Paper ID **A**

MIET KUMAON: JEE Mains 2013 MOCK EXAM

IMPORTANT INSTRUCTION

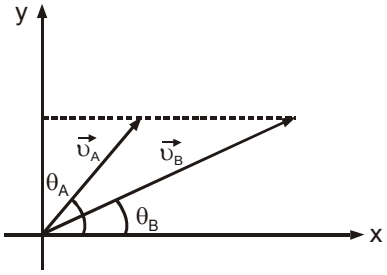
1. Immediately fill in the particulars on this page of the Test Booklet with Blue/Black point pen. Use of pencil is strictly prohibited.
2. The Answer Sheet is kept inside the Test Booklet. When you are directed to open the test booklet take out the Answer Sheet and fill in the particulars carefully.
3. The test is of **3 hours** duration.
4. The Test Booklet has 20 pages consisting of **90** questions. The maximum marks are **360**.
5. There are **three** parts in the question paper A, B, C consisting of Physics, Mathematics and Chemistry having 30 questions in each part of equal weightage. Each question is allotted 4 (four) marks for correct response.
6. Candidates will be awarded marks as stated above in instruction No. 5 for correct response. For each question 1/4(one fourth) marks will be deducted for indicating incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
7. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 6 above.
8. Use Blue/Black Ball Point Pen only for writing particulars/marking responses on Side-1 and Side-2 of the Answer Sheet. Use of pencil is strictly prohibited.
9. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device etc, except the Admit Card inside the examination hall/room.
10. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at bottom of each page and in 4 pages (Pages 17-20) at the end of the booklet. No additional Rough Sheets shall be provided.
11. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them**.
12. **Do not fold or make any stray marks on the Answer Sheet.**

PART A : PHYSICS

1. A particle of mass m_1 collides head on with another stationary particle of mass m_2 ($m_2 > m_1$). The collision is perfectly inelastic. The fraction of kinetic energy which is converted into heat in this collision is

(a) $\frac{m_2}{m_1 + m_2}$ (b) $\frac{m_1}{m_1 + m_2}$ (c) $\frac{m_1}{m_2 - m_1}$ (d) $\frac{m_2}{m_2 - m_1}$

2. Two particles A & B are projected from the same point in different directions in such a manner that vertical components of their initial velocities are same.



(a) The ratio of their time of flight =1

(b) The ratio of their range $\frac{R_A}{R_B} = \frac{\tan\theta_B}{\tan\theta_A}$

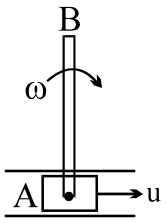
(c) Both (a) and (b) are correct

(d) Both (a) and (b) are incorrect

3. Which of the following combinations of three dimensionally different physical quantities P, Q, R can never be a meaningful quantity?

(a) PQ – R (b) PQ/R (c) (P – Q) / R (d) $(PR - Q^2) / QR$

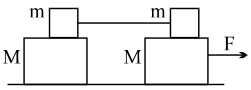
4. A mechanism consists of a part which is translated with a velocity u and a rod AB of length L and mass M hinged at A. The rod rotates about axis A with angular velocity ω. The kinetic energy of rod when it is vertical as shown is:



(a) $\frac{1}{2}Mu^2 + \frac{1}{6}ML^2\omega^2$ (b) $\frac{1}{2}Mu^2 + \frac{1}{6}ML\omega u$

(c) $\frac{1}{2}Mu^2 + \frac{1}{6}ML^2\omega^2 + \frac{1}{2}ML\omega u$ (d) None of these

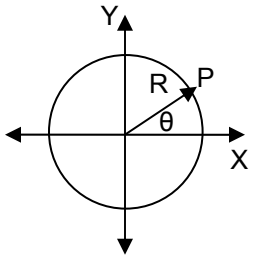
5. Four blocks are arranged on a smooth horizontal surface as shown. The masses of the blocks are given m=2.0kg, M=4.0kg (see the diagram). The blocks of mass m are connected by a light rod and coefficient of static friction between the top and the bottom blocks μ=0.4. If a horizontal force F is applied to one of the bottom blocks as shown, then maximum acceleration with which block of mass m can accelerate is:



(a) 4.0 m/s^2 (b) 2.0 m/s^2

(c) 1.0 m/s^2 (d) 3.0 m/s^2

6. A ring of mass M and radius R lies is *x-y* plane with its center at origin. The mass distribution of ring is non-uniform such that at any point P on the ring, the mass per unit length is given by $\lambda = \lambda_0 \cos^2\theta$ (where λ_0 is a positive constant). Then the moment of inertia of the ring about *z-axis* is

