# MIET KUMAON PCM MOCK EXAM

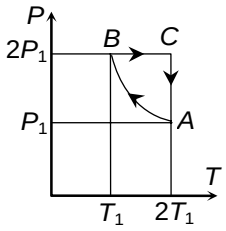
## IMPORTANT INSTRUCTION

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 16 pages consisting of **90** questions. The maximum marks are **360**.
5. There are **three** parts in the question paper A, B, C consisting of Physic, 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 of each question 1/4(one fourth) marks will be deducted for indicating incorrect response of each question. 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-1of 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 on page 16 as well as separate sheet provided at the exam centre.
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.** An ideal gas heat engine is operating between $227^0$C and $127^0$C. It absorbs $10^4$ J of heat at the higher temperature. The amount of heat converted into work is:
(a) 1000 J (b) 2000 J (c) 3000 J (d) 4000 J

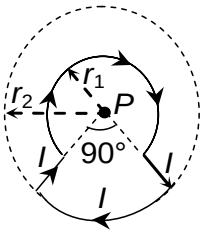
**2.** Two moles of an ideal monoatomic gas is taken through a cycle ABCA as shown in the figure. During the process AB, the relation is PT = constant. If $T_1$ = 300 K then the work done on the gas during the process AB is:
(a) 120 R (b) 240 R
(c) 1200 R (d) 2400 R




**3.** A tuning fork of frequency 340 Hz is vibrated above a cylindrical tube of length 120 cm. Water is slowly poured into the tube. The minimum height of water required for resonance is: (speed of sound in air = 340 m/s)
(a) 120 cm (b) 75 cm (c) 45 cm (d) 90 cm

**4.** A dog when barks produces $10^{-3}$ W of power. If this power is uniformly distributed over a hemispherical area, then the sound level at a distance of 5 m is: [log 6.37 = 0.8]
(a) 68 dB (b) 88 dB (c) 48 dB (d) 58 dB

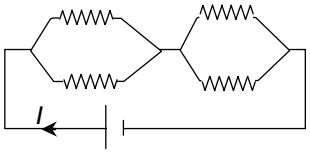
**5.** What is the magnitude of magnetic field at centre point P:
(a) $\frac{\mu_0 I}{8}\left(\frac{3}{r_1}-\frac{1}{r_2}\right)$ (b) $\frac{\mu_0 I}{8}\left(\frac{3}{r_1}+\frac{1}{r_2}\right)$
(c) $\frac{\mu_0 I}{8}\left(\frac{1}{r_1}+\frac{3}{r_2}\right)$ (d) $\frac{\mu_0 I}{8}\left(\frac{1}{r_1}-\frac{3}{r_2}\right)$



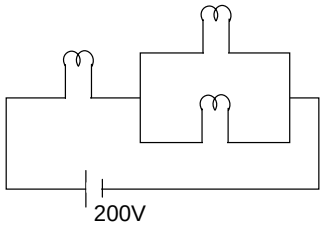

**6.** An electron having kinetic energy *K* is moving in a circular orbit of radius R perpendicular to a uniform magnetic field B. If kinetic energy is doubled and magnetic field is tripled the new radius will become:
(a) $\frac{3}{2}R$ (b) $\sqrt{\frac{3}{2}}R$ (c) $\sqrt{\frac{2}{9}}R$ (d) $\sqrt{\frac{4}{3}}R$

**7.** The magnetic induction inside the core of an electromagnet is 2 T and the magnetizing field is 100 $Am^{-1}$. The relative permeability of the material of the core is:
(a) 200 (b) $\frac{1}{50}$ (c) $\frac{\mu_0}{50}$ (d) $\frac{1}{50\mu_0}$

**8.** In the circuit shown in figure each resistor have equal resistance R. If any one resistance is short circuited, the current I
(a) will increase by a factor of 2
(b) will decrease by a factor of 2
(c) will increase by a factor of 4
(d) will decrease by a factor of 4



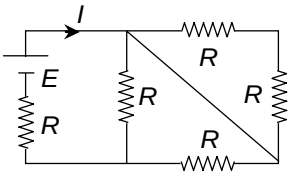
**9.** Three bulbs of power 100 W and voltage 220 V are connected across 220 V as shown in figure. Net power consumed is:




