Physics Single Correct (Maximum Marks: 15)

Question No. 1
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

A wave pulse in a string is described by the equation $y_1 = \dfrac{5}{(3x-4t)^2+2}$ and another wave pulse in the same string is described by $y_2 = \dfrac{-5}{(3x+4t-6)^2+2}$. The values of y_1, y_2 and x are in metres and t is in seconds. Which of the following statement is correct?

    A. y_1 travels along $-x$ -direction and y_2 along $+x$ -direction
    B. Both y_1 and y_2 travel along $+x$ -direction
    C. At $x = 1m$, y_1 and y_2 always cancel
    D. At time $t = 1s$, y_1 and y_2 exactly cancel everywhere

Question No. 2
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

There is some change in length when a 33000 N tensile force is applied on a steel rod of the area of cross-section 10^{-3} m^2. The change of temperature required to produce the same elongation, if the steel rod is heated, is (The modulus of elasticity is 3×10^{11} N m^{-2} and the coefficient of linear expansion of steel is $1.1 \times 10^{-5}\,°\text{C}^{-1}$)

    A. $20°$C
    B. $15°$C
    C. $10°$C
    D. $0°$C

Question No. 3
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

A clock face has negative charges $-q, -2q, -3q, \ldots, -12q$ fixed at the position of the corresponding numerals on the dial. The clock hands do not disturb the net field due to point charges. At what time does the hour hand point in the same direction of the electric field at the centre of the dial?
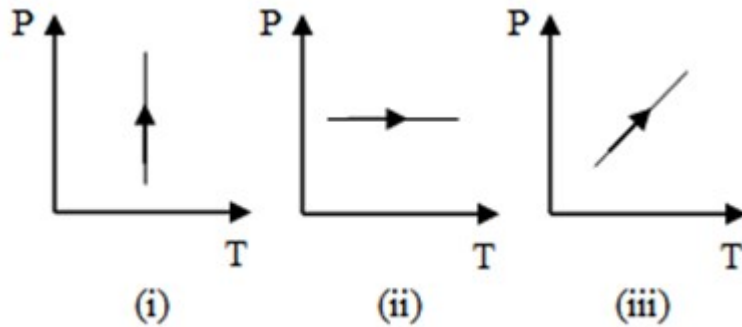
    A. $3 : 30$
    B. $9 : 30$
    C. $6 : 30$

Question No. 4
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

Pressure versus temperature graphs of an ideal gas are as shown in figure. Choose the wrong statement

A. density of gas is increasing in graph (i)
B. density of gas is decreasing in graph (ii)
C. density of gas is constant in graph (iii)
D. none of these

Question No. 5
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

In a plane EM wave the electric field oscillates sinusoidally at a frequency of 30MHz and amplitude 150 V/m . Identify the correct expression of B assuming the wave is propagating along x -axis and is oscillating along y -axis.

A. $5 \times 10^{-7} \sin[\frac{x}{3} - 6 \times 10^{+7} t]\hat{z}$ T

B. $5 \times 10^{-7} \sin[\pi(\frac{x}{5} - 6 \times 10^{+7} t)]\hat{z}$ T

C. $5 \times 10^{-7} \sin[\pi(\frac{x}{10} - 3 \times 10^{+7} t)]\hat{z}$ T

D. $5 \times 10^{-7} \sin[\pi(\frac{2x}{5} - 6 \times 10^{+8} t)]\hat{z}$ T

Physics Multiple Correct (Maximum Marks: 28)

Question No. 1
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

A point charge q = 6μC is moving in a straight line with a velocity

$\vec{v} = 5 \times 10^4 \, \vec{i}$ (m/s) . When the charge is at the location P(3 m, 4 m, 0) choose the correct statements about the electric & magnetic fields produced by the charge at the origin.

  A. Magnitude of magnetic field is 9.6×10^{-10} T
  B. Magnetic field is in $-z$ direction
  C. Electric field is varying with time
  D. Magnetic field is decreasing (with time) in magnitude