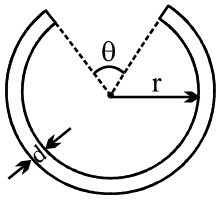


(a) MR^2 (b) $MR^2/2$
(c) $MR/2\,\lambda_0$ (d) $MR/\pi\,\lambda_0$

7. One mole of a diatomic gas is compressed to one fourth its original volume V_o according to the law : VT^2 = constant. The initial pressure is P_o. Then, which of the following is not true.
(a) $\Delta Q = P_o V_o / 2$ (b) $\Delta P = 7 P_o$ (c) $\Delta U = 2.5 P_o V_o$ (d) $W = -P_o V_o$

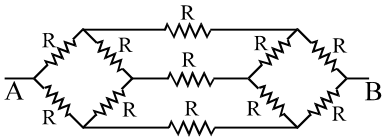
8. A hollow cylindrical beam of white light is incident on a converging lens in air. Axis of the beam coincides with the principal axis of the lens. A screen is placed behind the lens. Let f_V is focal length for violet light and f_R is focal length for red light and the distance between screen & lens is less than both f_V and f_R, pattern obtained on screen will be
(a) Straight coloured bands with white centre
(b) Circular coloured bands with violet innermost and red outermost
(c) Circular coloured bands with red innermost and violet outermost
(d) Uniform white illumination

9. A thin cylindrical metal rod is bent into a ring with a small gap as shown in figure. On heating the system



(a) θ decreases, r and d increases (b) θ and r increases, d decreases
(c) θ, r and d all increases (d) θ is constant, d & r increases

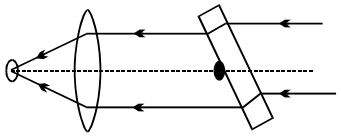
10. The equivalent resistance between the terminal points A and B in the network shown in figure is



(a) $\frac{7R}{5}$ (b) $\frac{5R}{6}$
(c) $\frac{7R}{12}$ (d) $\frac{5R}{12}$

11. Polychromatic light described by $E = 100 [\sin(0.5\pi \times 10^{15}t) + \cos(\pi \times 10^{15}t) + \sin(2\pi \times 10^{15}t)]$
where E is in V/m and t in sec, falls on a metal surface having work function 2.0 eV. The maximum kinetic energy of emitted photoelectron is
[Take h = Planck's constant = 6.4×10^{-34} J-s]
(a) zero (b) 1 eV (c) 2 eV (d) 3 eV

12. A slab of high quality flat glass, with parallel faces, is placed in the path of a parallel light beam before it is focussed to a spot by a lens. The glass is rotated slightly back and forth from the vertical orientation, about an axis out of the page as shown in the figure. According to ray optics the effect on the focussed spot is



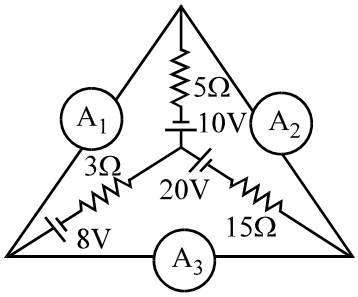
(a) the spot moves towards and then away from the lens

(b) the spot moves up and down parallel to the lens

(c) the spot blurs out of focus

(d) there is no effect on the spot

13. In the given circuit the ammeter A_1 and A_2 are ideal and the ammeter A_3 has a resistance of $1.9 \times 10^{-3}\Omega$. Then choose the correct option:



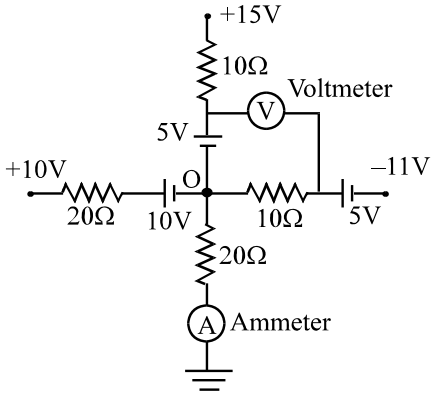
(a) The reading of only A_3 is zero

(b) The reading of all the ammeters is zero

(c) The reading of A_3 is $\frac{82}{27}$ A

(d) The reading of A_3 is $\frac{34}{27}$ A

14. The potential of certain points in the circuit are maintained at the values indicated. The Voltmeter and Ammeter are ideal. Then choose the correct option:



