$, then f(4) is equal to

(A) $\log_e 17 - \log_e 18$ (B) $\log_e 19 - \log_e 20$

(C) $\frac{1}{2}(\log_e 19 - \log_e 17)$ (D) $\frac{1}{2}(\log_e 17 - \log_e 19)$

150. The sum of two natural numbers is 10. Their product is maximum if the numbers are

(A) $x = 5, y = 5$ (B) $x = \sqrt{5}, y = 5$

(C) $x = 5, y = -5$ (D) $x = -5, y = 5$