

NEW STANDARD ACADEMY

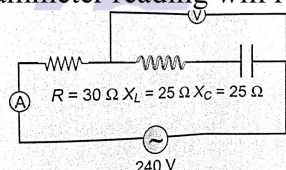
Date : 29-07-24

CLASS : 12TH JEE

Marks: 60
Time: 3 HRS

PHYSICS

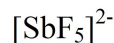
1. An LCR circuit contains $R = 50 \Omega$, $L = 1$ mH and $C = 0.1 \mu F$. The impedance of the circuit will be minimum for a frequency of
2. Reactance of a capacitor of capacitance $C \mu F$ for ac frequency $\frac{400}{\pi}$ Hz is 25Ω . The value C is
3. In a LCR circuit having $L = 8.0$ henry, $C = 0.5 \mu F$ and $R = 100$ ohm in series. The resonance frequency in per second is
4. In the circuit shown in figure, neglecting source resistance the voltmeter and ammeter reading will respectively, will be



5. Which is more dangerous in use : ac or dc? Explain, why.
6. The frequency of ac source is doubled. How do R , X_L and X_C get affected?
7. Distinguish between resistance, reactance and impedance for an ac circuit.
8. The instantaneous current and voltage in an ac circuit are given by $I = 10 \sin \sin t$ (in A) and $E = 200 \sin 300 t$ (in V) What is the average power dissipated in the circuit?
9. What do you mean by power factor? On what factors does it depend?
10. L , C and R represent physical quantities inductance, capacitance and resistance respectively. The combination representing dimension of frequency is?

CHEMISTRY

1. Explain the geometry & shape of the following
(a) $[\text{Fe}(\text{CN})_6]^{4-}$



2. Write the difference between inner orbital octahedral and outerorbital octahedral complexes.
3. Find the magnetic moment and magnetic nature of the following
(a) $[\text{NiCl}_4]^{2-}$ (b) $[\text{Ni}(\text{CN})_4]^{2-}$
4. Arrange the following in correct Increasing order of magnetic moment
(a) $[\text{Fe}(\text{CN})_6]^{4-}$ $[\text{CoCl}_4]^{2-}$
(c) $[\text{MnCl}_4]^{2-}$
5. $\text{PtCl}_4 \cdot 6\text{H}_2\text{O}$ on reaction with AgNO_3 forms 2 mol of AgCl (white ppt.) per mol of the $\text{PtCl}_4 \cdot 6\text{H}_2\text{O}$. What is complex? Give its Werner;s representation.
6. Both $\text{Ni}(\text{CO})_4$ and $[\text{NiCl}_4]^{2-}$ possess sp^3 hybridization but they differ in their magnetic behavior. Explain.
7. $[\text{Fe}(\text{CN})_6]^{4-}$ is diamagnetic while $[\text{FeF}_6]^{4-}$ is strongly paramagnetic .why?
8. $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{CoF}_6]^{3-}$, both are complexes of $\text{Co}(\text{III})$, but $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic while $[\text{CoF}_6]^{3-}$ is paramagnetic with moment 4.90B.M., Explain.
9. $\text{Mn}^{2+}(\text{aq})$ ion is light pink coloured while $[\text{Mn}(\text{CN})_6]^{4-}$ is blue in colour. Explain.
10. $[\text{Co}(\text{H}_2\text{O})_4]^{2+}$, $[\text{Co}(\text{Cl})_4]^{2-}$ and $[\text{Co}(\text{DMG})_2]$ are complexes of $\text{Co}(\text{II})$ but magnetic moment of $[\text{Co}(\text{H}_2\text{O})_4]^{2+}$ and $[\text{Co}(\text{Cl})_4]^{2-}$ is higher (3.87B.M) than $[\text{Co}(\text{DMG})_2]$. ($\mu = 1.73 B. M.$) Explain.

MATHS

1. If $f(x) = 2x + \cot^{-1}x + \log(\sqrt{1+x^2} - x)$, then prove that $f(x)$ is increasing function for real values of x .
2. Show that the function given by $f(x) = 3x+17$ is strictly increasing on \mathbb{R} .

3. Find the values of 'a' for which the function $(a+2)x^3 - 3ax^2 + 9ax - 1$ decreases monotonically throughout for all real x.
4. Let $g'(x) > 0$ and $f'(x) < 0 \forall x \in R$ then prove that $g(f(x+1)) < g(f(x-1))$.
5. Find the absolute maximum value and the absolute minimum value of the following functions in the given intervals:

$$f(x) = 4x - \frac{1}{2}x^2, x \in \left[-2, \frac{9}{2}\right]$$

6. Find the maximum value of $f(x) = \frac{x}{1+4x+x^2}$.
7. If $y = a \log_e|x+1| + b(x+1)^2 + x$ has its extremum value 4 at $x = 0$, then find (a,b).
8. Find the interval in which $f(x) = 3\cos^4 x + 10\cos^3 x + 6\cos^2 x - 3$ decreases is $x \in [0, \pi]$.
9. If the function $f(x) = ax e^{-bx}$ has a local maximum at the point (2,10) then find the values of a and b
10. Find the range of function $f(x) = x^4 - 14x^2 + 24x - 3$.