(a) The potential of junction O is $\frac{4}{3}$ V

(b) The reading of voltmeter is $12\frac{1}{3}$ V

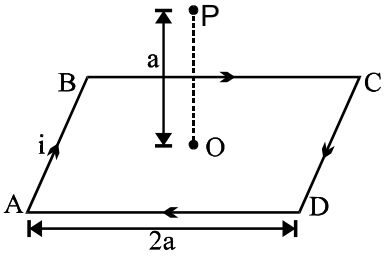
(c) The reading of ammeter is $\frac{1}{15}$ A

(d) All the options are correct

15. A conductor and a semi conductor are connected in parallel. At a certain voltage both the ammeters register the same current. If the voltage of the DC source is increased then:

a) current in conductor increases but in semi conductor decreases
b) current in conductor decreases but in semi conductor increases
c) both in conductor and semi conductor increases equally
d) none of the above

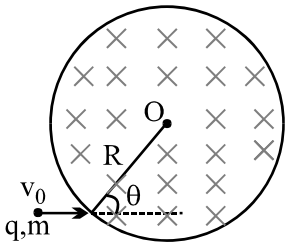
16. ABCD is a square loop of side 2a and carrying a current i. Find the magnetic field due to this loop at a point P located on the axis of the loop at a distance a from the centre of the loop



(a) $\frac{\sqrt{2}\mu_0 i}{\sqrt{3}\pi a}$ (b) $\frac{\mu_0 i}{\sqrt{6}\pi a}$

(c) $\frac{2\mu_0 i}{\sqrt{3}\pi a}$ (d) zero

17. Uniform magnetic field B exists in a circular region of radius R. A particle having specific charge $\frac{q}{m}$ enters the region with velocity v_0 as shown. The value of v_0 for which the particle passes through the center O of the region must be



(a) $v_0 = \frac{RqB}{2m\sin\theta}$ (b) $v_0 = \frac{RqB}{2m}$

(c) $v_0 = \frac{RqB}{2m\cos\theta}$ (d) $v_0 = \frac{RqB}{m\sin\theta}$

18. A charge of 2μc moves with a speed of 3 x 10^6 m/s along positive *x-axis*, and a magnetic field of $\vec{B} = -0.2\hat{K}$ Tesla exists in space. What is the magnetic force $\vec{F}_m$ on the charge

(a) $\vec{F}_m$ =1.2 N along positive *x-axis* (b) $\vec{F}_m$ =1.2 N along negative *x axis*

(c) $\vec{F}_m$ =1.2 N along positive *y-axis* (d) $\vec{F}_m$ =1.2 N along negative *y-axis*

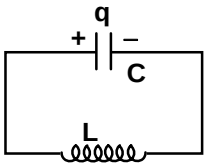
19. The period of satellite of the earth orbiting very near to earth surface is T_0. What is the approximate period of geostationary satellite in terms of T_0

(a) $T_0/\sqrt{7}$ (b) $\sqrt{7}\ T_0$ (c) $7T_0$ (d) $7\sqrt{7}T_0$

20. A photon materializes into an electron-positron pair. The rest mass energy and Kinetic energy of electron are 0.5Mev and 0.19Mev respectively. Energy of the photon (in Mev) is

(a) 0.38 Mev (b) 0.24Mev (c)0.69 Mev (d) 1.38 Mev

21. In an L-C circuit shown in the figure, C = 1F, L = 4H. At time t = 0, charge in the capacitor is 4C and it is decreasing at a rate of $\sqrt{5}$ C/s. Choose the correct statements.



(a) maximum charge in the capacitor can be 6C

(b) maximum charge in the capacitor can be 8C

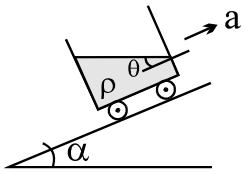
(c) charge in the capacitor will be maximum after time 2 $\sin^{-1}(2/3)$ sec
(d) None of these

22. For transistor action,
(a) the collector must be more heavily doped than the base region
(b) the collector-base junction must be forward biased
(c) the base region must be very narrow
(d) the base region must be of N-type material

23. Mobility of electrons in N-type Ge is 5000 cm^2/volt sec and specific conductivity is 5 mho/cm. If effect of holes is negligible then impurity concentration will be
(a) 6.25×10^{15} / cm^3 (b) 9.25×10^{14} / cm^3
(c) 6×10^{13} / cm^3 (d) 9×10^{13} / cm^3

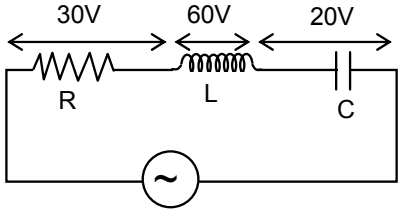
24. Two parallel glass plates are dipped partly in the liquid of density 'd', keeping them vertical. If the distance between the plates is 'x', Surface tension for liquid is T and angle of contact is θ then rise of liquid between the plates due to capillary effect will be :
(a) $\frac{T\cos\theta}{xd}$ (b) $\frac{2T\cos\theta}{xdg}$ (c) $\frac{2T}{xdg\cos\theta}$ (d) $\frac{T\cos\theta}{xdg}$

