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JEE • NEET • MHT-CET

2023_JEE Actual Paper_24 Jan_2nd Shift

FULL SYLLABUS

Date : 24-1-2023

Marks : 300

PHYSICS

1) **A body of mass 200g is tied to a spring constant 12.5 N/m, while the other end of spring is fixed at point O. If the body moves about O in a circular path on a smooth horizontal surface with constant angular speed 5 rad/s. Then the ratio of extension in the spring to its natural length will be:**

a) 2 : 3 b) 1 : 2
c) 1 : 1 d) 2 : 5

2) Match List I with List II

	List I		**List II**
A.	AM Broadcast	**I.**	88-108 MHz
B.	FM Broadcast	**II.**	540-1600 kHz
C.	Television	**III.**	3.7-4.2 GHz
D.	Satellite Communication	**IV.**	54MH_z – 890MHz

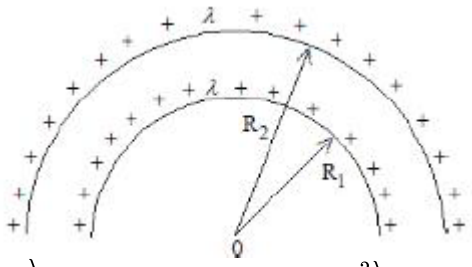
Choose the correct answer from the options given below :

a) A-II, B-I, C-IV, D-III b) A-IV, B-III, C-I, D-II
c) A-I, B-III, C-II, D-IV d) A-II, B-III, C-I, D-IV

3) **The frequency (ν) of an oscillating liquid drop may depend upon radius (r) of the drop, density (ρ) of liquid and the surface tension (s) of the liquid as : $\nu = r^a \rho^b s^c$. The values of a, b and c respectively are**

a) $\left(\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}\right)$ b) $\left(-\frac{3}{2}, \frac{1}{2}, \frac{1}{2}\right)$
c) $\left(-\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$ d) $\left(\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$

4) **The electric potential at the centre of two concentric half rings of radii R_1 and R_2, having same linear charge density λ is :**



a) $\frac{\lambda}{4\epsilon_0}$ b) $\frac{2\lambda}{\epsilon_0}$
c) $\frac{\lambda}{2\epsilon_0}$ d) $\frac{\lambda}{\epsilon_0}$

5) **If the distance of the earth from Sun is 1.5×10^6 km. then the distance of an imaginary planet from Sun, if its period of revolution is 2.83 years is :**

a) 3×10^6 km b) 3×10^7 km
c) 6×10^7 km d) 6×10^6 km

6) **Let γ_1 be the ratio of molar specific heat at constant pressure and molar specific heat at constant volume of a monoatomic gas and γ_2 be the similar ratio of diatomic gas. Considering the diatomic gas molecule as a rigid rotator, the ratio, $\frac{\gamma_1}{\gamma_2}$ is**

a) $\frac{21}{25}$ b) $\frac{35}{27}$
c) $\frac{27}{35}$ d) $\frac{25}{21}$

7) Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A: A pendulum clock when taken to Mount Everest becomes fast.

Reason R: The value of g (acceleration due to gravity) is less at Mount Everest than its value on the surface of earth.

In the light of the above statements, choose the **most appropriate** answer from the options given below

a) A is correct but **R** is not correct

b) Both **A** and **R** are correct but **R** is **NOT** the correct explanation of **A**

c) **A** is not correct but **R** is correct

d) Both **A** and **R** are correct and **R** is the correct explanation of **A**

8) Given below are two statements:

Statement I: Acceleration due to earth's gravity decreases as you go 'up' or 'down' from earth's surface.

Statement II: Acceleration due to earth's gravity is same at a height 'h' and depth 'd' from earth's surface, if h = d.

In the light of above statements, choose the most appropriate answer from the options given below.

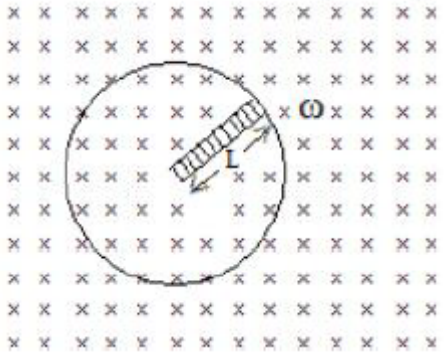
a) Statement I is incorrect but statement II is correct

b) Both Statement I and Statement II are incorrect

c) Both Statement I and II are correct

d) Statement I is correct but statement II is incorrect

9) **A metallic rod of length 'L' is rotated with an angular speed of 'ω' normal to a uniform magnetic field 'B' about an axis passing through one end of rod as shown in figure. The induced emf will be :**



a) $\frac{1}{2}B^2L^2\omega$ b) $\frac{1}{4}BL^2\omega$

c) $\frac{1}{4}B^2L\omega$ d) $\frac{1}{2}BL^2\omega$

10) **If two vectors $\vec{p} = \hat{i} + 2m\hat{j} + m\hat{k}$ and $\vec{Q} = 4\hat{i} - 2\hat{j} + m\hat{k}$ are perpendicular to each other. Then, the value of m will be.**

a) 1 b) 2

c) 3 d) -1

11) **The electric field and magnetic field components of an electromagnetic wave going through vacuum is described by**

