Test Code: JS-FT-17-25

Instructions:

1. **Subjects**: Physics, Chemistry, Mathematics (**25 questions per subject**)
2. **Question Format:**
Multiple Choice Questions (MCQs): Physics (Q1-20), Chemistry (Q26-45), Mathematics (Q51-70)
Integer-Type Questions: Physics (Q21-25), Chemistry (Q46-50), Mathematics (Q71-75)
3. Select the correct option for MCQs and enter an integer for integer-type questions.
4. **Marking Scheme:** +4 for correct answers, -1 for incorrect answers, and 0 for unattempted questions.

Duration: 180 minutes Total Marks: 300

Physics

Q1: A body starts from rest and moves with uniform acceleration. If the distance travelled by it in the first $2s$ is x_1 and in the next $2s$ is x_2, then x_1 and x_2 are related as

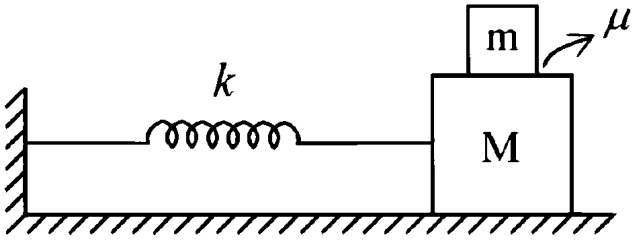
A. $x_1 = x_2$

B. $x_1 = 2x_2$

C. $2x_1 = x_2$

D. $3x_1 = x_2$

Q2: Two blocks of masses m and M, $(M > m)$, are placed on a frictionless table as shown in figure. A massless spring with spring constant k is attached with the lower block. If the system is slightly displaced and released, then ($\mu =$ coefficient of friction between the two blocks)



A. The time period of small oscillation of the two blocks is $T = 2\pi\sqrt{\frac{(m+M)}{k}}$
B. The acceleration of the blocks is $a = -\frac{kx}{M+m}$ ($x =$ displacement of the blocks from the mean position)
C. The magnitude of the frictional force on the upper block is $\frac{m\mu|x|}{M+m}$
D. The maximum amplitude of the upper block, if it does not slip, is $\frac{\mu(M+m)g}{k}$
E. Maximum frictional force can be $\mu(M+m)g$.
Choose the correct answer from the options given below :

A. B, C, D Only

B. C, D, E Only

C. A, B, D Only

D. A, B, C Only

Q3: The refractive index of a prism for a monochromatic wave is $\sqrt{2}$ and its refracting angle is 60°. For minimum deviation, the angle of incidence will be

A. 30°

B. 45°

C. 60°

D. 75°

Q4: Statement (I) : A uniform electric field and a uniform magnetic field are pointed in the same direction. If an electron is projected in the same direction the electron velocity will decrease in magnitude.
Statement (II) : Two infinite long parallel wires are carrying equal current in the same direction. The magnetic field at a point midway between the wires is zero.
Statement (III) : No net force acts on a rectangular coil carrying a steady current when suspended in a uniform magnetic field.
Which of the following is correct?

A. Statements I, II and III are true.

B. Statements I and II are true, but statement III is false.

C. Statements II and III are true, but statement I is false.

D. Statements I and III are true, but statement II is false.

Q5: The escape velocity for the earth is Ves.If escape velocity for a planet whose radius is four times and density is nine times that of the earth is $n\times 6\ Ves$. Find n.

A. 6

B. 4

C. 8

D. 2

Q6: A railway track is banked for a speed v, by making the height of the outer rail h higher than that of the inner rail. If the distance between the rails is l and the radius of curvature of the track is r, then:

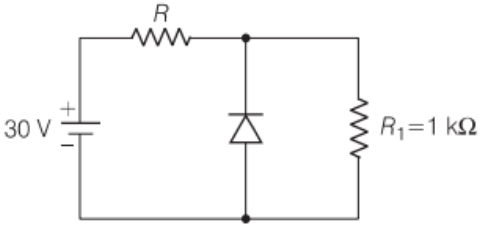
A. $\frac{h}{l}=\frac{v^2}{rg}$

B. $\tan\{\sin^{-1}\left(\frac{h}{l}\right)\}=\frac{v^2}{rg}$

C. $\tan^{-1}\left(\frac{h}{l}\right)=\frac{v^2}{rg}$

D. $\frac{h}{r}=\frac{v^2}{lg}$

Q7: If current in diode is five times that in R_1 and breakdown voltage of diode is $6V$, find the value of R?