25. A fluid container is containing a liquid of density ρ is accelerating upward with acceleration a along the inclined place of inclination α as shown. Then the angle of inclination θ of free surface is :



(a) $\tan^{-1}\left[\frac{a}{g\cos\alpha}\right]$ (b) $\tan^{-1}\left[\frac{a+g\sin\alpha}{g\cos\alpha}\right]$ (c) $\tan^{-1}\left[\frac{a-g\sin\alpha}{g(1+\cos\alpha)}\right]$ (d) $\tan^{-1}\left[\frac{a-g\sin\alpha}{g(1-\cos\alpha)}\right]$

26. In the a.c. circuit shown in the following figure, the potential difference of the source is
(a) 110 V (b) 10 V
(c) 50 V (d) 70 V



27. A solid sphere of uniform density and radius 4m is located with its centre at the origin O of coordinate axis. Two spheres of equal radius 1m with their centre at A(-2, 0, 0) and B(2, 0, 0) respectively are taken out, leaving behind spherical cavity. The mass of bigger sphere without cavity is 64 M. The potential at (0, 0, 0) is
(a) – 23 GM (b) -15 GM (c) -16 GM (d) none of these

28. In the process PV= constant, pressure (P) versus density (ρ) graph of an ideal gas is
(a) a straight line parallel to P-axis
(b) a straight line parallel to ρ -axis
(c) a straight line passing through origin
(d) a parabola

29. An engine has an efficiency of 1/6 when the temperature of the sink is reduced by 62^0C. If its efficiency is doubled then temperature of source and sink are
(a) 99^0C, 37^0C (b)124^0C, 62^0C (c)37^0C, 100^0C (d) 62^0C, 124^0C

30. The activity of a sample of radioactive material is R_1 at time t_1 and R_2 at time t_2 ($t_2 > t_1$). If mean life of the radioactive sample is T, then:

(a) $R_1 t_1 = R_2 t_2$ (b) $\frac{R_1 - R_2}{t_2 - t_1}$ = constant

(c) $R_2 = R_1 \exp\frac{(t_1 - t_2)}{T}$ (d) $R_2 = R_1 \exp\left(\frac{t_1}{Tt_2}\right)$

PART B : MATHEMATICS

31. The locus of the point of intersection of the tangents at the extremities of a chord of the circle
$x^2 + y^2 = b^2$ which touches the circle $x^2 + y^2 - 2by = 0$ passes through the point

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

32. If $\Delta(x) = \begin{vmatrix} x^2+4x-3 & 2x+4 & 13 \\ 2x^2+5x-9 & 4x+5 & 26 \\ 8x^2-6x+1 & 16x-6 & 104 \end{vmatrix} = ax^3 + bx^2 + cx + d$, then

(a) a = 3 (b) b = 0 (c) c = 2 (d) none of these

33. Consider 26 tangent lines to an ellipse. The lines separate the plane into several regions, some enclosed and others unbounded then numbers of unbounded regions are
(a) 50 (b) 52 (c) $^{26}C_2$ (d) none of these

34. The distances of the roots of the equation $\tan\theta_0 z^n + \tan\theta_1 z^{n-1} + \ldots + \tan\theta_n = 3$ from z = 0, where $\theta_0, \theta_1, \theta_2, \ldots, \theta_n \in \left[0, \frac{\pi}{4}\right]$ satisfy

(a) greater than 2/3 (b) greater than $|\cos\theta_1| + |\cos\theta_2| + \ldots + |\cos\theta_n|$
(c) less than 2/3 (d) less than $|\cos\theta_1| + |\cos\theta_2| + \ldots + |\cos\theta_n|$

35. If $(x + 1)(x + 2)(x + 3) \ldots (x + n) = A_0 + A_1x + A_2x^2 + \ldots + A_1x^n$, then $A_1 + 2A_2 + \ldots + nA_n$ is equal to

(a) $(n-1)!\left(1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n+1}\right)$ (b) $\left(1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n+1}\right)$

(c) $(n+1)!\left(\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n+1}\right)$ (d) none of these

36. If $x > 0$, $n \in N$ then $\frac{x^n}{1+x+x^2+\ldots+x^{2n}}$ is

(a) $\leq \frac{1}{2n+1}$ (b) $< \frac{2}{2n+1}$ (c) $\geq \frac{1}{2n+1}$ (d) $> \frac{2}{2n+1}$