(a) 66.66 W (b) 33.33 W

(c) 50 W (d) 16.67 W

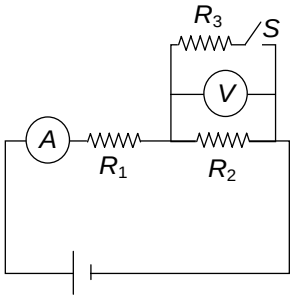
**10.** In the circuit shown in figure current I is:




(a) $\frac{E}{2R}$ (b) $\frac{E}{3R}$

(c) $\frac{E}{R}$ (d) none of these

**11.** In the circuit shown in figure when switch S is closed:




(a) reading of ammeter will decrease and that of voltmeter will increase

(b) reading of ammeter will increase and that of voltmeter will decrease

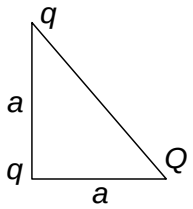
(c) both the readings will increase

(d) both the readings will decrease

**12.** A circular uniformly charged ring have linear charged density $\lambda$. Radius of ring is R. A small portion of length r ( << R ) is removed from the ring. A test charge Q is placed at the centre of the ring. Electrostatic force on this test charge would be: ( K = $\frac{1}{4\pi\varepsilon_0}$ )

(a) $\frac{KQ\lambda R}{r}$ (b) $\frac{KQ\lambda r}{R}$ (c) $\frac{KQ\lambda r}{R^2}$ (d) $\frac{KQ\lambda R}{r^2}$

**13.** In right angled triangle shown in figure, net electrostatic force on +Q charge would be:




(a) $\frac{\sqrt{2}qQ}{4\pi\varepsilon_0 a^2}$ (b) $\frac{\left(\sqrt{2}-1\right)qQ}{4\pi\varepsilon_0 a^2}$

(c) $\frac{qQ}{2\pi\varepsilon_0 a^2}$ (d) none of these

**14.** Electric field at distance r on perpendicular bisector of a small dipole is $E_0$. Magnitude of electric potential at distance 2r on the axis of dipole would be:

(a) $\frac{E_0}{4r}$ (b) $\frac{E_0}{8r}$ (c) $\frac{E_0 r}{4}$ (d) $\frac{E_0 r}{8}$

**15.** A ball is dropped from a height of 45 m from ground. The coefficient of restitution between the ball and ground is 2/3. What is the distance traveled by the ball in 4$^{th}$ sec of its motion. Assume negligible time is spent in rebounding. ( g = 10 m/s$^2$)

(a) 5 m (b) 20 m (c) 15 m (d) 10 m

**16.** A force exerts an impulse I on a particle changing its initial speed *u* to final speed 2*u*. The applied force and the initial velocity are oppositely oriented along the same line. The work done by the force is:

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

**17.** A particle of mass m is made to move with uniform speed $v_0$ along the perimeter of a regular hexagon, inscribed in a circle of radius R. The magnitude of impulse applied at each corner of the hexagon is:

(a) $2mv_0 \sin\frac{\pi}{6}$ (b) $mv_0 \sin\frac{\pi}{6}$ (c) $mv_0 \sin\frac{\pi}{3}$ (d) $2mv_0 \sin\frac{\pi}{3}$

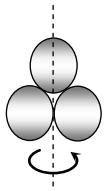
**18.** A continuous stream of particles of mass *m* and velocity *v* is emitted from a source at a rate of n per second. The particles travel along a straight line collide with a body of mass M and get embedded in the body. If the mass M was originally at rest , its velocity when it has received N particles will be:

(a) $\frac{mvN}{Nm+n}$ (b) $\frac{mvN}{Nm+M}$ (c) $\frac{mv}{Nm+M}$ (d) $\frac{Nm+M}{mv}$

**19.** A railway flatcar has an artillery gun installed on it. The combined system has a mass M and moves with a velocity V. The barrel of the gun makes an angle α with the horizontal. A shell of mass *m* leaves the barrel at a speed *v* relative to the barrel in the direction of flat car's motion. The speed of the flat car so that it may stop after the firing is:

(a) $\frac{mv}{M+m}$ (b) $\left(\frac{Mv}{M+m}\right)\cos\alpha$ (c) $\left(\frac{mv}{M+m}\right)\cos\alpha$ (d) $(M+m)v\cos\alpha$

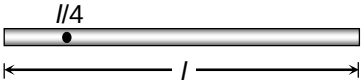
**20.** Three rings, each of mass *m* and radius *r*, are so placed that they touch each other. Find the moment of inertia about the axis as shown in figure.