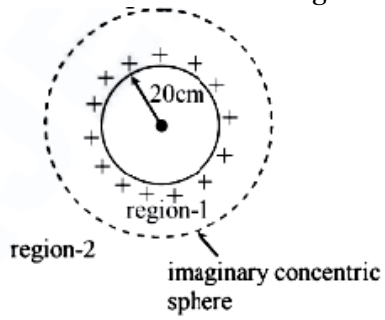
A. 2000 Ω

B. $\frac{2000}{3}\ \Omega$

C. 1000 Ω

D. $\frac{1000}{3}\ \Omega$

Q8: What is the radius of the imaginary concentric sphere that divides the electrostatic field of a metal sphere of a radius 20 cm and a charge of $8\mu C$ in two regions of identical energy. If it is $n\times10$ cm then find n.



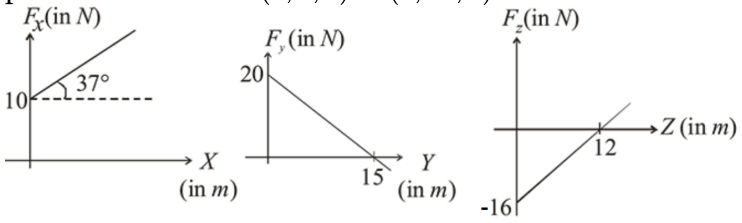
A. 1

B. 2

C. 3

D. 4

Q9: The components of a force acting on a particle are varying according to the graphs shown. When the particles move from $(0, 5, 6)$ to $(2, 10, 0)$ then the work done by this force is



A. 192 J

B. $\frac{400}{3}J$

C. $\frac{287}{2}J$

D. None of these

Q10: A gas in container A is in thermal equilibrium with another gas in container B. Both contain equal masses of the two gases in the respective containers. Which of the following can be true?

A. $P_AV_A = P_BV_B$

B. $P_A = P_B, V_A \neq V_B$

C. $P_A = P_B, V_A = V_B$

D. $\frac{P_A}{V_A} = \frac{P_B}{V_B}$

Q11: The masses of neutron and proton are 1.0087 amu and 1.0073 amu respectively. If the neutrons and protons combine to form a helium nucleus (alpha particle) of mass 4.0015 amu the binding energy of the helium nucleus will be ($1\,amu = 931\,MeV$)

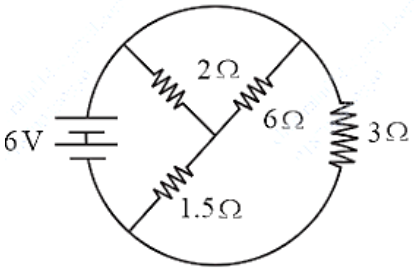
A. 28.4 MeV

B. 20.8 MeV

C. 27.3 MeV

D. 14.2 MeV

Q12: The total current supplied to the circuit by the battery is



A. 1 A

B. 2 A

C. 4 A

D. 6 A

Q13: On six complete rotations, the screw gauge moves by 3 mm on the main scale. If there are 50 divisions on the circular scale the least count of the screw gauge is

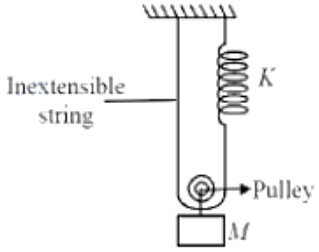
A. 0.01 cm

B. 0.02 mm

C. 0.001 mm

D. 0.001 cm

Q14: The time period of mass M when displaced from its equilibrium position and then released for the system as shown in figure is