37. Matrix A is given by $A = \begin{bmatrix} 6 & 11 \\ 2 & 4 \end{bmatrix}$, then the determinant of $A^{2005} - 6A^{2004}$ is

(a) 2^{2006} (b) $(-11)\,2^{2005}$ (c) $-2^{2005} \cdot 7$ (d) $(-9)\,2^{2004}$

38. A plane 2x + 3y + 5z = 1 has point P which is at minimum distance from line joining A(1, 0, – 3) and B(1, – 5, 7), then distance AP is equal to
(a) $3\sqrt{5}$ (b) $2\sqrt{5}$ (c) $4\sqrt{5}$ (d) none of these

39. The number of integral values of x satisfying $\sqrt{-x^2+10x-16} < x-2$ is
(a) 0 (b) 1 (c) 2 (d) 3

40. $\sum_{r=0}^{10} 2^{10}\ {}^{20}C_r\ {}^{20-r}C_{10-r}$ is equal to

(a) $^{20}C_{10}$ (b) $^{20}C_{10}\left(\frac{3}{2}\right)^{10}$ (c) $^{20}C_{10}\ 3^{10}$ (d) $^{20}C_{10}\ 2^{10}$

41. Two circles are constructed taking two sides of a triangle as diameters, then the probability of these two circles intersecting on the 3rd side of the triangle is

(a) 0 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) 1

42. If $f_r''(x) = a$, $a \in R$, where r = 1, 2, 3, then the degree of $g(x) = \begin{vmatrix} f_1(x) & f_2(x) & f_3(x) \\ f_1'(x) & f_2'(x) & f_3'(x) \\ f_1''(x) & f_2''(x) & f_3''(x) \end{vmatrix}$ is

(a) 0 (b) 2 (c) 4 (d) none of these

43. If α_1, α_2 and α_3 are the roots of the equation $ax^3 + bx + c = 0$, then the equation with roots $\frac{\alpha_1^4}{\alpha_2+\alpha_3}, \frac{\alpha_2^4}{\alpha_3+\alpha_1}, \frac{\alpha_3^4}{\alpha_2+\alpha_1}$ is

(a) $a^3x^3 + 3a^2cx^2 + 3ac^2x + b^3 = 0$ (b) $a^3x^3 - 3a^2cx^2 + 3ac^2x - c^3 = 0$
(c) $a^3x^3 - 3a^2cx^2 - 3ac^2x + b^3x + c^3 = 0$ (d) $a^3x^3 - 3a^2cx^2 + 3ac^2x + b^3x - c^3 = 0$

44. If $\lim_{x\to 0} \frac{\ln\cot\left(\frac{\pi}{4} - k_1 x\right)}{\tan k_2 x} = 1$ then

(a) $k_1 = k_2$ (b) $2k_1 = k_2$ (c) $k_1 = 2k_2$ (d) $k_1 = 4k_2$

45. The function $y = x - \cot^{-1}x - \log\left(x + \sqrt{x^2+1}\right)$ is increasing on

(a) (0, 0) (b) $(-\infty, 0)$ (c) $(0, \infty)$ (d) $(-\infty, \infty)$

46. f: $\left(0, \frac{\pi}{2}\right) \to$ A, $f(x) = \log_e(\sin x^{\sin x} + 1)$, then the minimum value of f(x) is

(a) $\log_e 2$ (b) $\log_e\left(\left(\frac{1}{e}\right)^{1/e} + 1\right)$ (c) $\log_e((e)^e + 1)$ (d) 2

47. An infinite G.P. has 2nd term x and its sum is 4, then x belongs to

(a) (0, 2] (b) (1, 8) (c) (– 8, 1] (d) none of these

48. If $z_1, z_2, z_3, \ldots\ldots z_n$ lie on the circle $|z|=2$, then the value of

$$|z_1+z_2+.....+z_n|-4\left|\frac{1}{z_1}+\frac{1}{z_2}+.....+\frac{1}{z_n}\right|$$

(a) 0 (b) n (c) –n (d) none of these

49. If the system of equations $x + 2y + 3z = 4$, $x + py + 2z = 3$ and $x + 4y + qz = 3$ has an infinite number of solutions then

(a) p = 2, q = 3 (b) p = 2, q = 4 (c) 3p = 2q (d) none of these

50. The $\int_0^{\pi/2}\frac{dx}{1+a^2\sin^2 x}$ has the value

(a) $\frac{\pi}{2\sqrt{1+a^2}}$ (b) $\frac{\pi}{\sqrt{1+a^2}}$ (c) $\frac{2\pi}{\sqrt{1+a^2}}$ (d) none of these