$E_x = E_o \sin(kz - \omega t)$

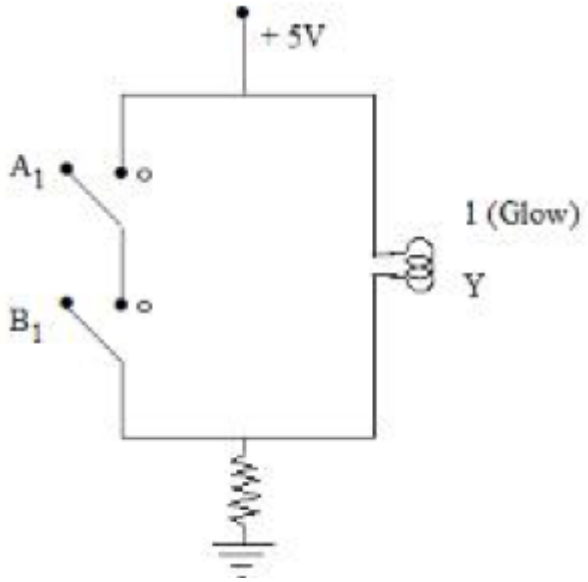
$B_y = B_o \sin(kz - \omega t)$

Then the correct relation between E_o and B_o is given by

a) $E_o = kB_o$ b) $E_o B_o = \omega k$

c) $\omega E_o = kB_o$ d) $kE_o = \omega B_o$

12)



The logic gate equivalent to the given circuit diagram is :

a) OR
b) NAND
c) NOR
d) AND

13) **An α-particle, a proton and an electron have the same kinetic energy. Which one of the following is correct in case of their de-Broglie wavelength.**

a) $\lambda_\alpha > \lambda_p > \lambda_e$
b) $\lambda_\alpha = \lambda_p = \lambda_e$
c) $\lambda_\alpha < \lambda_p < \lambda_e$
d) $\lambda_\alpha > \lambda_p < \lambda_e$

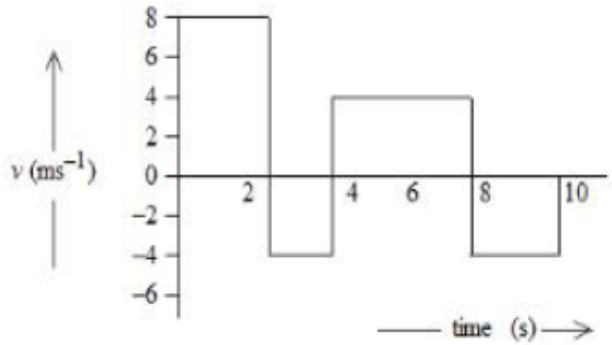
14) **When a beam of white light is allowed to pass through convex lens parallel to principal axis, the different colours of light converge at different point on the principle axis after refraction. This is called :**

a) Chromatic aberration
b) Polarisation
c) Spherical aberration
d) Scattering

15) **A long solenoid is formed by winding 70 turns cm^{-1}. If 2.0 A current flows, then the magnetic field produced inside the solenoid is _____ ($\mu_0 = 4\pi \times 10^{-7}$ TmA^{-1})**

a) 88×10^{-4} T
b) 176×10^{-4} T
c) 352×10^{-4} T
d) 1232×10^{-4} T

16) **The velocity time graph of a body moving in a straight line is shown in figure.**



The ratio of displacement to distance travelled by the body in time 0 to 10s is :

a) 1 : 4
b) 1 : 3
c) 1 : 2
d) 1 : 1

17) **A photon is emitted in transition from n = 4 to n = 1 level in hydrogen atom. The corresponding wavelength for this transition is (given, h = 4×10^{-15} eVs) :**

a) 94.1 nm
b) 99.3 nm
c) 974 nm
d) 941 nm

18) Given below are two statements: one is labelled as Assertion A and the other is labelled as **Reason R**

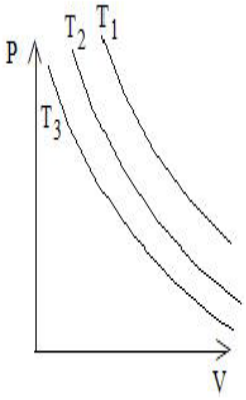
Assertion A : Steel is used in construction of buildings and bridges.