A. $2\pi\sqrt{\frac{M}{k}}$

B. $2\pi\sqrt{\frac{M}{2k}}$

C. $2\pi\sqrt{\frac{M}{4k}}$

D. $2\pi\sqrt{\frac{2M}{k}}$

Q15: An ac current is represented as
$i = 5\sqrt{2} + 10\cos\left(650\pi t + \frac{\pi}{6}\right) Amp$
The r.m.s value of the current is

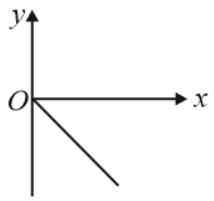
A. 10 Amp

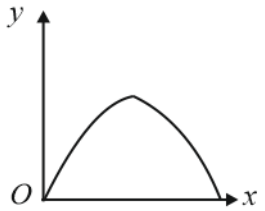
B. $5\sqrt{2} Amp$

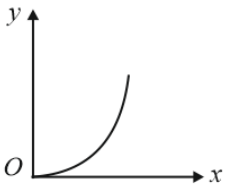
C. 100 Amp

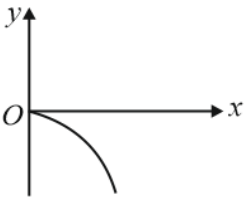
D. 50 Amp

Q16: Two particles of mass m and $2m$ have their position vectors as a function of time as $r_1(t) = t\hat{i} - t^3\hat{j} + 2t^2\hat{k}$ and $r_2(t) = t\hat{i} - t^3\hat{j} - t^2\hat{k}$ respectively (where t is the time). Which one of the following graphs represents the path of the centre of mass?

A.


B.


C.


D.


Q17: A plane electromagnetic wave travelling along the $x-$direction has a wavelength of 3 mm. The variation in the electric field occurs in the $y-$direction with an amplitude 66 Vm^{-1}. The equation for the electric and magnetic fields as a function of x and t are respectively-

A. $E_y = 33\ \cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$ and $B_z = 1.1 \times 10^{-7}\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$

B. $E_y = 11\ \cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$ and $B_y = 11 \times 10^{-7}\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$

C. $E_x = 33\ \cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$ and $B_y = 11 \times 10^{-7}\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$

D. $E_y = 66\ \cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$ and $B_z = 2.2 \times 10^{-7}\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$

Q18: Which of these is correct match?

A) Angular momentum	1) $[M^{-1}L^3T^{-2}]$
B) Torque	2) $[M^1LT^{-2}]$
C) Gravitational constant	3) $[M^1L^2T^{-2}]$
D) Tension	4) $[M^1L^2T^{-1}]$

A. $A-3,\ B-2, C-1, D-4$

B. $A-4,\ B-3, C-1, D-2$

C. $A-3,\ B-4, C-1, D-2$

D. $A-4,\ B-3, C-2, D-1$

Q19: n identical resistance are taken in which $\frac{n}{2}$ resistors are joined in series in the left gap and the remaining $\frac{n}{2}$ resistances are joined in parallel in the right gap of a metre bridge. Balancing length in cm is _____.

A. $100 \cdot \frac{n^2}{n^2+4}$

B. $100 \cdot \frac{n^2}{n^2+1}$

C. $400 \cdot \frac{1}{n^2+4}$

D. $400 \cdot \frac{1}{n^2+1}$

Q20: Assertion (A) When an ideal gas is compressed adiabatically, its temperature and the average kinetic energy of the gas molecules increase.
Reason (R) The kinetic energy increases because of collisions of molecules with moving parts of wall only.

A. A and R and true and R is correct explanation of A.

B. A and R are true but R is not correct explanation of A.

C. A is true and R is false.

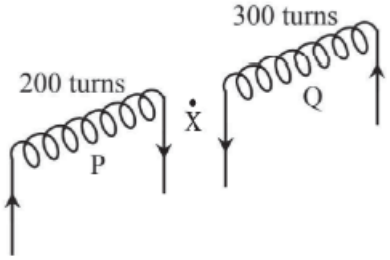
D. A is false and R is true.

Q21: The electric field in a region is given by $\overrightarrow{E} = (2\hat{i} + 4\hat{j} + 6\hat{k}) \times 10^3\ N/C$. The flux of the field through a rectangular surface parallel to $x - z$ plane is $6.0 Nm^2C^{-1}$. The area of the surface is _____ cm^2.

