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the metamorphosis starts from here....

Brilliant International Olympiad of SCIENCE

Class-12 M (Syllabus and Sample Question Paper)

PHYSICS Electrostatics, Current Electricity, Magnetic Effects of Current and Magnetism, Electromagnetic Induction and Alternating Currents, Electromagnetic Waves, Optics, Dual Nature of Matter and Radiation, Atoms and Nuclei, Electronic Devices, Communication Systems **CHEMISTRY** Solid State, Solutions, Electrochemistry, Chemical Kinetic , Surface Chemistry, General Principles and Processes of Isolation of Elements, p, d and f Block Elements, Coordination Compounds, Organic Compounds Containing Halogens (Haloalkanes and Haloarenes**),** Organic Compounds Containing Oxygen (Alcohols, Phenols and Ethers, Aldehydes , Ketones and Carboxylic Acids), Organic Compounds Containing Nitrogen (Amines, Amides, Cyanides, Isocyanides), Biomolecules , Polymers, Chemistry in Everyday Life **MATHEMATICS** Relations & function, Binary operation, Matrix and Determinants, Continuity & Differentiability, Differentiation, Application of derivatives, Inverse trigonometric function, Indefinite & definite Integration, Application of Integral, Differential Equation **Coordinate Geometry, Solid Geometry:** (St. line, Plane, Sphere), Probability, Permutation & Combination, Central Tendency, Variance & Standard Deviation, Random Variable & its distribution, Non- Verbal Reasoning (I.Q. Test)

The Actual Question Paper Contains 40 Questions. The Duration of the Test Paper is 60 Minutes

1. There are three circles with radii 3cm, 4cm and 5cm touches each other internally. If P is the point of intersection of tangents to these circles at their point of contact, then the sum of the distances from points of contacts is?

(A) $3\sqrt{5}$ cm (B) $12\sqrt{5}$ cm (C) $5\sqrt{3}$ cm (D) $4\sqrt{3}$ cm

(E) None of these

2. Let $\vec{a} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + \hat{j}$. If $\vec{c}$ is a vector such that $\vec{a}.\vec{c} = |\vec{c}|$, $|\vec{c} - \vec{a}| = \sqrt{5}$ and the angle between $\vec{a} \times \vec{b}$ and $\vec{c}$ is 30°, then $|(\vec{a} \times \vec{b}) \times \vec{c}|$ is equal to?

(A) $\frac{2}{3}$ (B) $\frac{\sqrt{3}}{2}$ (C) 2 (D) 3

(E) None of these

3. Evaluate: $\int_0^{\sqrt{3}} \tan^{-1}\frac{2x}{1-x^2}dx$

(A) $\pi\left(1-\frac{1}{\sqrt{3}}\right)-\log 4$ (B) $\pi\left(1-\frac{1}{\sqrt{3}}\right)+\log 4$ (C) $\pi\left(1-\frac{1}{\sqrt{3}}\right).\log 4$ (D) $\frac{\pi\left(1-\frac{1}{\sqrt{3}}\right)}{\log 4}$

(E) None of these

4. $\vec{a}, \vec{b}, \vec{c}$ **and** $\vec{d}$ **and the position vectors of the points A, B, C, D such that no three of them are collinear and** $\vec{a} + \vec{c} = \vec{b} + \vec{d}$**, then ABCD is a?**

(A) Rhombus (B) Rectangle (C) Square (D) Parallelogram

(E) None of these

5. **A random variable has the following probability distribution.**

n :	0	1	2	3	4	5	6	7
P(n) :	0	2p	2p	3P	p2	2p2	7p2	2p

The value of p is?

(A) $\frac{1}{10}$ (B) -1 (C) $-\frac{1}{10}$ (D) Both (B) and (C)

(E) None of these

6. **A shooter is firing at a distant target and has only 10% chance of hitting it. The least number of rounds, he must fire in order to have more than 50% chance of hitting it at least once is?**

(A) 11 (B) 9 (C) 7 (D) 5

(E) None of these

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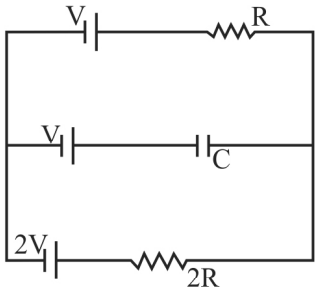
7. **If** $A = \begin{bmatrix} \cos\theta \sin\theta \\ -\sin\theta \cos\theta \end{bmatrix}$**, then** A^n **is equal to?**