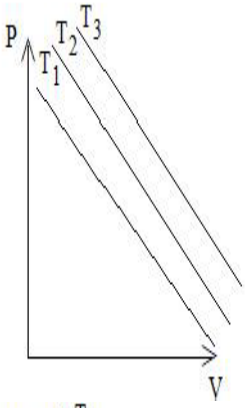
Reason R : Steel is more elastic and its elastic limit is high.

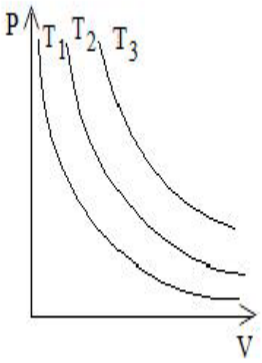
In the light of above statements, choose the most appropriate answer from the options given below.

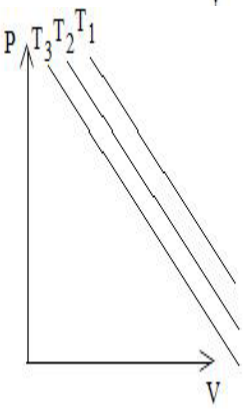
a) **A** is correct but **R** is not correct
b) **A** is not correct but **R** is correct
c) Both **A** and **R** are correct but **R** is **NOT** the correct explanation of **A**
d) Both **A** and **R** are correct but **R** is the correct explanation of **A**

19) **In an Isothermal change, the change in pressure and volume of a gas can be represented for three different temperature : $T_3 > T_2 > T_1$ as :**

a) 

b) 

c) 

d) 

20) **A cell of emf 90 V is connected across series combination of two resistors each of 100 Ω resistance. A voltmeter of resistance 400 Ω is used to measure the potential difference across each resistor. The reading of the voltmeter will be :**

a) 45 V b) 80 V
c) 90 V d) 40 V

21) A single turn current loop in the shape of a right angle triangle with sides 5 cm, 12 cm, 13 cm is carrying a current of 2 A. The loop is in a uniform magnetic field of magnitude 0.75 T whose direction is parallel to the current in the 13 cm side of the loop. The magnitude of the magnetic force on the 5 cm side will be $\frac{x}{130}$N. The value of x is
)

22) A spherical ball of radius 1mm and density 10.5 g/cc is dropped in glycerine of coefficient of viscosity 9.8 poise and density 1.5 g/cc. Viscous force on the when it attains constant velocity is 3696×10^{-x} N. The value of x is (Given, g = 9.8 m/s^2 and $\pi = \frac{22}{7}$)
)

23) A convex lens of refractive index 1.5 and focal length 18cm in air is immersed in water. The change in focal length of the lens will be _____ cm.
(given refractive index of water = $\frac{4}{3}$)
)

24) A body of mass 1kg begins to move under the action of a time dependent force $\vec{F} = t\hat{i} + 3t^2\hat{j}$N, where $\hat{i}\ and\ \hat{j}$ are the unit vectors along x and y axis. The power developed by above force, at the time t = 2s, will be _____ w.
)

25) The energy released per fission of nucleus of ^{240}X is 200 MeV. The energy released if all the atoms in 120g of pure ^{240}X undergo fission is _____ $\times 10^{25}$ MeV. (Given $N_A = 6 \times 10^{23}$)
)

26) A parallel plate capacitor with air between the plate has a capacitance of 15pF. The separation between the plate becomes twice and the space between them is filled with a medium of dielectric constant 3.5. Then the capacitance becomes $\frac{x}{4}$pF. The value of x is
)

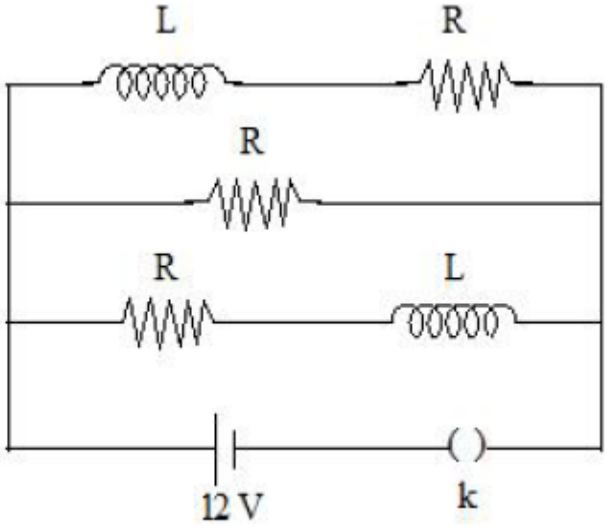
27) A mass m attached to free end of a spring executes SHM with a period of 1s. If the mass is increased by 3 kg the period of oscillation increases by one second, the value of mass m is _____ kg
)

28) A uniform solid cylinder with radius R and length L has moment of inertia I_1, about the axis of the cylinder. A concentric solid cylinder of radius $R' = \frac{R}{2}$ and length $L' = \frac{L}{2}$ is carved out of the original cylinder. If I_2 is the moment of inertia of the carved out portion of the cylinder then $\frac{I_1}{I_2}$=_____.