Question No. 2

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

A partition divides a container having insulated walls into two compartments I and II. The same gas fills the two compartments whose initial parameters are given. The partition is a conducting wall which can move freely without friction. Which of the following statements is/are correct with reference to the final equilibrium position?
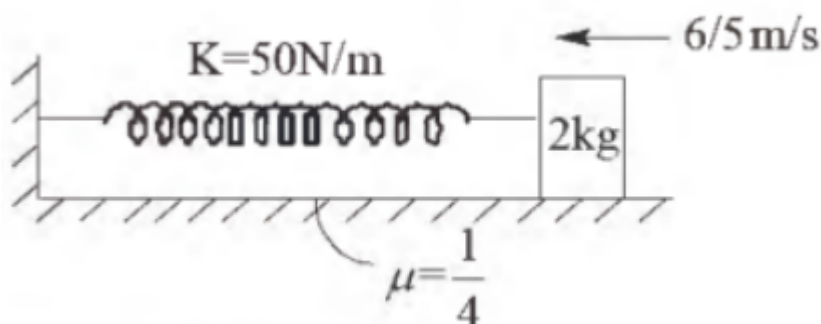
P,V,T	P,V,T
I	II
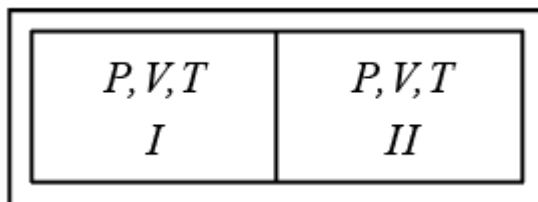
  A. The final pressure in the compartments are equal
  B. Volume of compartment I is 3 V/5
  C. Volume of compartment II is 12 V/5
  D. Final pressure in compartment I is 5p/3

Question No. 3

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

A block is given velocity when the spring was in natural length. Then $(g = 10 \text{ m/s}^2)$

A. Distance travelled by the block before it stops for the first time is 32 cm
B. Distance travelled by the block before it stops for the first time is 16 cm
C. Acceleration of block when it stops for the first time is 1.5 m/s^2
D. The block never reaches equilibrium position again

Question No. 4
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

A small disc of mass m is released on a parabolic curve in a vertical plane such that gravity acts along negative $y-$ axis. The equation of parabolic curve is $x^2 = \frac{2a}{\sqrt{3}} y$, where ' a ' is a positive constant. Frictional force between disc and curve are sufficient for pure rolling. When disc is reached at $x = a$ then choose the correct option(s) (disc is made of thick neutral conductor).
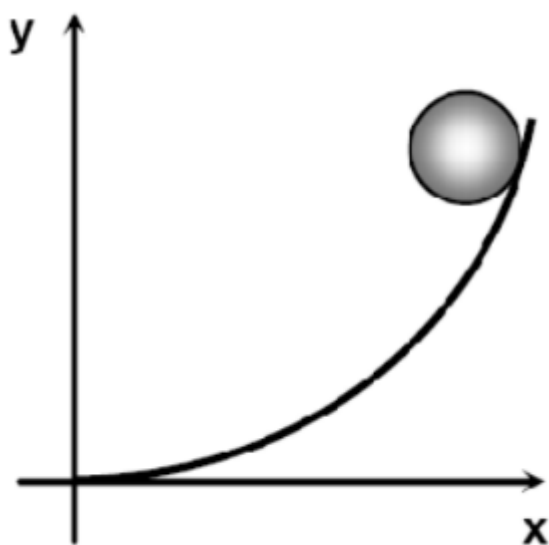
A. acceleration of disc along the trajectory is $\sqrt{3}g.$
B. acceleration of disc along the trajectory is $\frac{g}{\sqrt{3}}.$
C. frictional force between disc and curve is $\frac{mg}{2\sqrt{3}}.$
D. frictional force between disc and curve is $\frac{mg}{\sqrt{3}}.$

Question No. 5
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

In Young's double slit experiment, phase difference between the waves at a point on screen having intensity less than the average intensity on screen may be
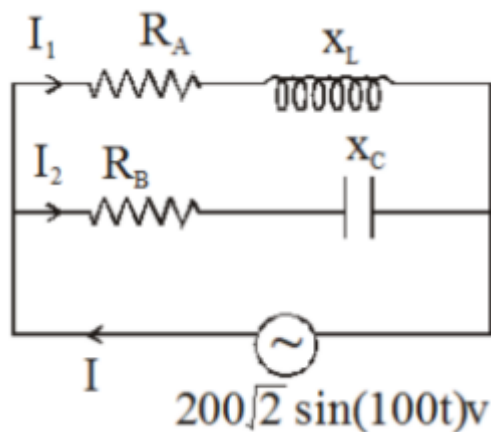
A. $\pi/4$
B. $2\pi/3$
C. π