Q22: Calculate the energy released in MeV in the following nuclear reaction :
$^{238}_{92}U \rightarrow\ ^{234}_{90}Th + \ ^{4}_{2}He + Q$
[Mass of $^{238}_{92}U = 238.05079\ u$]
Mass of $^{234}_{90}Th = 234.043630\ u$
Mass of $^{4}_{2}He = 4.002600\ u$
$1u = 931.5\ MeV$ (mark answer to nearest integer in MeV)

Q23: Three identical uniform thin metal rods form the three sides of an equilateral triangle. If the moment of inertia of the system of these three rods about an axis passing through the centroid of the triangle and perpendicular to the plane of the triangle is n times the moment of inertia of one rod separately about an axis passing through the centre of the rod and perpendicular to its length, the value of n is

Q24: Two solenoids P and Q of equal length but different number of turns, are arranged coaxially as shown in figure. P has 200 turns and Q has 300 turns. There is a current of $1A$ in Q. The current in P in order that there is no resultant field at X midway between the coils is K, find $8K$.



Q25: Bulk modulus of water is $2\times10^9 N/m^2$. The pressure required to increase the volume of water by 0.1% in N/m^2 is $2\times10^K N/m^2$. Find K.

Chemistry

Q26: Which of the following IUPAC name and formula combinations is not correct?

Formula	IUPAC Name
a) $K_2[Pt(CN)_4]$	Potassium tetracyanoplatinate (II)
b) $[Mn(CN)_5]^{2-}$	Pentacyanomagnate (II) ion
c) $K[Cr(NH_3)_2Cl_4]$	Potassium diammine tetrachlorochromate (III)
d) $[Co(NH_3)_4(H_2O)(I)]SO_4$	Tetraammine aquaiodo cobalt (III) sulphate

A. option a
B. option b
C. option c
D. option d

Q27: $Mg(OH)_2$ is precipitated when $NaOH$ is added to a solution of Mg^{2+}. If the final concentration of Mg^{2+} is $10^{-10}M$, the concentration of $OH^-(M)$ in the solution is:
[Solubility product for $Mg(OH)_2 = 5.6\times10^{-12}$]

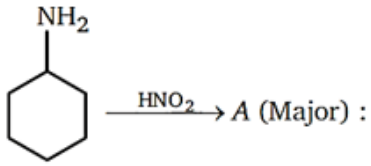
A. 0.056
B. 0.12
C. 0.24
D. 0.025

Q28:
Match the following.

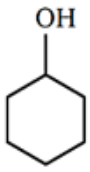
List I (Element)	List II (Property)
A. He	I. Can be used as inert atmosphere
B. Ar	II. Radioactive element
C. Xe	III. Form fluoride compounds
D. Rn	IV. Can be used as airship balloons

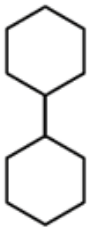
The correct match for A,B,C and D respectively.

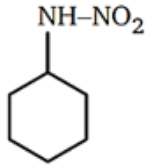
A. IV, III, II, I
B. IV, I, III, II
C. I, II, III, IV
D. II, I, IV, III

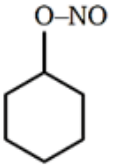


Q29:
Product A is :

A. 

B. 

C. 

D. 

Q30: In an atom the order of increasing energy of electrons with quantum numbers
(i) $n = 4, l = 1$
(ii) $n = 4, l = 0$
(iii) $n = 3, l = 2$ and
(iv) $n = 3, l = 1$ is

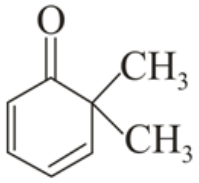
A. iii< i <iv< ii

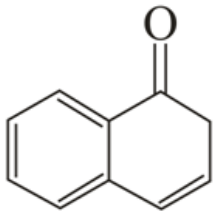
B. ii<iv<i<iii

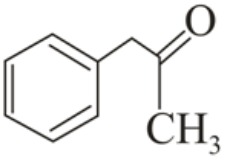
C. i<iii<ii<iv

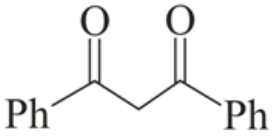
D. iv <ii<iii<i

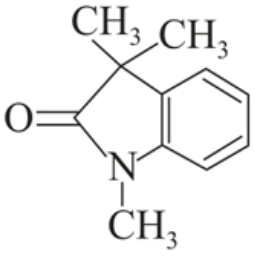
Q31: Which of the following carbonyl compounds will exhibit enolization?