(a) $5mr^2$ (b) $\frac{5}{7}mr^2$

(c) $7mr^2$ (d) $\frac{7}{2}mr^2$

**21.** A uniform thin rod of length $l$ and mass *m* is hinged at a distance $l/4$ from one of the end and released from horizontal position as shown in figure. The angular velocity of the rod as it becomes vertical is




(a) $2\sqrt{\frac{5g}{7l}}$ (b) $2\sqrt{\frac{6g}{7l}}$ (c) $2\sqrt{\frac{3g}{7l}}$ (d) $2\sqrt{\frac{g}{7l}}$

**22.** A uniform rod of mass *m* length $l$ rests on a smooth horizontal surface. Rod is given a sharp horizontal impulse *p* perpendicular to the rod at a distance $l/4$ from the centre. The angular velocity of rod will be

(a) $\frac{3p}{ml}$ (b) $\frac{p}{ml}$ (c) $\frac{p}{2ml}$ (d) $\frac{2p}{ml}$

**23.** The orbital velocity of an artificial satellite in a circular orbit just above the earth's surface is *v*. For a satellite orbiting at an altitude of half of the earth's radius, the orbital velocity is

(a) $\left(\frac{3}{2}\right)v$ (b) $\sqrt{\left(\frac{3}{2}\right)}v$ (c) $\sqrt{\left(\frac{2}{3}\right)}v$ (d) $\left(\frac{2}{3}\right)v$

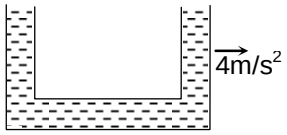
**24.** The masses and radii of the earth and the moon are $M_1, R_1$ and $M_2, R_2$ respectively. Their centers are at distance d apart. The minimum speed with which a particle of mass *m* should be projected from a point midway the two centres so as to escape to infinity is

(a) $\sqrt{\frac{2G(M_1+M_2)}{d}}$ (b) $\sqrt{\frac{4G(M_1+M_2)}{d}}$ (c) $\sqrt{\frac{(4GM_1M_2)}{d}}$ (d) $\sqrt{\frac{G(M_1+M_2)}{d}}$

**25.** A small ball of radius R and specific gravity $\frac{1}{2}$ floats on water in a large tank. The work done in pressing the ball down, in order that the ball just gets immersed in water is ( $\rho =$ density of water)

(a) $\frac{2}{3}\pi R^2\rho g$ (b) $\frac{1}{3}\pi R^4\rho g$ (c) $\frac{2}{3}\pi R^4\rho g$ (d) $\frac{1}{3}\pi R^2\rho g$

**26.** A uniform glass U-tube is partially filled with a liquid. Horizontal portion of the U-tube is of one meter length. The tube is given a 4 $m/s^2$ of constant horizontal acceleration. The difference in the heights of the liquid in the two arms of the U-tube is: (g = 10 $m/s^2$)




(a) 5/2 m (b) 2/5 m (c) 3/5 m (d) 5/3 m

**27.** A vertical spring carries a 5 kg body and is resting in equilibrium. An additional force is applied so that the spring is further stretched for equilibrium. When released from this position it performs 50 complete oscillations in 25 seconds with amplitude of 5 cm. The additional force applied is:

(a) 80 N (b) $80\pi^2$ N (c) 39.5 N (d) 4 N

**28.** When a certain metallic surface is illuminated with monochromatic light of wavelength $\lambda$, the stopping potential for photoelectric current is $3V_0$ and when the same surface is illuminated with light of wavelength $2\lambda$, the stopping potential is $V_0$. The threshold wavelength of this surface for photoelectric effect is:

(a) $6\lambda$ (b) $4\lambda/3$ (c) $4\lambda$ (d) $8\lambda$

**29.** Given that mass of $^1_1H$ = 1.007825 A.m.u ; mass of neutron = 1.008665 A.m.u. ; mass of $^4_2He$ atom = 4.00260 A.m.u. and 1 Amu = 931 MeV/$c^2$ ,what is the binding energy of an $\alpha$-particle ?

(a) 24.5 MeV. (b) 28.3 MeV. (c) 17.8 MeV (d) 32.6 MeV.

**30.** When a monochromatic point source of light is at a distance of 0.2 m from a photoelectric cell, the cut-off voltage and the saturation current are respectively 0.6 V and 18 mA. If the same source is placed 0.6 m from the photoelectric cell, then:

(a) the stopping potential will be 0.2 V.
(b) the stopping potential will be 0.05 V.
(c) the saturation current will be 6.0 mA.
(d) the saturation current will be 2.0 mA.