Question No. 6
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

Figure shows a two branched parallel circuit with
$R_A = 10\Omega, L = \frac{\sqrt{3}}{10}$ H, $R_B = 20\Omega$ and $C = \frac{\sqrt{3}}{2}$ mH . Current in $L - R_A$ is I_1 and in $C - R_B$ is I_2 and main current is I

A. Phase difference between I_1 and I_2 is $90°$
   At some instant current in $L - R_A$ is 10 A. At the same instant current in
B. $C - R_B$ branch will be $5\sqrt{3}$ A
C. At some instant I_1 is $10\sqrt{2}$ A then at this instant I will be $10\sqrt{2}$ A
D. Power dissipated in the circuit is 2121.3 W

Question No. 7
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

A parallel plate capacitor has its two plates connected to an ideal spring of force constant K. Relaxed length of spring is L and it is made of non-conducting material. The area of each plate is A. The capacitor has a charge q_0 on it. To discharge the capacitor through the resistance R, switch S is closed. Assume that there is no friction and the plates always remains parallel to each other.
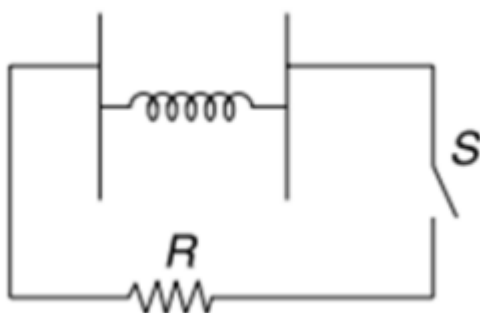
If the time constant of the circuit is very large and discharge process is very

A. slow, heat dissipated in the resistance is $\dfrac{q_0^2 L}{2\epsilon_0 A} - \dfrac{q_0^4}{4\epsilon_0^2 A^2 k}$

If the time constant of the circuit is very large and discharge process is very

B. slow, heat dissipated in the resistance $\dfrac{q_0^2 L}{2\epsilon_0 A} - \dfrac{q_0^4}{8\epsilon_0^2 A^2 k}$

If the time constant of the circuit is very small and discharge process is

C. almost instantaneous, heat dissipated in the resistance is $\dfrac{q_0^2 L}{2\epsilon_0 A} - \dfrac{q_0^4}{4\epsilon_0^2 A^2 k}$

If the time constant of the circuit is very small and discharge process is

D. almost instantaneous, heat dissipated in the resistance is $\dfrac{q_0^2 L}{2\epsilon_0 A} - \dfrac{q_0^4}{8\epsilon_0^2 A^2 k}$

Physics Numerical (Maximum Marks: 24)

Question No. 1
Numerical Type
The answer has to be filled into the input box provided below.

A hydrogen atom in ground state, moving with speed v collides with another hydrogen atom in ground state at rest. If $v \le v_0 = \sqrt{\dfrac{kE_0}{m_H}} \approx a \cdot bc \times 10^n$ m/s (scientific notation rounded off to 2 decimal places), then the collision is elastic. Here a, b and c are whole number, less then 9. Find the value of $\dfrac{a \times b \times c}{k \times n}$.

Given : $\dfrac{me^4}{2h^2} = E_0 = 13.6\text{eV}/$ atom $= 2.18 \times 10^{-18}$ J/ atom $\Rightarrow$ ionization energy of H-atom $\Rightarrow$ $m_H = 1.67 \times 10^{-27}$ kg $\Rightarrow$ Mass of hydrogen atom.

Question No. 2
Numerical Type
The answer has to be filled into the input box provided below.

In the adjacent figure, a uniform plank of mass m and length $l = 1m$ is lying at rest on a smooth horizontal surface. Two horizontal forces $F_1 = F + kx$ and $F_2 = F - kx$ are applied at the ends A and B respectively in the opposite direction, where x is the distance moved by centre of mass of the plank from initial position O. An insect of mass $m/2$ sits on plank at end A gently and starts moving with the constant velocity of 2 m/s with respect to the plank, towards B. Find the speed of the plank when its centre of mass has moved by a distance $l/2$. Given $\dfrac{k}{m} = \dfrac{32}{3}$.
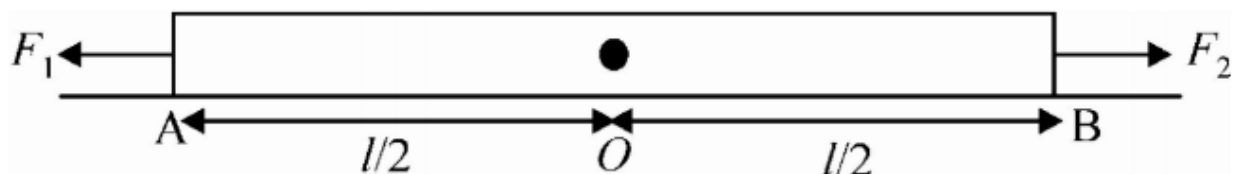
Question No. 3
Numerical Type
The answer has to be filled into the input box provided below.

