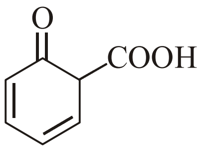
Q.3 In an unielectronic species, the number of revolution per second made by the electron in 4^{th} orbit is twice of the number of revolutions per second made by the electron in 2^{nd} orbit of H-atom. The unielectronic specie is,

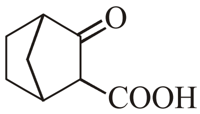
(1) H (2) He^+ (3) Li^{2+} (4) Be^{3+}

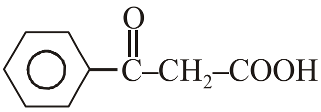
Q.4 Which metal gives H_2 gas on reaction with NaOH solution-

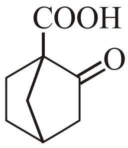
(1) Zn (2) Mg (3) Fe (4) Cu

Q.5 Which of the following will not undergo decarboxylation.

(1) 

(2) 

(3) 

(4) 

Q.6 50 ml aliquot of a H_2O_2 (aq.) solution is titrated against 200 ml of 0.2 M acidified $KMnO_4$ (aq.) solution. After the equivalence point, remaining $KMnO_4$ (aq.) solution requires 100 ml, 0.5 M $H_2C_2O_4$ (aq.) solution in acidic medium. The volume strength of H_2O_2 (aq.) solution is

(1) 1 V (2) 11.2 V (3) 5.6 V (4) 22.4 V

Q.7 The aqueous solution of slaked lime in excess water is known as -

(1) Lime water (2) Lime stone (3) Milk of lime (4) Quick lime

Q.8 How many stereoisomers will be formed of 2-methyl hepta-3E, 5E-dienoic acid ?

(1) 4 (2) 6 (3) 7 (4) 8

SPACE FOR ROUGH WORK

Q.37 If $x \in \{1, 2, 3, \ldots\ldots, 9\}$ and $f_n(x) = x\,x\,x \ldots\ldots x$ (n-digits) then $\left(f_n(3)\right)^2 + f_n(2)$ is equal to

(1) $2f_{2n}(1)$ (2) $f_n^{\,2}(1)$ (3) $f_{2n}(1)$ (4) $f_{2n}(4)$

Q.38 Number of points having position vector $a\hat{i} + b\hat{j} + c\hat{k}$ where a, b, c $\in \{1, 2, 3, 4, 5\}$ such that $2^a + 3^b + 5^c$ is divisible by 4 is

(1) 70 (2) 140 (3) 210 (4) 280

Q.39 If n be an integer and x, y, z, w are distinct, the number of distinct terms in the expansion of $(x + y + z + w)^n$ is

(1) ${}^nC_2$ (2) ${}^{n+2}C_2$ (3) ${}^{n+3}C_n$ (4) ${}^nC_3$

Q.40 If $f(x) = \begin{vmatrix} x^2 + 3x & x - 1 & x - 3 \\ x + 1 & 2 - x & x - 3 \\ x - 3 & x + 4 & 3x \end{vmatrix}$, then $f'(0)$ is equal to

(1) – 39 (2) 64 (3) 24 (4) none of these

Q.41 If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{-1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$, then $P^TQ^{2019}P$ is equal to

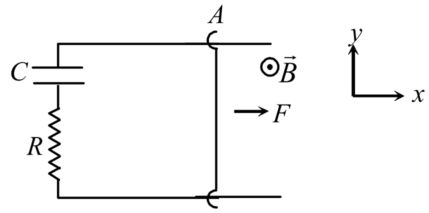
(1) $\begin{bmatrix} 1 & 2019 \\ 0 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} \frac{\sqrt{3}}{2} & 2019 \\ 0 & \frac{\sqrt{3}}{2} \end{bmatrix}$ (3) $\begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{2019}{2} \\ \frac{-2019}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$ (4) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Q.42 Let $A = \{1, 3, 5, 7, 9\}$ and $B = \{2, 4, 6, 8\}$ be two set. An element (a, b) of their cartesian product $A \times B$ is chosen at random. The probability that $(a + b) = 9$ is

(1) $\frac{4}{5}$ (2) $\frac{3}{5}$ (3) $\frac{2}{5}$ (4) $\frac{1}{5}$

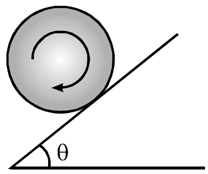
SPACE FOR ROUGH WORK

Q.65 A conducting rod AB moves parallel to x-axis in the x-y plane. A uniform magnetic field B pointing normally out of the plane exists throughout the region. A force F acts perpendicular to the rod, so that the rod moves with uniform velocity v. The force F is given by (neglect resistance of all the wires)



(1) $\frac{vB^2l^2}{R}e^{-t/RC}$ (2) $\frac{vB^2l^2}{R}$ (3) $\frac{vB^2l^2}{R}\left(1-e^{-t/RC}\right)$ (4) $\frac{vB^2l^2}{R}\left(1-e^{-2t/RC}\right)$

Q.66 A cylinder of mass m and radius R is spined to a clockwise angular velocity ω_o and then gently placed on an inclined plane for which coefficient of friction $\mu = \tan\theta$, θ is the angle of inclined plane with horizontal. The centre of mass of the cylinder will remain stationary for time:



(1) $\omega_o R/g\sin\theta$ (2) $2\omega_o R/3g\sin\theta$
(3) $2\omega_o R/5g\sin\theta$ (4) $\omega_o R/2g\sin\theta$

Q.67 N atoms of a radioactive element emit n alpha particles per second at an instant. Then the half - life of the element is

(1) $\frac{n}{N}$ sec. (2) $1.44\frac{n}{N}$ sec. (3) $0.69\frac{n}{N}$ sec. (4) $0.69\frac{N}{n}$ sec.

Q.68 A heavy nucleus having mass number 200 gets disintegrated into two small fragments of mass number 80 and 120. If binding energy per nucleon for parent atom is 6.5 M eV and for daughter nuclei is 7 MeV and 8 MeV respectively, then the energy released in the decay will be:
(1) 200 MeV (2) – 220 MeV (3) 220 MeV (4) 180 MeV

Q.69 The angular momentum of an electron in first orbit of Li^{++} ion is :

(1) $\frac{3h}{2\pi}$ (2) $\frac{9h}{2\pi}$ (3) $\frac{h}{2\pi}$ (4) $\frac{h}{6\pi}$

SPACE FOR ROUGH WORK