# PART B : MATHEMATICS

**31.** The equation of the internal bisector of $\angle BAC$ of $\Delta ABC$ with vertices A(5, 2), B(2, 3) and C(6, 5) is :

(a) $2x + y + 12 = 0$ (b) $x + 2y - 12 = 0$

(c) $2x + y - 12 = 0$ (d) none of these

**32.** If cosec A + cot A = $\frac{11}{2}$, then tan A is

(a) $\frac{21}{22}$ (b) $\frac{15}{16}$ (c) $\frac{44}{117}$ (d) $\frac{117}{43}$

**33.** All roots of the equation, $(1 + z)^6 + z^6 = 0$ :

(a) lie on a unit circle with centre at the origin

(b) lie on a unit circle with centre at (-1, 0)

(c) lie on the vertices of a regular polygon with centre at the origin

(d) are collinear

**34.** If tangent at (1, 2) to the circle $c_1$: $x^2 + y^2 = 5$ intersects the circle $c_2$: $x^2 + y^2 = 9$ at A & B and tangents at A & B to the second circle meet at point C, then the co-ordinates of C are:

(a) (4, 5) (b) $\left(\frac{9}{15}, \frac{18}{5}\right)$ (c) $(4, -5)$ (d) $\left(\frac{9}{5}, \frac{18}{5}\right)$

**35.** Two real numbers $\alpha$ & $\beta$ are such that $\alpha + \beta = 3$ & $|\alpha - \beta| = 4$, then $\alpha$ & $\beta$ are the roots of the equation:

(a) $4x^2 - 12x - 7 = 0$ (b) $4x^2 - 12x + 7 = 0$

(c) $4x^2 - 12x + 25 = 0$ (d) none of these

**36.** Let a, b and c be real numbers such that $4a + 2b + c = 0$ and $ab > 0$. Then the equation $ax^2 + bx + c = 0$ has

(a) real roots (b) imaginary roots (c) exactly one root (d) none of these

**37.** If y = f(x) satisfies the condition $f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2}$, $(x \neq 0)$ then f(x) =

(a) $-x^2 + 2$ (b) $-x^2 - 2$ (c) $x^2 + 2$ (d) none of these

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

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

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

**39.** If the system of equations ax + y + z = 0, x + by + z = 0 and x + y + cz = 0, has a non-trivial solution, then the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ is:

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

**40.** If A is a square matrix of order 3, then true statement is

(a) det (- A) = - det A (b) det A = 0 (c) det (A + I) = 1 + det A (d) det 2A = 2 det A

**41.** There are 2 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 atleast one ball is separated from the balls of the same colour

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

**42.** The number of permutations that can be formed by arranging all the letters of the word 'NINETEEN' in which no two E's occur together is

(a) $\frac{8!}{3!\ 3!}$ (b) $\frac{5!}{3!\times\ {}^6C_2}$ (c) $\frac{5!}{3!}\times{}^6C_3$ (d) $\frac{8!}{5!}\times{}^6C_3$

**43.** Length of the focal chord of the parabola $y^2 = 4ax$ at a distance p from the vertex is:

(a) $\frac{2a^2}{p}$ (b) $\frac{a^3}{p^2}$ (c) $\frac{4a^3}{p^2}$ (d) $\frac{p^2}{a}$

**44.** $\underset{n\to\infty}{Lim}\frac{5^{n+1}+3^n-2^{2n}}{5^n+2^n+3^{2n+3}}$ =

(a) 5 (b) 3 (c) 1 (d) zero

**45.** $\underset{x\to-1}{Lim}\frac{\cos 2-\cos 2x}{x^2-|x|}$ =

(a) 2 cos 2 (b) -2 cos 2 (c) 2 sin 2 (d) -2 sin 2

**46.** If $\vec{p}$ *and* $\vec{s}$ are not perpendicular to each other and $\vec{r}\times\vec{p}=\vec{q}\times\vec{p}$ *and* $\vec{r}\,.\,\vec{s}=0$ 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) $\vec{q}+\mu\,\vec{p}$ for all scalars $\mu$