Find the effective value or rms value (in ampere) of an alternating current in one time period that changes according to the law (All quantities are in S.I. unit and symbols have their usual meaning)

$I = 10$, when $0 < t < T/8$;

$I = 0$, when $\frac{T}{8} < t < \frac{T}{2}$

$I = -10$, when $\frac{T}{2} < t < \frac{5}{8} T$

$I = 0$, when $\frac{5}{8} T < t < T$;

$I = 10$, when $T < t < \frac{9}{8} T$

Question No. 4
Numerical Type
The answer has to be filled into the input box provided below.

Degree of freedom for a gas is 6. This gas does 25 J of piston work at constant pressure. Net heat absorbed by the gas during this process is _____.

Question No. 5
Numerical Type
The answer has to be filled into the input box provided below.

Two L shaped wires are kept over each other as shown. The wire on the left is fixed and the wire on the right is movable on the left wire without any friction. The whole system is in a horizontal plane. Now we make a soap film of surface tension 0.1 N/m in between the wires such that it covers the common quadrilateral area. If the right wire has a mass of 250gm, what is its initial acceleration (in m/s²) on being released ?
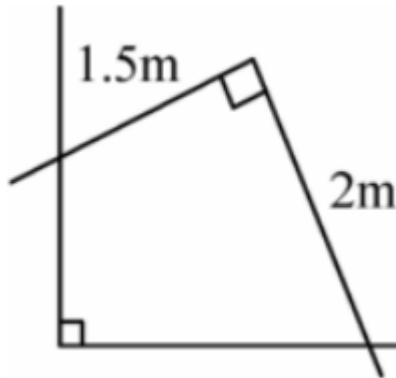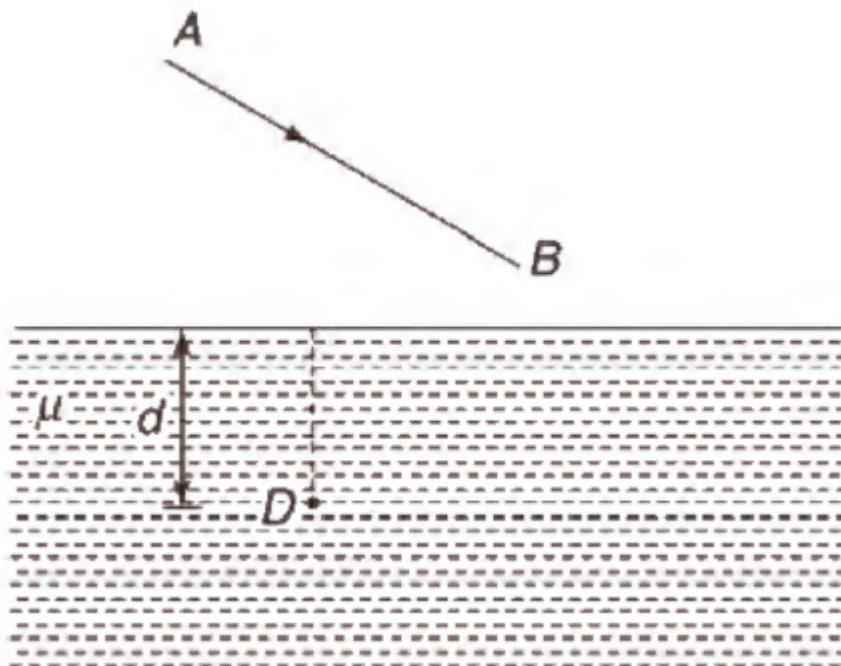

Question No. 6

Numerical Type

The answer has to be filled into the input box provided below.

A diver D is still under water ($\mu = \frac{4}{3}$) at a depth $d = 10$ m . A bird is diving along line AB at a constant velocity in air. When the bird is exactly above the diver he sees it at a height of 50 m from himself and velocity of the bird appears to be inclined at $45°$ to the horizontal. At what distance from the diver the bird actually hits the water surface (roundoff answer to nearest integer).

