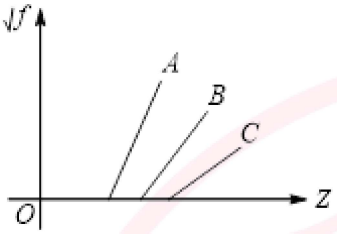
Date :-07/01/2022 **Time :-50 Minutes** **Exam Name :-IIT-JEE-1to1Guru-1** **Mark :- 84**

1. Figure shows Moseley s plot between $\sqrt{f}$ and Z, where f is the frequency and Z is the atomic number. Three lines A, B and C shown in the graph may represent



(a) K_α, K_β and K_γ lines, respectively

(b) K_γ, K_β and K_α lines, respectively

(c) K_α, L_α and M_α lines, respectively **(d)** Nothing

2. A particle of mass m is moving along a trajectory given by $x = x_0 + a\cos\omega_1 t$ $y = y_0 + b\cos\omega_2 t$ The torque, acting on the particle about the origin, at $t = 0$ is: [10 Apr. 2019 I]

(a) $m(-x_0 b + y_0 a)\omega_1^2 \hat{k}$ **(b)** $+my_0 a\omega_1^2 \hat{k}$ **(c)** zero

(d) $-m(x_0 b\omega_2^2 - y_0 a\omega_1^2)\hat{k}$

3. The work done in moving an alpha particle between two points having potential difference 25 V is

(a) 8×10^{-18}J **(b)** 8×10^{-19}J **(c)** 8×10^{-20}J

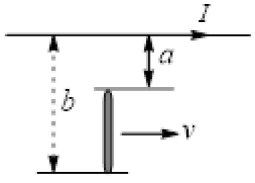
(d) 8×10^{-16}J

4. Surface tension of a soap solution is $1.9 \times 10^{-2} N/m$. Work done in blowing a bubble of 2.0 *cm* diameter will be

(a) $7.6 \times 10^{-6}\pi$ *joule* **(b)** $15.2 \times 10^{-6}\pi$ *joule*

(c) $1.9 \times 10^{-6}\pi$ *joule* **(d)** 1×10^{-4} *joule*

5. Figure shows a copper rod moving with velocity v parallel to a long straight wire carrying current =100 A. Calculate the induced emf in the rod, where $v = 5\ \text{ms}^{-1}, a = 1\ \text{cm}, b = 100\ \text{cm}$



(a) 0.23 mV **(b)** 0.46 mV **(c)** 0.16 mV

(d) 0.32 mV

6. A capacitor of capacity 2 μF is charged to a potential difference of 12 V. It is then connected across an inductor of inductance 6 μH. What is the current (in

7. A student measures diameter of a sphere using vernier calliper having least count 0.1 mm and reports diameter equal to 0.025307 meter. Numbers of significant figure in diameter will be-

8. Which among the following is step-growth polymer?

(a) PTFE **(b)** PVC **(c)** Polyester **(d)** Polythene

9. It is generalized that a 10°C increase in temperature causes the rate of reactions to double. Applied to a reaction at 295 K, what is the value of E_a ?

(a) 120 kcal mol^{-1} **(b)** 1200 kcal mol^{-1}

(c) 1.2 kcal mol^{-1} **(d)** 12 kcal mol^{-1}

10. The bad smelling substance formed by the action of alcoholic caustic potash on chloroform and aniline is

(a) Nitrobenzene **(b)** Phenyl isocyanide

(c) Phenyl cyanide **(d)** Phenyl isocyanate

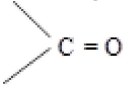
11. The thermal stability of CF_4 is

(a) Less than SiF_4 **(b)** More than SiF_4

(c) Less than CCl_4 **(d)** Less than $SiCl_4$

12. Na and Mg crystallize in bcc- and fcc-type crystals, respectively, then the number of atoms of Na and Mg present in the unit cell of their respective crystal is

(a) 4 and 2 **(b)** 9 and 14 **(c)** 14 and 9 **(d)** 2 and 4

13. The observed dipole moment of H_2O = 1.85 D. The H - O bond distance is 0.94 and HOH bond angle is 105 °. cos 52.5° = 0.609 ; cos 105° = - 0.26 Determine the percentage fractional charges on each oxygen atom in terms of charge of electron in nearest possible integers. Charge of electron = 4.8 x 10^{-10} e. s. u. 

14. In a regular B_{12} - icosahedron, how many boron atoms are equidistant from a given boron atom ?

15. The value of the integral $\int_0^2 |x^2 - 1|dx$ is

(a) 0 **(b)** 2 **(c)** $-\frac{1}{3}$ **(d)** -2

16. The differential equation satisfied by the family of curves $y = ax\cos\left(\frac{1}{x}+b\right)$, where a and b are parameters, is

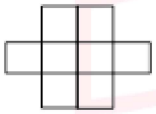
(a) $x^2y_2 + y = 0$ **(b)** $x^4y_2 + y = 0$

(c) $xy_2 - y = 0$ **(d)** $x^4y_2 - y = 0$

17. Domain of definition of the function $f(x) = \frac{3}{4-x^2} + \log_{10}(x^3 - x)$, is

(a) $(1, 2)$ **(b)** $(-1,0)\cup(1,2)$ **(c)** $(1,2)\cup(2,\infty)$

(d) $(-1,0)\cup(1,2)\cup(2,\infty)$

18. Six x have to be placed in the square of the figure given, such that each row contains at least one x, this can be done in 

(a) 24 ways **(b)** 28 ways **(c)** 26 ways **(d)** 36 ways

19. The radius of a circle is increasing at the rate of 0.1 cm/s. When the radius of the circle is 5 cm, the rate of change of its area, is

(a) $-\pi cm^2/s$ **(b)** $10\pi cm^2/s$ **(c)** $0.1\pi cm^2/s$

(d) $\pi cm^2/s$

20. Let

$$f(x) = \begin{cases} |x^3 + x^2 + 3x + \sin x|\left(3 + \sin\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases},$$

then number of points (where $f(x)$ attains its minimum value) is

21. 'n' is selected from the set {1, 2, 3, . 100} and the number $2^n + 3^n + 5^n$ is formed. Total number of ways of selecting 'n' so that the formed number is divisible by 4, is equal to ....