(i) 

(ii) 

(iii) 

(iv) 

(v) 

A. (i), (ii) and (iii)

B. (ii), (iii) and (iv)

C. (iii), (iv) and (v)

D. (i), (iii) and (v)

Q32: For BCl_3, $AlCl_3$ and $GaCl_3$ the increasing order of ionic character is:

A. $BCl_3 < AlCl_3 < GaCl_3$

B. $GaCl_3 < AlCl_3 < BCl_3$

C. $BCl_3 < GaCl_3 < AlCl_3$

D. $AlCl_3 < BCl_3 < GaCl_3$

Q33: The boiling point of an azeotropic mixture of water and ethyl alcohol is less than that of theoretical value of water and alcohol mixture. Hence, the mixture shows

A. that solution is highly saturated

B. positive deviation from Raoult's law

C. negative deviation from Raoult's law

D. nothing can be said

Q34: Which complex has the highest value of spin only magnetic moment?

A. $[Fe(CN)_6]^{3-}$
B. $[Fe(CN)_6]^{4-}$
C. $[Ni(CN)_4]^{2-}$
D. $[NiCl_4]^{2-}$

Q35: The number of carbon atoms formed in the alkane, when a potassium salt of monocarboxylic acid containing n carbon atom undergoes Kolbe's electrolysis is:

A. $2n$
B. $2n + 2$
C. $2n - 1$
D. $2n - 2$

Q36: Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 gmL^{-1}. Volume of acid required to make one litre of 0.1 M H_2SO_4 solution is

A. 16.65 mL
B. 22.20 mL
C. 5.55 mL
D. 11.10 mL

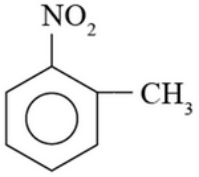
Q37: Assertion (A) Boron has a smaller first ionisation enthalpy than beryllium.
Reason (R) The penetration of a 2s-electron to the nucleus is more than the 2p-electron hence, 2p-electron is more shielded by the inner core of electrons than 2s-electrons.

A. Assertion and Reason both are correct statements but Reason is not correct explanation for Assertion.
B. Assertion is correct statement but Reason is wrong statement.
C. Assertion and Reason both are correct statements and Reason is correct explanation for Assertion.
D. Assertion and Reason both are wrong statements.

Q38: The order of strengths of the following carboxylic acids is:
(i) $CH_3 - CH_2 - COOH$
(ii) $CH_3 - COOH$
(iii) $C_6H_5 - COOH$
(iv) $C_6H_5 - CH_2COOH$

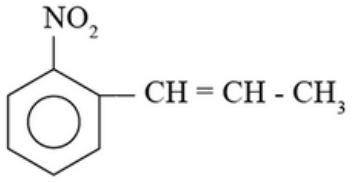
A. (iii) > (iv) > (ii) > (i)
B. (iv) > (ii) > (iii) > (i)
C. (iii) > (ii) > (iv) > (i)
D. (i) > (iv) > (ii) > (iii)

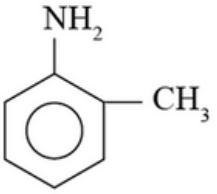
Q39: In the given reaction

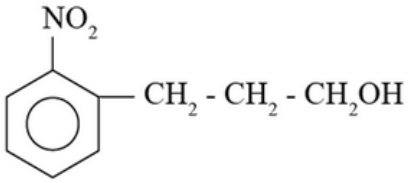


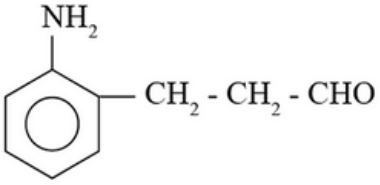
$$+CH_3-CHO \xrightarrow{\text{(i) } NaOH \text{ (ii) } \Delta} [X]$$

$[X]$ will be

A. 