Chemistry Single Correct (Maximum Marks: 15)

Question No. 1
Only One Option Correct Type

Each question has multiple options out of which ONLY ONE is correct.

Consider the following statements:

I. Thermal stabilities of carbonates of alkaline earth metals increases down the group.
II. Except $LiOH$, hydroxides of all other alkali metals are thermally stable.
III. Li_2CO_3 is thermally stable whereas, other carbonates of the group are thermally unstable.
IV. Solubilities of hydroxides of alkaline earth metals increases down the group.
Pick out the correct of the following:

   A. I, II, III
   B. II, III, IV
   C. I, II, IV
   D. All

Question No. 2
Only One Option Correct Type

Each question has multiple options out of which ONLY ONE is correct.

Compound that is both paramagnetic and coloured is

   A. $K_2Cr_2O_7$
   B. $(NH_4)_2[TiCl_6]$
   C. $VOSO_4$
   D. $K_3[Cu(CN)_4]$

Question No. 3
Only One Option Correct Type

Each question has multiple options out of which ONLY ONE is correct.

An ammonia -ammonium chloride buffer has a pH value of 9 with $[NH_3] = 0.25$. What will be the new pH if 500 mL 0.1 M KOH is added to 200 mL buffer solution $(K_b = 2 \times 10^{-5})$.
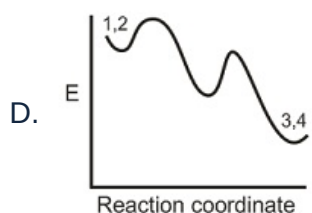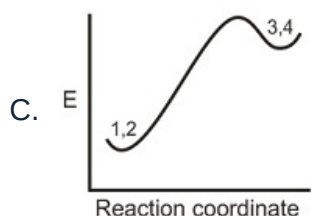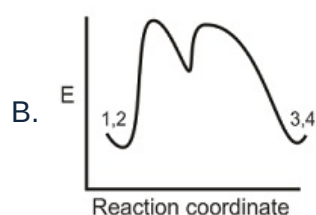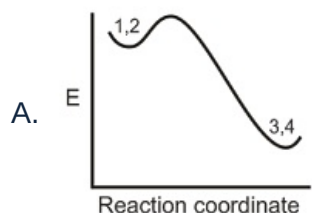$[\log(2) = 0.3]$

   A. 8.4
   B. 9.6
   C. 5.6
   D. 4.4

Question No. 4

Only One Option Correct Type

Each question has multiple options out of which ONLY ONE is correct.

Which reaction coordinate diagram best describe the energetics of the following nucleophilic acyl substitution reaction?

$RCOCl(1) + NH_3(2) \longrightarrow RCONH_2(3) + HCl(4)$

A.

B.

C.

D.

Question No. 5
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

A hydrogen-like atom has ground state binding energy 122.4 eV. Then:

A. its atomic number is 3.

B. an 80 eV electron cannot excite it to a higher state.

C. an electron of 8.2 eV and a photon of 91.8 eV are emitted, when a 100 eV electron interacts with it.

D. All the three other options are correct.

Chemistry Multiple Correct (Maximum Marks: 28)

Question No. 1
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

Pressure over 1000 ml of a liquid is gradually increased from 1 bar to 1001 bar, under adiabatic conditions. The final volume of the liquid is 990 ml. Assuming linear variation of volume with pressure, which of the following is/are correct for this process?

   A. ΔH=99.4 kJ
   B. ΔH=100.4 kJ
   C. ΔE=0.50 kJ
   D. ΔE=0.60 kJ

Question No. 2

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

Predict major product of the following reaction
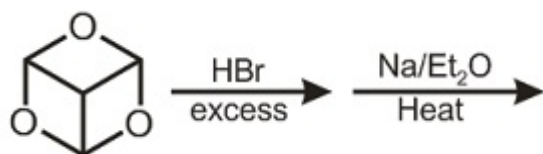
A. □

B. ◇

C. △

D. ▯

Question No. 3

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

A solution of colourless salt H on boiling with excess NaOH produces a non-flammable gas. The gas evolution ceases after sometime upon addition of Zn dust to the same solution, the gas evolution restarts. The colourless salt(s) H is (are):

   A. NH_4NO_3
   B. NH_4NO_2
   C. NH_4Cl
   D. $(NH_4)_2SO_4$

Question No. 4

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

Which represents correct order?