**47.** Let A = $\int_0^1\frac{e^t}{1+t}dt$ then $\int_{a-1}^{a}\frac{e^{-t}}{t-a-1}dt$ has the value

(a) $Ae^{-a}$ (b) $-\ Ae^{-a}$ (c) $-\ ae^{-a}$ (d) $Ae^{a}$

**48.** The distance of the point of intersection of the line x – 3 = (1/2) (y–4) = (1/2) (z–5) and the plane x + y + z = 17 from the point (3, 4, 5) is

(a) 2 (b) 3 (c) 1/3 (d) 1/2

**49.** The function f (x) = [ x ] cos $\left[\frac{(2x-1)}{2}\right]\pi$ , ( where [.] denote GIF) is discontinuous at:

(a) all x (b) x = n/2, n $\in$ I - {1} (c) no x (d) x which is not an integer

**50.** The area contained between the curve $xy = a^2$, the vertical line x = a, x = 4a (a > 0) and x-axis is

(a) $a^2$ log 2 (b) $2a^2$ log 2 (c) a log 2 (d) 2a log 2

**51.** Let $e^{f(x)}$ = ln x. If g(x) is the inverse function of f(x) then g'(x) equals to:

(a) $e^x$ (b) $e^x + x$ (c) $e^x + e^x$ (d) $e^x$ + ln x

**52.** If $S_1$, $S_2$ and $S_3$ are the sums of first n natural numbers, their squares and their cubes respectively, then $\frac{S_3(1+8S_1)}{S_2^2}$ is

(a) 1 (b) 3 (c) 9 (d) 10

**53.** If p and q are respectively the sum and the sum of the squares of n successive integers beginning with 'a', then $nq - p^2$ is

(a) independent of 'a' (b) independent of 'n'

(c) dependent on 'a' (d) none of these

**54.** x - 2y + 4 = 0 is a common tangent to $y^2 = 4x$ & $\frac{x^2}{4}+\frac{y^2}{b^2}=1$, then the value of 'b' and the other common tangent are given by :

(a) b = $\sqrt{3}$ ; x + 2y + 4 = 0 (b) b = 3; x + 2y + 4 = 0

(c) b = $\sqrt{3}$ ; x + 2y - 4 = 0 (d) b = $\sqrt{3}$ ; x - 2y - 4 = 0

**55.** The equation of the ellipse with its centre at (1, 2), focus at (6, 2) and passing through the point (4, 6) is:

(a) $\frac{(x-1)^2}{45}+\frac{(y-2)^2}{20}=1$ (b) $\frac{(x-1)^2}{20}+\frac{(y-2)^2}{45}=1$

(c) $\frac{(x-1)^2}{25}+\frac{(y-2)^2}{16}=1$ (d) $\frac{(x-1)^2}{16}+\frac{(y-2)^2}{25}=1$

**56.** The curves $x^3 + p\,xy^2 = -2$ and $3x^2y - y^3 = 2$ are orthogonal for:

(a) p = 3 (b) p = - 3 (c) no value of p (d) p = ± 3

**57.** The general solution of sinx + sin5x = sin2x + sin4x is:

(a) 2 nπ ; n ∈ I (b) nπ ; n ∈ I (c) nπ/3 ; n ∈ I (d) 2 nπ/3 ; n ∈ I

**58.** $\sin^{-1}(\cos(\sin^{-1}x)) + \cos^{-1}(\sin(\cos^{-1}x))$ is equal to

(a) 0 (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{3\pi}{4}$

**59.** Let $f(x) = x^3 + ax^2 + bx + 5\sin^2 x$ be an increasing function in the set of real numbers R. Then a & b satisfy:

(a) $a^2 - 3b - 15 > 0$ (b) $a^2 - 3b + 15 < 0$ (c) $a^2 - 3b - 15 < 0$ (d) a > 0 & b > 0

**60.** There are two urns. There are m white & n black balls in the first urn and p white & q black balls in the second urn. One ball is taken from the first urn & placed into the second. Now, the probability of drawing a white ball from the second urn is:

(a) $\frac{pm + (p+1)n}{(m+n)(p+q+1)}$ (b) $\frac{(p+1)m + pn}{(m+n)(p+q+1)}$

(c) $\frac{qm + (q+1)n}{(m+n)(p+q+1)}$ (d) $\frac{(q+1)m + qn}{(m+n)(p+q+1)}$

# PART C : CHEMISTRY

**61.** A compound contains 8% sulphur. The minimum molecular weight of the compound is
(a) 100 (b) 200 (c) 350 (d) 400

**62.** Mole fraction of solute in aqueous solution is 0.2, the molarity of solution will be
(a) 13.88 (b) 1.388 (c) 0.138 (d) 0.0138