(Both I_1 and I_2 are about the axis of the cylinder)
)

29) If a copper wire is stretched to increase its length by 20%. The percentage increase in resistance of the wire is _____ %.
)

30) Three identical resistors with resistance R = 12Ω and two identical inductors with self inductance L = 5 mH are connected to an ideal battery with emf of 12 V as shown in figure. The current through the battery long after the switch has been closed will be _____ A.



)

CHEMISTRY

31) **Which of the following cannot be explained by crystal field theory?**

a) Colour of metal complexes
b) Stability of metal complexes
c) The order of spectrochemical series
d) Magnetic properties of transition metal complexes

32) **Correct statement is:**

a) An average human being consumes nearly 15 times more air than food
b) An average human being consumes equal amount of food and air
c) An average human being consumes 100 times more air than food
d) An average human being consumes more food than air

33) Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion R : Beryllium has less negative value of reduction potential compared to the other alkaline earth metals.
Reason R : Beryllium has large hydration energy due to small size of Be^{2+} but relatively large value of atomization enthalpy
In the light of the above statements, choose the most appropriate answer from the options given below.

a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is NOT the correct explanation of A
c) A is not correct but R is correct
d) A is correct but R is NOT correct

34) Given below are two statements:

Statement I : Pure Aniline and other arylamines are usually colourless.

Statement II : Arylamines get coloured on storage due to atmospheric reduction

In the light of the above statements, choose the most appropriate answer from the options given below:

a) Statement I is correct but statement II is incorrect
b) Both Statement I and Statement II are incorrect
c) Both Statement I and Statement II are correct
d) Statement I is incorrect but statement II is correct

35) **Which one amongst the following are good oxidizing agents?**

A. Sm^{2+}

B. Ce^{2+}

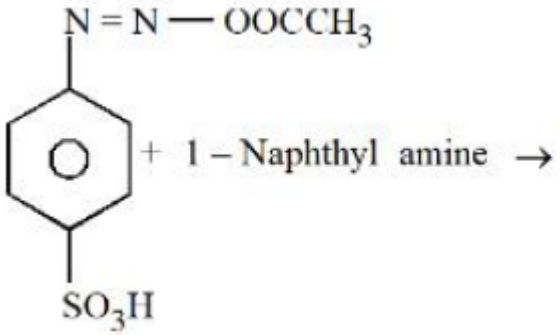
C. Ce^{4+}

D. Tb^{4+}

Choose the most appropriate answer from the options given below :

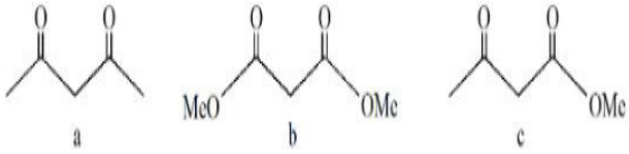
a) C and D only
b) A and B only
c) D only
d) C only

36) **Choose the correct colour of the product for the following reaction.**



a) Red
b) Blue
c) Yellow
d) White

37) **Which will undergo deprotonation most readily in basic medium?**



a) Both a and c
b) a only
c) c only
d) b only

38) **The number of s-electrons present in an ion with 55 protons in its unipositive state is**

a) 8
b) 10
c) 9
d) 12

39) **Match List I with List II**

	List I Type		**List II Name**
a.	Antifertility drug	**i.**	Norethindrone
b.	Tranquilizer	**ii.**	Meprobomate
c.	Antihistamine	**iii.**	Seldane
d.	Antibiotic	**iv.**	Ampicillin

Choose the correct answer from the options given below :

a) A-IV, B-III, C-II, D-I
b) A-II, B-I, C-III, D-IV
c) A-I, B-III, C-II, D-IV
d) A-I, B-II, C-III, D-IV

40) **What is the number of unpaired electron(s) in the highest occupied molecular orbital of the following species : $N_2 : N_2^+ : O_2 : O_2^+$?**

a) 2, 1, 0, 1
b) 0, 1, 0, 1
c) 2, 1, 2, 1
d) 0, 1, 2, 1

41) **A student has studied the decomposition of a gas AB_3 at 25°C. He obtained the following data.**