    A. Polarity of $M - H$ bond : $PH_3 < AsH_3 < SbH_3 < NH_3$
    B. Bond angle : $NO_2^+ > NO_2 > NO_2^-$
    C. Stability : $H_2 > H_2^+ = H_2^-$
    D. Bond angles : $NH_3 > AsH_3 > SbH_3 > BiH_3$

Question No. 5

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

For the endothermic reaction

$$3 A(g) \rightleftharpoons B(g) + C(g)$$

select the option(s) by which equilibrium concentration of $A(g)$ can be increased ?

    A. Decreasing the temperature
    B. Increasing the volume of the container
    C. Decreasing the volume of the container
    D. Adding $B(g)$ at equilibrium

Question No. 6

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

Which of the following regarding halides nucleophilicity and their leaving group ability is(are) true?

    A. Iodide is the best leaving group in both S_N1 and S_N2 reaction.
    B. Iodide is the strongest nucleophile in polar protic solvent.
    C. In acetone, iodide substitute chloride from substrate.
    D. In THF, F^- is strongest nucleophile.

Question No. 7

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

CCl_4 and acetone form a non-ideal solution at room temperature in a copper container. For this process, the true statement(s) is (are):

A. ΔG is positive
B. ΔS_{system} is positive
C. $\Delta S_{surroundings} < 0$
D. $\Delta H > 0$

Chemistry Numerical (Maximum Marks: 24)

Question No. 1
Numerical Type
The answer has to be filled into the input box provided below.

(i) Number of $P - P$ bonds in $P_4 S_3$ is (A).

(ii) Amongs the following number of planar species is (B).

$XeF_2, ClF_3, H_2O, [XeF_5]^-, I_3^-, BCl_3, XeF_4, SF_4, PCl_5, SF_6, IF_7$

Determine the value of $(A + B)$.

Question No. 2
Numerical Type
The answer has to be filled into the input box provided below.

An aromatic tetracarboxylic acid $(C_{10}H_6O_8)$ can form two type of monoanhydrides on heating with P_2O_5. The sum of locants of all carboxylic groups in this compound will be:

Question No. 3
Numerical Type
The answer has to be filled into the input box provided below.

How many organic products are formed in good amount in given reaction?
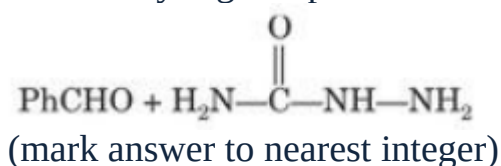
$$PhCHO + H_2N-\overset{\overset{\displaystyle O}{\|}}{C}-NH-NH_2$$

(mark answer to nearest integer)

Question No. 4

Numerical Type

The answer has to be filled into the input box provided below.

The substituents, R_1 and R_2, for nine peptides are listed in the table given below. How many of these peptides are positively charged at $pH = 7.0$?

$$\overset{\oplus}{H_3N} - CH - CO - NH - CH - CO - NH - CH - CO - NH - CH - \overset{\ominus}{COO}$$

with substituents H, R_1, R_2, H respectively below each CH.

Peptide	R_1	R_2
I	H	H
II	H	CH_3
III	CH_2COOH	H
IV	CH_2CONH_2	$(CH_2)_4NH_2$
V	CH_2CONH_2	CH_2CONH_2
VI	$(CH_2)_4NH_2$	$(CH_2)_4NH_2$
VII	CH_2COOH	CH_2CONH_2
VIII	CH_2OH	$(CH_2)_4NH_2$
IX	$(CH_2)_4NH_2$	CH_3

Question No. 5

Numerical Type

The answer has to be filled into the input box provided below.

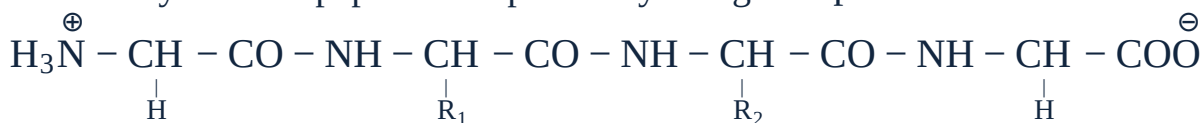3 A current was passed through an aqueous solution of an unknown salt of Pd for 1 hour. 2.977 g of Pd^{n+} was deposited at the cathode. Find n. (Atomic weight of Pd $= 106.4$)

Question No. 6

Numerical Type

The answer has to be filled into the input box provided below.