51. The function f defined by f(x) = $\lim_{t\to\infty}\left\{\frac{(1+\sin\pi x)^t-1}{(1+\sin\pi x)^t+1}\right\}$ is

(a) continuous everywhere (b) discontinuous at all integer values of x

(c) continuous at x = 0 (d) none of these

52. The curve represented by x = 3 (*cos* t + *sin* t) , y = 4 (*cos* t – *sin* t) is

(a) ellipse (b) parabola (c) hyperbola (d) circle

53. The line 5x +12y = 9 touches the hyperbola $x^2 - 9y^2 = 9$ at the point

(a) (-5,4/3) (b) (5 ,-4/3) (c) (3, -1/2) (d) none of these

54. There are two identical white balls, 3 identical red balls, and 4 green balls of different shades. The number of ways in which they can be arranged in a row so that at least one ball is separated from the balls of the same colour is

(a) 6(7! – 4!) (b) 7(6! – 4!) (c) 8! – 5! (d) none of these

55. Function f : $(-\infty, 1) \to (0, e^5]$ defined by f(x) = $e^{-(x^2-3x+2)}$ is

(a) many one and onto (b) many one and into

(c) one one and onto (d) one one and into

56. The area bounded by the curve y = f(x), x-axis and the ordinates x = 1 and x = b is (b - 1) sin (3b + 4), $\forall b \in R$, then f(x) =

(a) (x - 1) cos (3x + 4) (b) sin (3x + 4)

(c) sin (3x + 4) + 3 (x - 1) cos (3x + 4) (d) none of these

57. Two variants of a test paper are distributed among 12 students. Number of ways of seating of the students in two rows so that the students sitting side by side do not have identical papers & those sitting in the same column have the same paper is

(a) $\frac{12!}{6!\ 6!}$ (b) $\frac{12!}{2^5.\ 6!}$ (c) $(6!)^2 . 2$ (d) 12! . 2

58. If $\vec{p}$ & $\vec{s}$ are not perpendicular to each other and $\vec{r}\times\vec{p}=\vec{q}\times\vec{p}$ & $\vec{r}.\vec{s}=0$ then $\vec{r}=$

(a) $\vec{p}.\vec{s}$ (b) $\vec{q}-\left(\frac{\vec{q}.\vec{s}}{\vec{p}.\vec{s}}\right)\vec{p}$ (c) $\vec{q}+\left(\frac{\vec{q}.\vec{p}}{\vec{p}.\vec{s}}\right)\vec{p}$ (d) $\vec{q}+\mu\vec{s}$ for all scalars μ

59. The equation of the plane through the point (-1, 2 ,0) and parallel to the lines $\frac{x}{3}=\frac{y+1}{0}=\frac{z-2}{-1}$ and $\frac{x-1}{1}=\frac{2y+1}{2}=\frac{z+1}{-1}$ is

(a) x + 2y + 3z – 1 = 0 (b) x - 2y + 3z + 5 = 0

(c) x + y - 3z + 1 = 0 (d) x + y + 3z – 1 = 0

60. The solution of $y\,dx - x\,dy + 3x^2y^2e^{x^3}dx = 0$ is

(a) $\frac{x}{y}+e^{x^3}=c$ (b) $\frac{x}{y}-e^{x^3}=0$ (c) $-\frac{x}{y}+e^{x^3}=c$ (d) none of these

PART C : CHEMISTRY

61. A 1.50 g sample of an ore containing silver was dissolved, and all of the Ag^+ was converted to 0.124 g of Ag_2S. What was the percentage of silver in the ore?
(a) 14.23% (b) 10.8% (c) 8.27% (d) 7.20%

62. You are given 500 ml of 2N HCl and 500 ml of 5N HCl. What will be the maximum volume of 3M HCl that you can make from these two solutions?
(a) 250 ml (b) 750 ml (c) 500 ml (d) 1000 ml

63. The pH of a 0.1M monobasic acid is measured to be 2. Its osmotic pressure at a given temperature T Kelvin is:
(a) 0.1RT (b) 0.11RT (c) 1.1RT (d) 0.01RT

64. The percentage of Se in peroxidase enzyme is 0.5% by mass (atomic mass of Se = 78.4 amu). Then, the minimum molecular mass of enzyme which contains not more than one Se atom is:
(a) 1.568×10^4 (b) 1.568×10^7 (c) 1.568×10^3 (d) 1.568×10^6

65. If the radius of the first Bohr's orbit of hydrogen is 'x' then de Broglie wavelength of electron in 3rd orbit is nearly:
(a) 2 π x (b) 6 π x (c) 9x (d) x/3