**63.** Assuming that water vapour behaves as an ideal gas, ΔU of 1 mole of water at 1 bar pressure and 100˚C (given that $\Delta H_{vap}$ of water at 1 bar and 373K = 41 kj $mole^{-1}$ and R = 8.3 J mole $K^{-1}$) will be
(a) 3.7905 Kj/mole (b) 37.904 Kj/mole (c) -37.904 kj/mole (d) -4.100 kj/mole

**64.** $A + B \rightleftharpoons 2C$
If 1 mole of A and 1.5 mole of B and .5 mole of C are placed in 1 litre vessel and allowed to attain the equilibrium. The final concentration of C is 0.75 mole $L^{-1}$ the value of $K_c$ is
(a) 0.75 (b) 0.46 (c) 0.50 (d) 0.25

**65.** The solubility product of $Mg(OH)_2$ is $10^{-14}$. The solubility of $Mg(OH)_2$ in a buffer solution of PH=8 is:
(a) $10^{-8}$ (b) $10^{-6}$ (c) $10^{-2}$ (d) $10^{-4}$

**66.** 1.2% solution (w/v) of NaCl is isotonic with 7.2% solution (w/v) of glucose (molar mass 180 g/mole). The degree of dissociation of NaCl solution is:
(a)95% (b) 90% (c) 100% (d) 5%

**67.** A crystal is made of particle X, Y & Z. 'X' form F.C.C. packing, Y occupies all the octahedral voids of X & Z occupies all tetrahedral voids of X. If all the particles along one body diagonal are removed then the formula of the crystal would be
(a) $XYZ_2$ (b) $X_2YZ_2$ (c) $X_8Y_4Z_5$ (d) $X_5Y_4Z_8$

**68.** The emf in volts of oxidation potential of half cell given below is
Pt / $H_2$(g) / HCl
2atm (0.02M)
(a) +0.1143V (b) -0.1143V (c) +0.2286V (d) -0.2286V

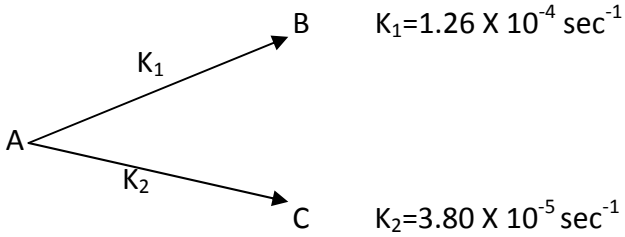
**69.** The standard electrode potential (E˚) of $Fe^{3+}/Fe^{2+}$ and $Fe^{2+}/Fe$ electrodes are +0.77V and -0.44V respectively at 300 K. The E˚ of $Fe^{3+}/Fe$ electrode at the same temperature is
(a) 1.21V (b)0.33V (c) -0.11V (d) -0.04V

**70.** For the reaction $2O_3 \longrightarrow 3O_2$, the following mechanism is suggested
$O_3 \rightleftharpoons O_2 + [O]$ (fast)
$O_3 + [O] \rightarrow 2O_2$ (slow)
The rate law expression wil be
(a) $r = K[O][O_3]$ (b) $r = K[O_3]^2$ (c) $r = K[O_3]^2[O_2]^{-1}$ (d) $r = K[O_3]^3[O_2]^1$

**71.** For the reaction A ⟶ B, ΔH = -44Kcal, the activation energy is 13 Kcal. Calculate the activation energy for reverse reaction

(a) 57Kj (b) 31Kj (c) 57Kcal (d) 31Kcal

**72.** A substance undergoes first order decomposition. The decomposition follows two parallel first order reaction as:




The percentage of B and C are:

(a) 80% B and 20% C (b) 20% B and 80% C

(c) 76.83% B and 23.17% C (d) 23.27% B and 76.83% C

**73.** The number of spectral lines when electron jumps from $5^{th}$ energy level to second energy state will be

(a)15 (b) 6 (c)5 (d) 10

**74.** To remove an electron from 1s orbital of hydrogen I is the ionization potential. The energy required to promote an electron from 1s to 3d orbital is