A hydrocarbon A of molecular weight 54g reacts with an excess of Br_2 in CCl_4 to give a compound B whose molecular weight is 539% more than that of A. however on catalytic hydrogenation with excess of H_2 A forms C whose molecular weight is only 7.4% more than that of A. A reacts with an alkyl bromide of molecular weight 109g in the presence of $NaNH_2$ to give another hydrocarbon D, which on reductive ozonolysis, yields diketone E, if the molecular weight of E is xyz then find the value of $(x + y + z)$.

Mathematics Single Correct (Maximum Marks: 15)

Question No. 1

Each question has multiple options out of which ONLY ONE is correct.

If $\sum_{r=1}^{r=n} \frac{r^4 + r^2 + 1}{r^4 + r} = \frac{675}{26}$, then n is equal to

   A. 10
   B. 15
   C. 25
   D. 30

Question No. 2
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

If $\Delta(x) = \begin{vmatrix} 3 & 3x & 3x^2 + 2a^2 \\ 3x & 3x^2 + 2a^2 & 3x^3 + 6a^2 x \\ 3x^2 + 2a^2 & 3x^3 + 6a^2 x & 3x^4 + 12a^2 x^2 + 2a^4 \end{vmatrix}$, then which of

the following options are always true for all $a \in R$?

   A. $\Delta'(x) = 0$
   B. $\Delta(x)$ is not independent of x
   C. $\int_0^1 \Delta(x)\,dx = 16a^6$
   D. $y = \Delta(x)$ is the equation of a circle.

Question No. 3
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

Number of solutions of $|z - 1| + |z + i| = 4$ and $|2z - 1 + i| = \sqrt{14}$ is

   A. 2
   B. 3
   C. 4
   D. none of these

Question No. 4
Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

ABCD is a cyclic quadrilateral with $AC \perp BD$ and O is the centre of its circumcircle, then $\overrightarrow{OA} \cdot \overrightarrow{OB} + \overrightarrow{OB} \cdot \overrightarrow{OC} + \overrightarrow{OC} \cdot \overrightarrow{OD} + \overrightarrow{OD} \cdot \overrightarrow{OA}$ is equal to

   A. 1
   B. -1

C. 0

D. none of these

Only One Option Correct Type
Each question has multiple options out of which ONLY ONE is correct.

Tangent to hyperbola $xy = c^2$ at point P intersects the x-axis at T and the y-axis at T'. Normal to hyperbola at P intersects the x-axis at N and the y-axis at N'. If the area of triangle PNT and $PN'T'$ are Δ and Δ' respectively, then $\frac{1}{\Delta} + \frac{1}{\Delta'}$ is equal to :

  A. c^2

  B. $\frac{2}{c^2}$

  C. $\frac{1}{c^2}$

  D. $\frac{c^2}{2}$

Mathematics Multiple Correct (Maximum Marks: 28)

One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

In kota city a person owns independently a mercedes car with probability $\frac{3}{10}$ and Audi with probability $\frac{4}{10}$. If he has mercedes only then he keeps a driver with probability $\frac{6}{10}$ where as if he owns Audi car only, then he keeps a driver with probability $\frac{7}{10}$ where as if he keeps both type of cars then his probability of keeping a driver is $\frac{9}{10}$. Then

  A. Probability that person keeps a driver is $\frac{412}{1000}$

  B. Probability that person keeps a driver is $\frac{71}{125}$

  C. Given that person keeps driver probability that he owns Audi car is $\frac{54}{103}$

  D. Given that person keeps driver, the probability that he own Audi car is $\frac{76}{103}$

One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

Which of the following is /are true?

  A. $\int_0^1 \sin(x^2 + 2x + 1)dx - \int_1^2 \sin x^2 dx = 0$

  B. $\int_{-1}^1 e^{\sin x} dx - \int_0^1 e^{\sin(2x+1)} dx = 0$

C. $\int_{-5}^{-4} \sin(x^2 - 3)dx + \int_{-2}^{-1} \sin(x^2 + 12x + 33)dx = 0$

D. $\int_{-4}^{4} \cos x^2 dx - 8\int_{0}^{1} \cos 16(2x - 1)^2 dx = 0$

Question No. 3
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

Let $f(x)$ be a non-negative continuous and bounded function for all $x \geq 0$. If $\cos x f'(x) \leq (\sin x - \cos x)f(x)\forall x \geq 0$ then which of the following is/are correct?