B. 

C. 

D. 

Q40: A plot of $\frac{1}{T}$ vs $\ln k$ for a reaction gives the slope $-1 \times 10^4\ K$. The energy of activation for the reaction is: (Given, $R = 8.314\ J\ K^{-1}\ mol^{-1}$)

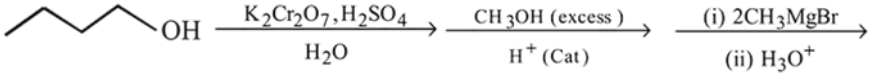
A. 8314 $J\ mol^{-1}$

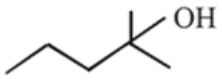
B. 1.202 $kJ\ mol^{-1}$

C. 12.02 $J\ mol^{-1}$

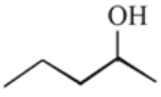
D. 83 $kJ\ mol^{-1}$

Q41: The end product of the following sequence of reactions is:



A. 

B. 

C. 

D. 

Q42: A compound A contains C and H only and has molecular mass 72. It's photochlorination gives a mixture containing only one monochloro and two dichloro hydrocarbons. The IUPAC name of A is:

A. 2, 2-dimethylpropane

B. n-pentane

C. 2-methyl butane

D. cyclopentane

Q43: When a mixture of $NaCl$ and $K_2Cr_2O_7$ is gently warmed with conc. H_2SO_4. Mark incorrect option

A. A deep red vapour is evolved

B. The vapour when passed through $NaOH$ solution, gives a yellow solution

C. Chlorine gas is also evolved

D. Chromyl chloride is formed

Q44: $2-$Bromobutane(A) is treated with NaI in the presence of dry acetone to give compound $'B'$. The compound $'B'$ is boiled with moist silver oxide to give compound $'C'$. Identify the compounds $'B'$, $'C'$. and possible number of optical isomers of compound $'C'$?

A. $2-$Iodobutane, Butan$-2-ol$, 2 isomers

B. $3-$Iodopentane, Pentan$-3-ol$, 4 isomers

C. $2-$Iodobutane, Butan$-2-ol$, 4 isomers

D. $3-$Iodopentane, Pentan$-3-ol$, 2 isomers

Q45: Choose the correct option regarding the following.
Assertion : Actinides exhibit a larger number of oxidation states than lanthanides.
Reason : There is a large energy gap between $5f$,$6d$ and $7s$ sub-shells.

A. Assertion and Reason are correct, and Reason is the correct explanation for the Assertion.

B. Assertion and Reason are correct, and Reason is not the correct explanation for the Assertion.

C. Assertion is correct, Reason is incorrect.

D. Assertion is incorrect, Reason is correct.

Q46: For the following electrochemical cell at $298\,K$,
$Pt(s)|H_2(g,\,1\,bar)|H^+(aq,1M)||M^{4+}(aq.)|M^{2+}(aq.)|Pt(s)$
$E_{\text{cell}} = 0.092\,V$ when $\frac{[M^{2+}(aq.)]}{[M^{4+}(aq.)]} = 10^x$
Given: $E^0_{M^{4+}/M^{2+}} = 0.151\,V; 2.303\frac{RT}{F} = 0.059$
The value of x isL

Q47: The concentration of R in the reaction $R \to P$ was measured as a function of time and the following data is obtained:

$[R]\ (molar)$	1.0	0.75	0.40	0.10
$t\ (min).$	0.0	0.05	0.12	0.18

The order of the reaction is:

Q48: During the Kjeldahl method, $2.8\ g$ of an organic compound was digested and the evolved ammonia was absorbed by 60 mL of $\frac{M}{20}H_2SO_4$. What volume of $\frac{M}{20}NaOH$ solution was required for complete neutralisation of the unreacted acid if the percentage of nitrogen in the compound was 1%? (mark answer in mL)

Q49: A metal (M) forms two oxides M_2O_x and M_2O_y. The ratio M : O (by weight) in the two oxides are $25:4$ and $25:6$. The minimum value of atomic mass of M is:

Q50: Calculate the resonance energy (-x) of C_6H_6 from the following data. ΔH_f° for $C_6H_6 = -358.5kJ/mol$
Heat of atomisation of $C = 716.8kJ/mol$
Bond energy of $C-H$, $C-C$, C=C and $H-H$ are 490 , 340 , 620 and $436.9kJ/mole$

Maths

Q51: The domain of the function $f(x)=\sqrt{\frac{4-x^2}{[x]+2}}$, where $[x]$ denotes the greatest integer not more than x , is

A. $(-\infty,-2)\cup(1,2)$
B. $(-\infty,-2)\cup(-1,2)$
C. $(-\infty,-2),\cup[-1,2]$
D. $(-\infty,-1)\cup(1,2)$

Q52: The latus rectum of a conic section is the width of perpendicular line segment through the focus. The positive difference between the lengths of the latus rectum of $3y=x^2+4x–9$ and $x^2+4y^2-6x+16y=24$ is

A. $\frac{1}{2}$
B. 2
C. $\frac{3}{2}$
D. $\frac{5}{2}$

Q53: A relation R is defined as $(x,y)\in R\Rightarrow x^y=y^x$ for $x,y\in I-\{0\}$, where I is the set of all integers. Then the relation R is

A. reflexive but not symmetric
B. symmetric but not reflexive
C. reflexive and symmetric both
D. equivalence relation

Q54: A rectangle is given with a perimeter of $48\ cm$. If the rectangle encloses maximum area possible, then the area of the rectangle will be

A. $120\ cm^2$
B. $172\ cm^2$
C. $144\ cm^2$
D. $112\ cm^2$

Q55: Let $\vec{a}=2\hat{i}+\hat{k},\vec{b}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{c}=4\hat{i}-3\hat{j}+7\hat{k}$. If $\vec{r}$ is a vector such that $\vec{r}\times\vec{b}=\vec{c}\times\vec{b}$ and $\vec{r}\cdot\vec{a}=0$, then the value of $\vec{r}\cdot\vec{b}$ is

A. 7
B. -7
C. -5
D. 5

Q56: The function $f:\left[-\frac{1}{2},\frac{1}{2}\right]\rightarrow\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ defined by $f\left(x\right)=\sin^{-1}\left(3x-4x^3\right)$ is

A. both one-one and onto
B. neither one-one nor onto
C. onto but not one-one
D. one-one but not onto

Q57: If sum of coefficients in the expression of $(\alpha x^2-2x+1)^{35}$ is equal to sum of coefficients in the expansion of $(x-\alpha y)^{35}$, then α is equal to

A. 0
B. 1
C. any real number
D. 2

Q58: Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}, a, b, \in N$. Then:

A. there exist more than one but finite number of B's such that $AB = BA$

B. there exists exactly one B such that $AB = BA$

C. there exists infinitely many B's such that $AB = BA$

D. there cannot exist any B such that $AB = BA$

Q59: There are 7 distinguishable rings. The number of possible five-rings arrangements on the four fingers (except the thumb) of one hand (the order of the rings on each finger is to be counted and it is not required that each finger has a ring) is equal to

A. 214110

B. 211410

C. 124110

D. 141120

Q60: If one root of the equation $(\ell - m)x^2 + \ell x + 1 = 0$ is double the other and ℓ is real, then what is the greatest value of m?

A. $-\frac{9}{8}$

B. $\frac{9}{8}$

C. $-\frac{8}{9}$

D. $\frac{8}{9}$

Q61: The mean and standard deviation of 10 observations $x_1, x_2, x_3 \ldots x_{10}$ are $\bar{x}$ and σ respectively. Let 10 is added to $x_1, x_2 \ldots x_9$ and 90 is subtracted from x_{10}. If still, the standard deviation is the same, then $x_{10} - \bar{x}$ is equal to

A. 35

B. 45

C. 55

D. 50

Q62: Let $f(x)$ be an even function, $I_1 = \int_0^{\frac{\pi}{2}} f(\cos 2x) \cos x dx, I_2 = \int_0^{\frac{\pi}{4}} f(\sin 2x) \cos x dx$ Then $\frac{I_1}{I_2} =$