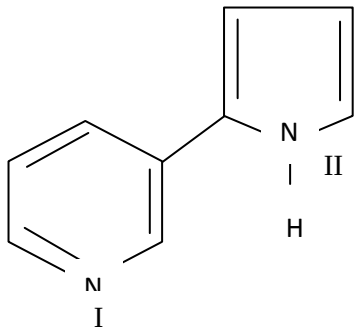
(a) 1/9 I (b) 8/9 I (c) 1/8 I (d) 2/3 I

**75.** Any P-orbital can accommodate up to

(a) Four electrons (b) Two electrons with parallel spin

(c) Six electrons (d) Two electrons with opposite spin

**76.** Hybridization of nitrogen I and II in the following compound is




(a) $sp^2$, $sp^3$ (b) sp, $sp^2$ (c) $sp^2$, $sp^2$ (d) $sp^2$, sp

**77.** Which of the following is correct order of bond angle?

(a) $NH_3 > PH_3 > NF_3$ (b) $NF_3 > NH_3 > PH_3$ (c) $NH_3 > NF_3 > PH_3$ (d) $PH_3 > NH_3 > NF_3$

**78.** The increasing order of thermal stability of the following salt is

I. $CaCO_3$ II. $BaCO_3$ III. $K_2CO_3$ IV. $CuCO_3$

(a) I < II < III < IV (b) IV < I < II < III (c) I < IV < II < III (d) I < IV < III < II

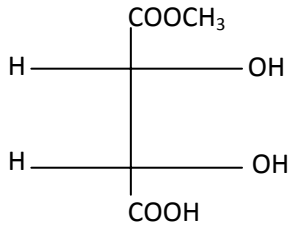
**79.** Which is the correct order of electron affinity?

(a) O > S > Se > Te (b) S > Se > Te > O (c) S > O > Se > Te (d) S > Se > O > Te

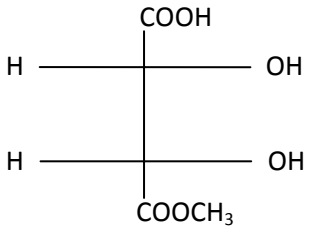
**80.** In square planar complex of $CO^{2+}$ ion unpaired electron are present in

(a) $dx^2$-$y^2$ (b) $dz^2$ (c) dxy (d) dzx

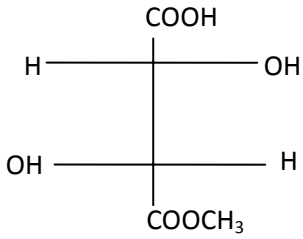
**81.** The correct statement about compound I, II, III is




I




II




III

(a) (I) and (III) are diastereomers (b) (I) and (III) are enantiomers

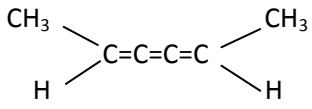
(c) (I) and (II) are enantiomers (d) (I) and (II) are identical.

**82.** The correct order of stability of conformations of $NH_2$-$CH_2$-$CH_2$-OH is:

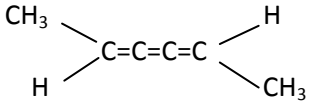
(a) Anti > Gauch > Eclipsed (b) Gauch > Anti > Eclipsed

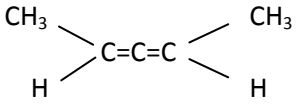
(c) Eclipsed > Gauch > Anti (d) Gauch > Eclipsed > Anti 13.88

**83.** Which of the following pairs of elements are geometrical isomers?

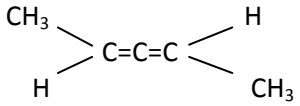
(a) 


and




(b) 

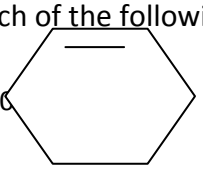

and

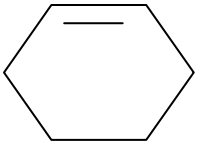


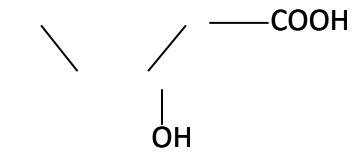

(c) Both (a) and (b)

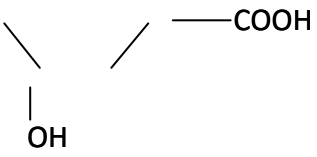
(d) None of these

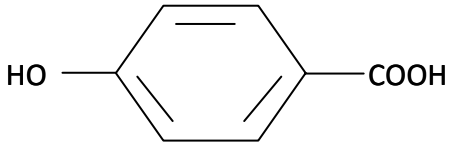
**84.** Which of the following is strongest acid?