A. $f(6) + f(5) > 0$

B. $x^2 - 3x + 2 + f(7) = 0$ has two distinct solution

C. $f(5).f(7) - f(6)(5) = 0$

D. $\lim_{x \to 6} \dfrac{f(x) - \sin(\pi x)}{(x - 6)} = 1$

Question No. 4
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

Which of the following statements are INCORRECT? (where {}} denotes the fractional part of function)

A. $f(x) = \{x\}\cos^2((\frac{2x-1}{2})\pi)$ is differentiable for all $x \in R$

B. $f(x) = |\sin x|\cos^{-1}(\cos x)$ is differentiable $\forall x \in (0, 2\pi)$

C. $f(x) = ||x - 2| - |x - 6|| - 3|x| + 2x + 1$ is not differentiable at 3 points

D. $f(x) = \{x\}|\sin \pi x|$ is not differentiable at all integers

Question No. 5
One or More Options Correct Type
The question has multiple options out of which ONE or MORE is/are correct.

If $P = \dfrac{1}{n^4} \prod_{r=1}^{2n} (n^2 + r^2)^{\frac{1}{n}}$, then $\lim_{n \to \infty} \ell n P$ is equal to-

A. $\int_0^2 \ln(1 + x^2)dx$

B. $\int_0^1 \ln(x^2 - 4x + 5)$

C. $\int_0^2 \ln(x^2 - 4x + 5)dx$

D. $2\int_0^1 \ln(1 + x^2)dx$

Question No. 6

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

If $f(x)$ is a function defined on the set of non negative integers and having co-domain also as set of non negative integers, given that

(i) $x - f(x) = 20[\frac{x}{20}] - 80[\frac{f(x)}{80}]$ and (ii) $1990 < f(2020) < 2050$.

Then possible values of f(2020) can take (where [.] denote greatest integer function)

    A. 1920
    B. 3960
    C. 2000
    D. 4000

Question No. 7

One or More Options Correct Type

The question has multiple options out of which ONE or MORE is/are correct.

Consider a set $\{1, 2, 3, \ldots, 100\}$. The number of ways in which a number can be selected from the set so that it is of the form x^y, (where $x, y, \in N$ and ≥ 2), is

    A. 12
    B. 16
    C. 5
    D. 11

Mathematics Numerical (Maximum Marks: 24)

Question No. 1

Numerical Type

The answer has to be filled into the input box provided below.

Let $y = g(x)$ is solution of differential equation $g'(x) + g(x) = \frac{2xe^{-x}}{1+g(x)e^x}$ such that $g(0) = 1$, then $[\frac{g(-1)}{e}]$ is equal to [where [.] denotes G.I.F]

Question No. 2

Numerical Type

The answer has to be filled into the input box provided below.

The plane $\frac{x}{1} + \frac{y}{2} + \frac{z}{3} = 1$ intersect x-axis, y-axis, z-axis at A, B, C respectively. If the distance between origin and othrocenter of $\triangle ABC$ is equal to k then value of 7k is equal to

Question No. 3
Numerical Type
The answer has to be filled into the input box provided below.

If z is a complex number and the minimum value of $|z| + |z - 1| + |2z - 3|$ is λ and if $y = 2[x] + 3 = 3[x - \lambda]$, then find the value of $\frac{[x+y]}{10}$ (where [.] denotes the greatest integer function)

Question No. 4
Numerical Type
The answer has to be filled into the input box provided below.

Value of $\sum_{k=1}^{\infty} \sum_{r=0}^{k} \frac{1}{3^k} (^k C_r)$ is

Question No. 5
Numerical Type
The answer has to be filled into the input box provided below.

If equation $4x^4 - ax^3 + bx^2 - cx + 6 = 0$ has four distinct real roots say $x_1 < x_2 < x_3 < x_4$ such that $\frac{1}{x_1} + \frac{2}{x_2} + \frac{3}{x_3} + \frac{4}{x_4} = 8$, $a, b, c \in R^+$ then $\frac{x_4}{x_1}$ is equal to

Question No. 6
Numerical Type
The answer has to be filled into the input box provided below.

Let $x_1, x_2, \ldots\ldots\ldots\ldots x_{100}$ are 100 observations such that $\sum x_i = 0$, $\sum_{1 \le i < j \le 100} |x_i x_j| = 80000$ & mean deviation from their mean is 5, then their standard deviation is _____