(A) $\begin{bmatrix} \cos^n\theta \sin^n\theta \\ -\sin^n\theta \cos^n\theta \end{bmatrix}$ (B) $\begin{bmatrix} \cos\theta^n \sin\theta^n \\ -\sin\theta^n \cos\theta^n \end{bmatrix}$

(C) $\begin{bmatrix} \cos n\theta \sin n\theta \\ -\sin n\theta \cos n\theta \end{bmatrix}$ (D) $\begin{bmatrix} \cos n^2\theta \sin n^2\theta \\ -\sin n^2\theta \cos n^2\theta \end{bmatrix}$

(E) None of these

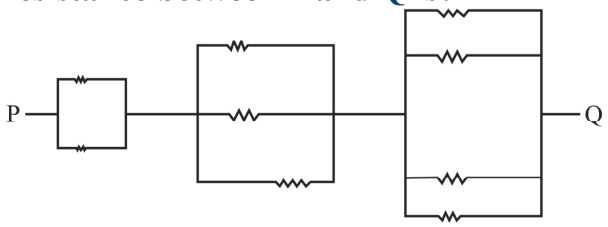
8. **In the given circuit with steady current, the potential drop accross the capacitor must be?**



(A) V (B) $V/2$ (C) $V/3$ (D) $2V/3$

(E) None of these

9. A number of each 24 Ω resistors are connected as shown in the figure. The effective resistance between P and Q is?



(A) 21.6 Ω (B) $\frac{24\Omega}{3}$ (C) 26 Ω (D) 36 Ω
(E) None of these

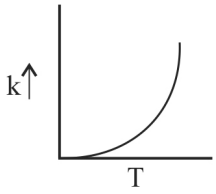
10. An electron of mass m and charge e is travelling with a speed v along a circular path of radius r at right angles to a uniform magnetic field B. If the speed of the electron is doubled and the magnetic field is halved, the resulting path would have a radius of ?

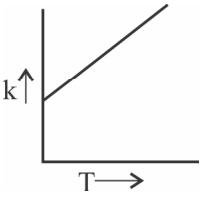
(A) 4r (B) 2r (C) $r/4$ (D) $r/2$
(E) None of these

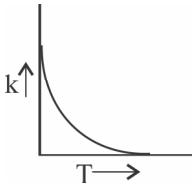
11. The distance between an object and the screen is 100 cm. A lens produces an image on the screen when placed at either of the position 40 cm apart. The power of lens is ?

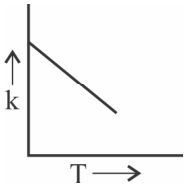
(A) 3 dioptre (B) 5 dioptre (C) 1 dioptre (D) 9 dioptre
(E) None of these

12. Plots of variation of the rate constant 'K' with temprature (T) are given below. The plot that follows arrhenius equation is ?

(A) 

(B) 

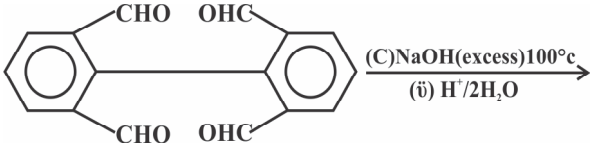
(C) 

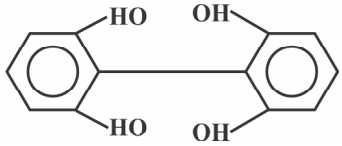
(D) 

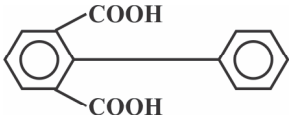
(E) None of these

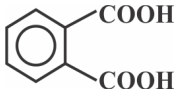
13. But-2-one can be converted to propanoic acid by which of the following?

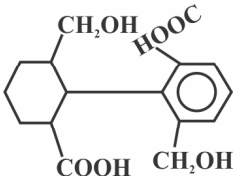
(A) NaOH/NaI, H^+ (B) Fehling Solution
(C) NaOH, I_2/H^+ (D) Tollen's reagent
(E) None of these

14. 

(A) 

(B) 

(C) 

(D) 

(E) None of these

15. The product of acid Catalyzed hydration of 2-phenylpropene is ?

(A) 3-phenyl-2-propanol
(B) 1-phenyl-2-propanol
(C) 2-phenyl-2-propanol
(D) 2-phenyl-1-propanol
(E) None of these

ANSWERS

1. A	2. B	3. A	4. D	5. A
6. C	7. C	8. C	9. C	10. A
11. B	12. A	13. C	14. D	15. C