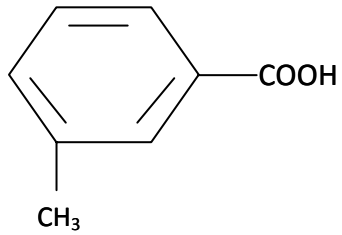




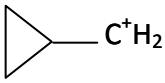
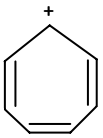
(a) 


(b) 

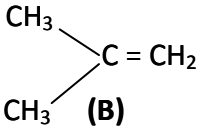

(c) 


(d) 


**85.** Which of the following is most stable carbocation

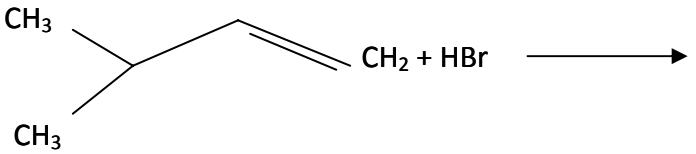
(a) $(C_6H_5)_3C^+$ (b)  (c)  (d) $(CH_3)_3C^+$

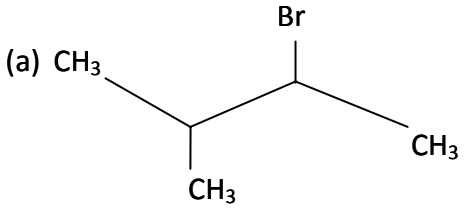
**86.** The reactivity of the alkenes

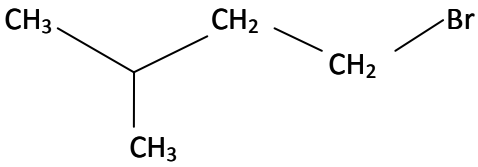
$CH_3 - CH = CH_2$ **(A)**  **(B)** $(CH_3)_3C - CH = CH_2$ **(C)**

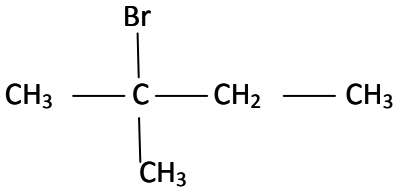
towards hydrogen is

(a) A > B > C (b) A > C > B (c) C > A > B (d) C > B > A

**87.**  ‘A’ (Predominant), ‘A’ is

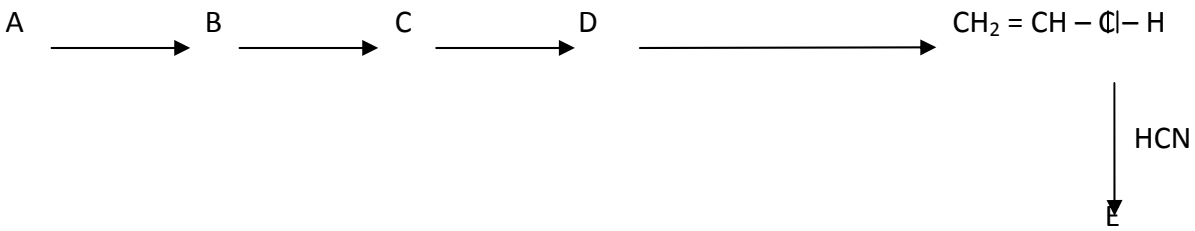
(a) 


(b) 


(c) 


(d) None of these

**88.** HCN $H_3O^+$ $PCl_5$ $H_2$/P-Z Catalyst O




The compounds A and E in this reaction are :

(a) $CH_3-\overset{\overset{O}{\|}}{C}-H$ & $CH_2=CH-\underset{CN}{\overset{OH}{CH}}$

(b) $CH\equiv CH$ & $CH_2-CH=O$ with $CH_2-CN$

(c) $CH=CH-CH=O$ with CN & $HC\equiv C-CH_3$

(d) $CH_2=CH_2$ & $CH_2<\begin{matrix}CH=O\\CN\end{matrix}$

**89.** Which one of the following is most reactive for ArSE Reactions :

(a) $C_6H_5$-I (b) $C_6H_5$-Br (c) $C_6H_5$-F (d) $C_6H_5$- Cl

**90.** Consider the following groups :

(I) – OH (II) $-C_6H_5$ (III) –OR (IV) $-NR_2$

Arrange these groups in decreasing order of their reactivity for ArSE Reaction.

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

# ROUGH WORK