66. 8 mole of $AB_3(g)$ are introduced to a 1.0 dm^3 vessel. If it dissociates as

$$2AB_3(g) \rightleftharpoons A_2(g) + 3B_2(g)$$

then at equilibrium, 2 mole of A_2 are found to be present. The equilibrium constant of this reaction is:
(a) 2 (b) 27 (c) 36 (d) 3

67. The heat of combustion of solid benzoic acid at constant volume is -321.301 at 27 °C. The heat of combustion at constant pressure is
(a) -321.30 - 300R (b) -321.30 + 300R (c) -321.30 - 150R (d) -321.30 + 900R

68. For the reaction:

$$2NO + Cl_2 \longrightarrow 2NOCl,$$

The following mechanism has been proposed,

$$NO + Cl_2 \rightleftharpoons NOCl_2 \text{ (fast)}$$

$$NOCl_2 + NO \longrightarrow 2NOCl \text{ (slow)}$$

The rate law for the reaction is
(a) $R = k[NO]^2[Cl_2]$ (b) $R = k[NO][Cl_2]^2$ (c) $R = k[NOCl_2]$ (d) $R = k[NOCl]^2$

69. For a gaseous reaction, following data is given:

$A \longrightarrow B;\ k_1 = 10^{15}\, e^{-2000/T}$

$C \longrightarrow D;\ k_2 = 10^{14}\, e^{-1000/T}$

The temperature at which $k_1 = k_2$ is

(a) 1000K (b) 2000K (c) 868.82K (d) 434.6K

70. At constant pressure, the presence of inert gases:

(a) Reduces the dissociation of PCl_5

(b) Increases the dissociation of PCl_5

(c) Does not affect the degree of dissociation of PCl_5

(d) Steps up the formation of PCl_5

71. What will be the pH of a solution formed by mixing 40 cm^3 of 0.1M HCl with 10 cm^3 of 0.45M NaOH?

(a) 10 (b) 8 (c) 5 (d) 12

72. Oxidation number of C in HNC is

(a) +2 (b) -3 (c) +3 (d) Zero

73. If four moles of electrons are transferred from anode to cathode in an experiment on electrolysis of water, then total volume of the two gases produced at S.T.P will be

(a) 224 L (b) 72.6 L (c) 67.2 L (d) 89.4 L

74. Given standard electrode potentials;

$Fe^{3+} + 3e^- \longrightarrow Fe \quad E° = -0.036\ V$

$Fe^{2+} + 2e^- \longrightarrow Fe \quad E° = -0.440\ V$

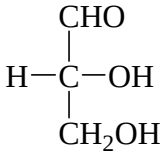
The standard reduction electrode potential E° for

$Fe^{3+} + e^- \longrightarrow Fe^{2+}$ is

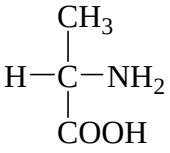
(a) 0.772 V (b) -0.404 V (c) 0.440 V (d) -0.772 V

75. Which among the following compound has (L) configuration:

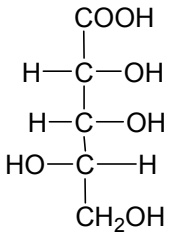
(a)



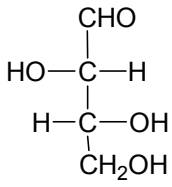
(b)



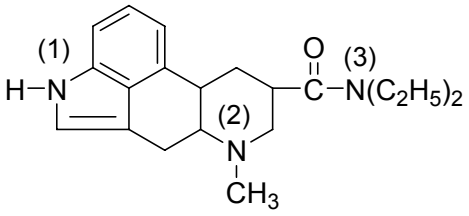
(c)



(d)

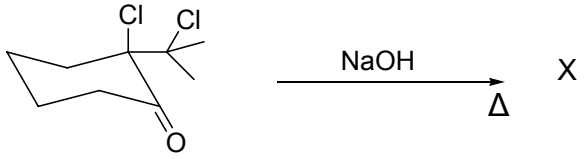


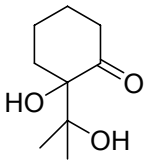
76. Which nitrogen in LSD is most basic:

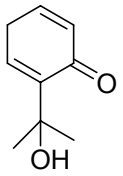


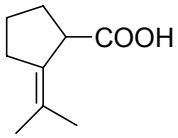
(a) 1 (b) 2 (c) 3 (d) All are equally basic

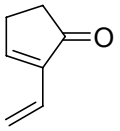
77. In the following reaction, find X



(a) 

(b) 

(c) 

(d) 