P(mm Hg)	50	100	200	400
Relative $t_{1/2}$ (s)	4	2	1	0.5

a) 0
b) 1
c) 2
d) 0.5

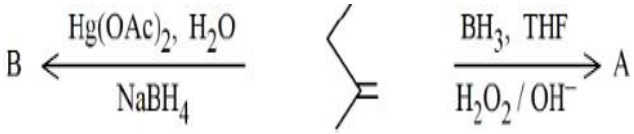
42) **$K_2Cr_2O_7$ paper acidified with dilute H_2SO_4 turns green when exposed to**

a) Sulphur trioxide
b) Carbon dioxide
c) Sulphur dioxide
d) Hydrogen sulphide

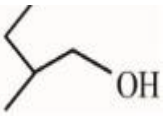
43) **The hybridization and magnetic behavior of cobalt ion in $[Co(NH_3)_6]^{3+}$ complex, respectively is**

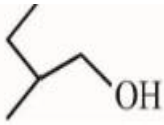
a) sp^3d^2 and paramagnetic
b) d^2sp^3 and paramagnetic
c) sp^3d^2 and diamagnetic
d) d^2sp^3 and diamagnetic

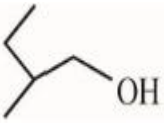
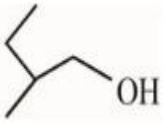
44) Find out the major products from the following reactions.



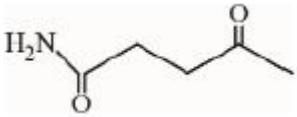
a) A =  , B = 

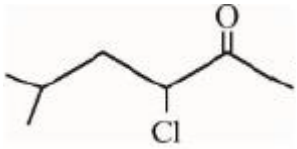
b) A =  , B = 

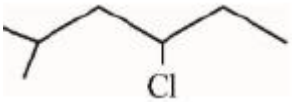
c) A =  , B = 

d) A =  , B = 

45) **Given below are two statements:**

Statement I :  **under Clemmensen reduction conditions will give**

Statement II :  **under Wolff-Kishner reduction condition will give**



In the light of the above statements, choose the correct answer from the options given below:

a) Statement I is false but Statement II is true.
b) Both Statements I and Statement II are true.
c) Both Statements I and Statement II are false.
d) Statement I is true but Statement II is false.

46) **The metal which is extracted by oxidation and subsequent reduction from its ore is:**

a) Ag
b) Cu
c) Fe
d) Al

47) **Identify the correct statements about alkali metals.**

A. The order of standard reduction potential ($M^+|M$) for alkali metal ions is Na > Rb > Li.

B. CsI is highly soluble in water.

C. Lithium carbonate is highly stable to heat.

D. Potassium dissolved in concentrated liquid ammonia is blue in colour and paramagnetic.

E. All the alkali hydrides are ionic solids.

Choose the correct answer from the options given below :

a) A, B and E only
b) A, B, D only
c) A and E only
d) C and E only

48) **In which of the following reactions the hydrogen peroxide acts as a reducing agent?**

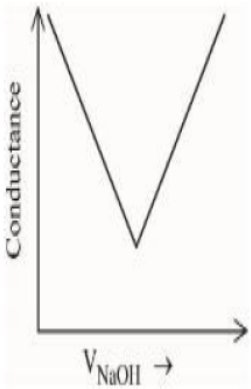
a) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4\ H_2O$

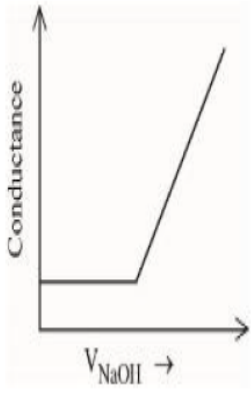
b) $Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$

c) $2Fe^{2+} + H_2O_2 \rightarrow 2Fe^{3+} + 2OH^-$

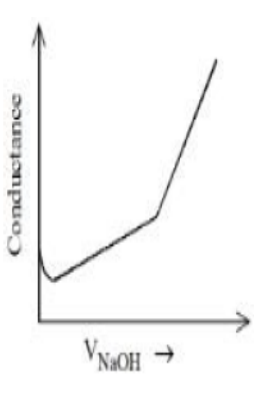
d) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

49) **Choose the correct representation of conductometric titration of benzoic acid vs sodium hydroxide.**

a) 

b) 

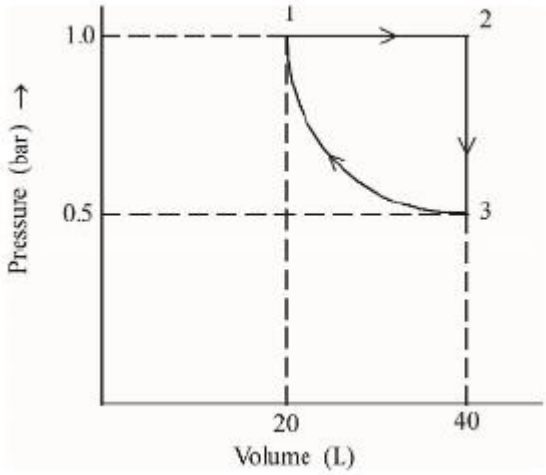
c) 

d) 

50) Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion A : Benzene is more stable than hypothetical cyclohexatriene.
Reason R : The delocalized π electron cloud is attracted more strongly by nuclei of carbon atoms.
In the light of the above statements, choose the correct answer from the options given below.

a) A is true but R is false
b) Both A and R are correct but R is NOT the correct explanation of A.
c) A is false but R is true
d) Both A and R are correct but R is the correct explanation of A

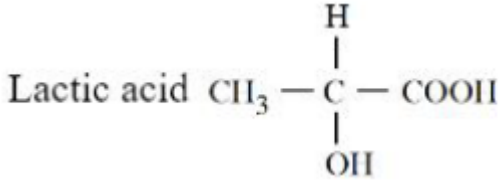
51) One mole of an ideal monoatomic gas is subjected to changes as shown in the graph. The magnitude of the work done (by the system or on the system) is _____ J (nearest integer)



Given : log 2 = 0.3
ln 10 = 2.3
)

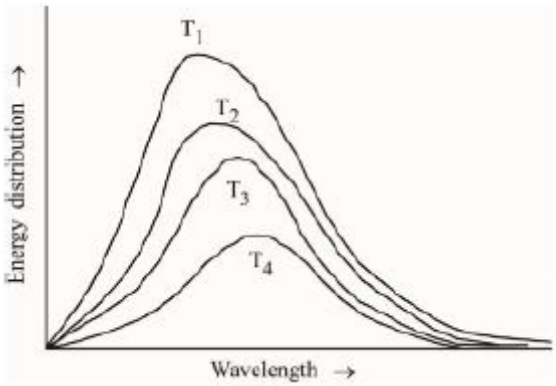
52) The number of units, which are used to express concentration of solutions from the following is _____ Mass percent, Mole fraction, Molarity, ppm, Molality
)

53) If the pKa of lactice acid is 5, then the pH of 0.005 M calcium lactate solution at 25°C is _____ $\times 10^{-1}$ (Nearest integer)

Lactic acid 

)

54) Following figure shows spectrum of an ideal black body at four different temperatures. The number of correct statement/s from the following is _____



A. $T_4 > T_3 > T_2 > T_1$

B. The black body consists of particles performing simple harmonic motion.

C. The peak of the spectrum shifts to shorter wavelength as temperature increase.

D. $\frac{T_1}{v_1} = \frac{T_2}{v_2} = \frac{T_3}{v_3} \neq$constant

E. The given spectrum could be explained using quantisation of energy.
)

55) Maximum number of isomeric monochloro derivatives which can be obtained from 2, 2, 5, 5– tetramethyl hexane by chlorination is

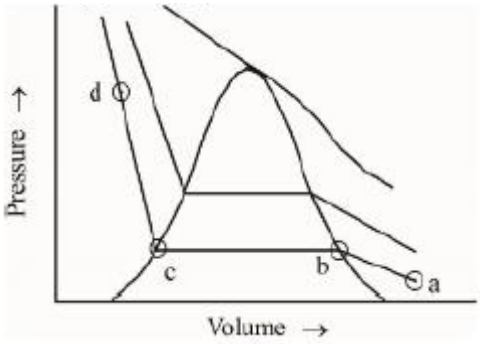
_____

)

56) Sum of π – bonds present in peroxodisulphuric acid and pyrosulphuric acid is

)

57) The number of statement/s, which are correct with respect to the compression of carbon dioxide from point (a) in the Andrews isotherm from the following is _____



A. Carbon dioxide remains as a gas upto point (b)
B. Liquid carbon dioxide appears at point (c)
C. Liquid and gaseous carbon dioxide coexist between points (b) and (c)
D. As the volume decreases from (b) to (c), the amount of liquid decreases
)

58) The total pressure observed by mixing two liquids A and B is 350 mm Hg when their mole fractions are 0.7 and 0.3 respectively.

The total pressure becomes 410 mm Hg if the mole fractions are changed to 0.2 and 0.8 respectively for A and B. The vapour pressure of pure A is _____ mm Hg. (Nearest integer) Consider the liquids and solutions behave ideally.
)

59) The number of statement/s which are the characteristics of physisorptions is _____
A. It is highly specific in nature.
B. Enthalpy of adsorption is high
C. It reverse with increase in temperature
D. It results into unimolecular layer
E. No activation energy is needed
)

60) The total number of tripeptides possible by mixing of valine and proline is ____
)