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Q63: If straight lines $ax + by + p = 0$ and $x \cos \alpha + y \sin \alpha - p = 0$ include and angle $\pi/4$ between them and meet the straight line $x \sin \alpha - y \cos \alpha = 0$ in the same point, then the value of $a^2 + b^2$ is equal to

A. 1

B. 2

C. 3

D. 4

Q64: Let $f(x)$ be defined by $f(x)=\begin{cases}\frac{3x-[x]}{x}, & x<1\\ \frac{3-x^2+x}{[x]}, & x\geq 1\end{cases}$ (where $[.]$ is GIF) Then which is incorrect

A. $f(x)$ is continuous at $x=1$

B. $f(x)$ is not differentiable at $x=1$

C. $f'\left(\frac{3}{2}\right)+f'(0)=-2$

D. $f\prime(x)$ is continuous at $x=1$

Q65: The sum of the following series $1+6+\frac{9\left(1^2+2^2+3^2\right)}{7}+\frac{12\left(1^2+2^2+3^2+4^2\right)}{9}+\frac{15\left(1^2+2^2+\ldots+5^2\right)}{11}+\ldots$ up to 15 terms is

A. 7820

B. 7830

C. 7520

D. 7510

Q66: Left f be a differentiable function such that $f'(x)=7-\frac{3}{4}\frac{f(x)}{x},(x>0)$ and $f(1)\neq 4$. Then $\lim\limits_{x\to 0^+} xf\left(\frac{1}{x}\right)=$

A. Exists and equals 4

B. Does not exist

C. Exist and equals 0

D. Exists and equals $\frac{4}{7}$

Q67: $\lim_{x\to 0}\left[\min(y^2-4y+11)\frac{\sin x}{x}\right]$ (where [.] denotes the greatest integer function) is

A. 5

B. 6

C. 7

D. does not exist

Q68: If the foot of the perpendicular from the point $A(p+1,-1,11)$ on the line $\frac{x}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ is $B(q,5,7)$ then the value of $(p-q)$ is

A. 1.5

B. 1

C. 0.5

D. 0

Q69: The locus of the mid-points of a chord of the circle $x^2+y^2=4$ which subtends a right angle at the origin is

A. $x+y=2$

B. $x^2+y^2=1$

C. $x^2+y^2=2$

D. $x+y=1$

Q70: If z is a complex number satisfying the equation $|z-(1+i)|^2=2$ and $\omega=\frac{2}{z}$, then the locus traced by 'ω' in the complex plane is

A. $x-y-1=0$

B. $x+y-1=0$

C. $x-y+1=0$

D. $x+y+1=0$

Q71: Let $a_1,a_2,a_3,\ldots\ldots\ldots a_n$ be a finite arithmetic sequence with $a_4+a_7+a_{10}=17$ and $a_4+a_5+a_6+\ldots\ldots+a_{14}=77$. If $a_k=13$, then value of $\frac{k}{2}$ is

Q72: A biased coin that has a probability of getting heads as $p(0 < p < 1)$ is tossed until a head appears for the first time. If the probability that the number of tosses required is even, is $\frac{2}{5}$, then $9p$ is equal to

Q73: $OABC$ is a unit square where O is the origin and $B = (1, 1)$. The curves $y^2 = x$ and $x^2 = y$ divide the area of the square into three parts $OABO, OBO$ and $OBCO$. If a_1, a_2, a_3 are the areas (in sq units) of these parts respectively, then $a_1 + 2a_2 + 3a_3 =$

Q74: Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ where a, b, c, d are positive integers arranged in ascending order and exactly two of a, b, c, d are prime numbers and also pair wise coprime and satisfies $A^2 - 16A - 17I = 0$ (where I is an identity matrix of order 2×2). If $B = \begin{bmatrix} b & a \\ c & d \end{bmatrix}$ where $\det(A)$ represent determinant value of matrix A, then $\det(B)$ equals

Q75: If α and β are the roots of equation $(k+1)\tan^2 x - \sqrt{2}\,\lambda\ \tan x = 1 - k$ and $\tan^2(\alpha + \beta) = 50$. Find value of λ.