78. Which one of the following compound is most activating for aromatic electrophilic substitution reaction?

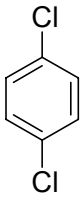
(a) C_6H_5-F (b) C_6H_5-Cl (c) C_6H_5-I (d) C_6H_5-NO_2

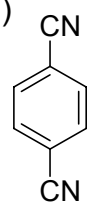
79. Ionic addition of bromine to cis-2-butene yield:

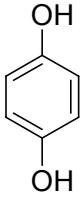
(a) Meso -2,3-dibromobutane (b) (dl) -2,3-dibromobutane

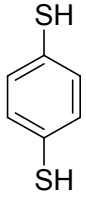
(c) (d) -2,3-dibromobutane (d) (l) -2,3-dibromobutane

80. For which of the following molecule the dipole moment is not zero?

(1) 

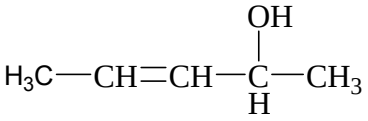
(2) 

(3) 

(4) 

(a) Only 1 (b) 1 and 2 (c) only 3 (d) 3 and 4

81. Number of stereoisomer of the given compound



(a) 2 (b) 4 (c) 3 (d) 6

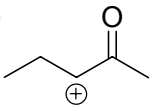
82. In square planar complex of Co^{2+} ion, unpaired electrons are present in orbital
(a) dx^2-y^2 (b) dz^2 (c) dxy (d) dzx

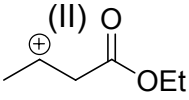
83. How many hydrogen-bonded water molecule(s) are associated in $CuSO_4.5H_2O$?
(a) 1 (b) 2 (c) 4 (d) 5

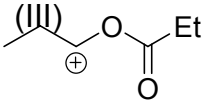
84. Which of the following exhibit square pyramid geometry?
1. $XeOF_4$ 2. ICl_2^- 3. XeF_2 4. BrF_5

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

85. The correct order of stability of following carbocation is

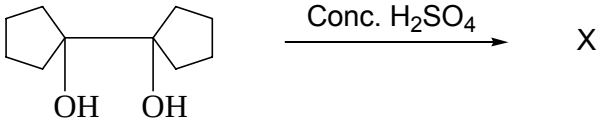
(I) 

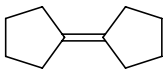
(II) 

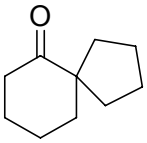
(III) 

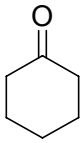
(a) I > II > III (b) III > I > II (c) III > II > I (d) I > III > II

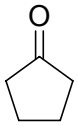
86. In the following reaction, find the product X



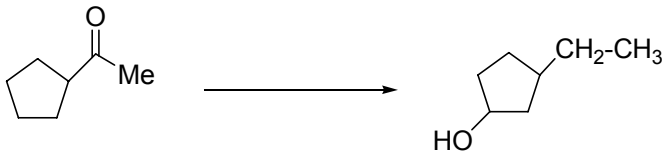
(a) 

(b) 

(c) 

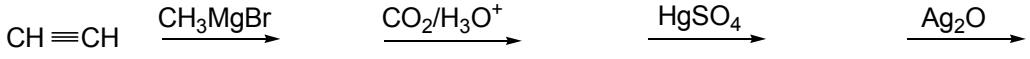
(d) 

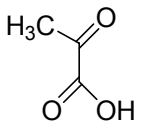
87. The appropriate reagent for the transformation is

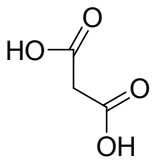


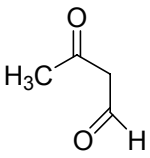
(a) Zn-Hg, HCl (b) NH_2-NH_2, OH^- (c) H_2/Ni (d) $NaBH_4$

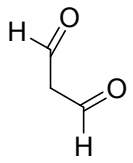
88. End product of the following sequence of reaction is



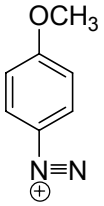
(a) 

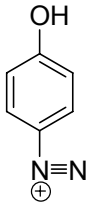
(b) 

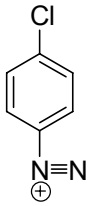
(c) 

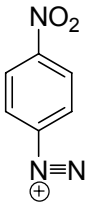
(d) 

89. Which of the following is most reactive ion in azo-coupling reaction?

(a) 

(b) 

(c) 

(d) 

90. For 3d orbital, number of angular nodes and spherical nodes are respectively

(a) 2 and 1 (b) 2 and Zero (c)1 and 2 (d) 2 and 2

ROUGH WORK

ROUGH WORK

ROUGH WORK

ROUGH WORK