MATHEMATICS

61) **The equations of the sides AB and AC of a triangle. ABC are $(\lambda + 1)x + \lambda y = 4$ and $\lambda x + (1 - \lambda)y + \lambda = 0$ respectively. Its vertex A is on the y – axis and its orthocenter is (1, 2). The length of the tangent from the point C to the part of the parabola $y^2 = 6x$ in the first quadrant is :**

a) 4 b) 2
c) $2\sqrt{2}$ d) $\sqrt{6}$

62) **Let p and q be two statements. The $\sim(p \wedge (p \Rightarrow \sim q))$ is equivalent to**

a) $p \vee ((\sim p) \wedge q)$ b) $(\sim p) \vee q$
c) $p \vee (p \wedge q)$ d) $p \vee (p \wedge (\sim q))$

63) **Let y = y(x) be the solution of the differential equation $(x^2 - 3y^2)dx + 3xy\,dy = 0$, y(1) = 1.**

Then $6y^2(e)$ is equal to

a) $\frac{3}{2}e^2$ b) e^2
c) $2e^2$ d) $3e^2$

64) **The number of real solutions of the equation $3\left(x^2 + \frac{1}{x^2}\right) - 2\left(x + \frac{1}{x}\right) + 5 = 0$, is**

a) 3 b) 4
c) 0 d) 2

65) **If $f\left(x\right) = \frac{2^{2x}}{2^{2x}+2}, x \in R$, then $f\left(\frac{1}{2023}\right) + f\left(\frac{2}{2023}\right) + \ldots + f\left(\frac{2022}{2023}\right)$ is equal to**

a) 2010 b) 2011
c) 1011 d) 1010

66) **If the system of equations**

$x + 2y + 3z = 3$

$4x + 3y - 4z = 4$

$8x + 4y - \lambda z = 9 + \mu$

has infinitely many solutions, then the ordered pair (λ, μ) is equal to:

a) $\left(-\frac{72}{5}, -\frac{21}{5}\right)$ b) $\left(-\frac{72}{5}, \frac{21}{5}\right)$
c) $\left(\frac{72}{5}, \frac{21}{5}\right)$ d) $\left(\frac{72}{5}, -\frac{21}{5}\right)$

67) **The locus of the mid points of the chords of the circle $C_1 : (x-4)^2 + (y-5)^2 = 4$ which subtend on angle θ_I at the centre of the circle C_1, is a circle of radius r_i. If $\theta_1 = \frac{\pi}{3},\ \theta_3 = \frac{2\pi}{3}$ and $r_1^2 = r_2^2 + r_3^2$, then θ_2 is equal to**

a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$
c) $\frac{3\pi}{4}$ d) $\frac{\pi}{6}$

68) **Let the plane containing the line of intersection of the planes $P_1 : x + (\lambda + 4)y + z = 1$ and $P2 : 2x + y + z = 2$ pass through the points (0, 1, 0) and (1, 0, 1). Then the distance of the point $(2\lambda, \lambda, -\lambda)$ from the plane P2 is**

a) $2\sqrt{6}$ b) $5\sqrt{6}$
c) $3\sqrt{6}$ d) $4\sqrt{6}$

69) **Let the six numbers $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ be in A.P. and $\alpha_1 + \alpha_3 = 10$. If the mean of these six numbers is $\frac{19}{2}$ and their variance is σ^2, then $8\sigma^2$ is equal to :**

a) 200 b) 210
c) 220 d) 105

70) **The set of all values of a for which $\lim_{x\to a}([x-5]-[2x+2]) = 0$, where [∝] denotes the greatest integer less than or equal to ∝ is equal to**

a) (-7.5, -6.5] b) [-7.5, -6.5)
c) [-7.5, -6.5] d) [-7.5, -6.5]

71) **If $f(x) = x^3 - x^2 f'(1) + xf''(2) - f'''(3)$, $x \in R$, then**

a) f(1) + f(2) + f(3) = f(0) b) f(3) - f(2) = f(1)
c) 3f(1) + f(2) = f(3) d) 2f(0) - f(1) + f(3) = f(2)

72) **Let f(x) be a function such that f(x + y) = f(x) · f(y) for all x, y ∈ N. If f(1) = 3 and $\sum_{k=1}^{n} f(k) = 3279$ then the value of n is**

a) 8 b) 7
c) 9 d) 6

73) **The value of $\left(\frac{1+\sin\frac{2\pi}{9}+i\cos\frac{2\pi}{9}}{1+\sin\frac{2\pi}{9}-i\cos\frac{2\pi}{9}}\right)^3$ is**

a) $\frac{1}{2}\left(1 - i\sqrt{3}\right)$ b) $-\frac{1}{2}\left(\sqrt{3} - i\right)$
c) $-\frac{1}{2}\left(1 - i\sqrt{3}\right)$ d) $\frac{1}{2}\left(\sqrt{3} + i\right)$

74) **The number of integers, greater than 7000 that can be formed, using the digits 3, 5, 6, 7, 8 without repetition, is**

a) 48 b) 168
c) 220 d) 120

75) $\int_{\frac{3\sqrt{2}}{4}}^{\frac{3\sqrt{3}}{4}} \frac{48}{\sqrt{9-4x^2}}dx$ **is equal to**

a) $\frac{\pi}{6}$ b) $\frac{\pi}{3}$
c) 2π d) $\frac{\pi}{2}$

76) **Let $\vec{\alpha} = 4\hat{i} + 3\hat{j} + 5\hat{k}$ and $\vec{\beta} = \hat{i} + 2\hat{j} - 4\hat{k}$. Let $\vec{\beta}_1$ be parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ be perpendicular to $\vec{\alpha}$. If $\vec{\beta} = \vec{\beta}_1 + \vec{\beta}_2$, then the value of $5\vec{\beta}_2 \cdot \left(\hat{i} + \hat{j} + \hat{k}\right)$ is**

a) 6 b) 9
c) 11 d) 7

77) **Let A be a 3 × 3 matrix such that $|\text{adj (adj (adj A))}| = 12^4$ Then $|A^{-1}\ \text{adj}\ A|$ is equal to**

a) 12 b) 1
c) $\sqrt{6}$ d) $2\sqrt{3}$

78) **If the foot of the perpendicular drawn from (1, 9, 7) to the line passing through the point (3, 2, 1) and parallel to the planes x + 2y + z = 0 and 3y – z = 3 is (α, β, γ), the α + β + γ is equal to**

a) 5 b) 3
c) 1 d) -1

79) **The number of square matrices of order 5 with entries from the set {0, 1}, such that the sum of all the elements in each row is 1 and the sum of all the element in each column is also 1, is**

a) 225 b) 125
c) 150 d) 120

80) **If $({}^{30}C_1)^2 + 2({}^{30}C_2)^2 + 3({}^{30}C_3)^2 + ... + 30({}^{30}C_{30})^2 = \frac{\alpha 60!}{(30!)^2}$ then α is equal to :**

a) 60 b) 15
c) 10 d) 30

81) If $\frac{1^3+2^3+3^3+\ldots\ up\ to\ n\ terms}{1\cdot3+2\cdot5+3\cdot7+\ldots\ up\ to\ n\ terms} = \frac{9}{5}$, then the value of n is)

82) Let f be a differentiable function defined on $\left[0, \frac{\pi}{2}\right]$ such that f(x) > 0 and $f\left(x\right) + \int_0^x f\left(t\right)\sqrt{1 - \left(\log_e f(t)\right)^2}$ $dt = e, \forall x \in \left[0, \frac{\pi}{2}\right]$. Then $\left(6 \log_e f\left(\frac{\pi}{6}\right)\right)^2$ is equal to ____.
)

83) The equations of the sides AB, BC and CA of a triangle ABC are : 2x + y = 0, x + py = 21a ($a \neq 0$) and $x - y = 3$ respectively. Let P(2, a) be the centroid of ΔABC. Then $(BC)^2$ is equal to
)

84) If the shortest between the lines $\frac{x+\sqrt{6}}{2} = \frac{y-\sqrt{6}}{3} = \frac{z-\sqrt{6}}{4}$ and $\frac{x-\lambda}{3} = \frac{y-2\sqrt{6}}{4} = \frac{z+2\sqrt{6}}{5}$ is 6, then the square of sum of all
)

85) Let S = {$\theta \in$ [0. 2π) : tan (π cos θ) + tan (π sin θ) = 0}
Then $\sum_{\theta \in S} \sin^2\left(\theta + \frac{\pi}{4}\right)$ is equal to _____
)

86) The minimum number of elements that must be added to the relation R = {(a, b), (b, c), (b, d)} on the set {a, b, c, d} so that it is an equivalence relation, is ___
)

87) Three urns A, B and C contain 4 red, 6 black: 5 red, 5 black; and λ red, 4 black balls respectively. One of the urns is selected at random and a ball is drawn. If the ball drawn is red and the probability that it is drawn from urn C is 0.4 then the square of the length of the side of the largest equilateral triangle, inscribed in the parabola $y^2 = \lambda x$ with one vertex at the vertex of the parabola, is
)

88) Let $\vec{a} = \hat{i} + 2\hat{j} + \lambda\hat{k}$, $\vec{b} = 3\hat{i} - 5\hat{j} - \lambda\hat{k}$, $\vec{a} \cdot \vec{c} = 7, 2\vec{b} \cdot \vec{c} + 43 = 0$, $\vec{a} \times \vec{c} = \vec{b} \times \vec{c}$. Then $\left|\vec{a} \cdot \vec{b}\right|$ is equal to
)

89) Let the sum of the coefficients of the first three terms in the expansion of $\left(x - \frac{3}{x^2}\right)^n, x \neq 0, n \in N$, be 376. Then the coefficient of x^4 is _____
)

90) If the area of the region bounded by the curves $y^2 - 2y = -x$, x + y = 0 is A, then 8 A is equal to
)