

NEW STANDARD ACADEMY

SEMRI KOTHI SUPER MARKET, RAEBARELI

CLASS 12 (Biology) DPP (Academy) 05/08/2024

1. How does one visualise DNA on an agarose gel?
2. Describe the role of CaCl_2 in the preparation of competent cells?
3. Biotechnologists refer to *Agrobacterium tumefaciens* as a natural genetic engineer of plants. Give reasons to support the statement.
4. How can bacterial DNA be released from the bacterial cell for biotechnology experiments?
5. Who had first attempted construction of recombinant DNA?
6. Restriction enzymes belong to which large class of enzymes?
7. Who had first elucidated the molecular basis of restriction endonucleases?
8. Name the most commonly used vector.
9. In a plasmid cloning vector pBR322, BR refers to.
10. The vectors which move from one host to another and used in rDNA technology are?
11. A RNA directed DNA polymerase enzyme which has the ability of synthesizing DNA on RNA template is?
12. When clones are derived directly from the genomic DNA, such genomic cloned sets of fragments constitute?
13. The technique of Polymerase Chain Reaction (PCR) was developed by.
14. How is the mass scale production of recombinant proteins done?
15. What is elution?
16. How is an exonuclease functionally different from an endonuclease. Give example of two endonucleases other than Sal I.
17. What would happen when one grows a recombinant bacterium in a bioreactor but forget to add antibiotic to the medium in which the recombinant is growing?
18. While doing a PCR, "denaturation" step is missed. What will be its effect on the process?
19. Restriction enzymes should not have more than one site of action in the cloning site of a vector, comment.
20. What does "competent" refer to the competent cells used in transformation?

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CLASS 12 (CHEMISTRY) DPP (Academy) 5/08/2024

- How is nickel detected and estimated quantitatively in a salt?
- Which orbitals are involved in the overlapping in metal carbonyls?
- Write IUPAC names of the following complexes:
 - $\text{Na}_3[\text{CrF}_4(\text{OH})_2]$
 - $[\text{CoCl}(\text{ONO})(\text{en})_2]\text{Cl}$
- Why do metal are complexed in biological molecules?
- Using valence bond theory, explain the geometry and magnetic behaviour of iron pentacarbonyl (O).
- Draw the structures of the following:
 - cis dichloridotetracyanochromate(III)
 - Pentaamminenitrito-N-chromium(III)
 - Hexamethyldialuminium
- Compare the following complexes with respect to their shape, magnetic behaviour and hybrid orbitals involved:
 - $[\text{CoF}_4]^{2-}$
 - $[\text{Ni}(\text{CO})_4]$
 - $[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^-$
- Compare the following complexes with respect to structural shape of units, magnetic behaviour and hybrid orbitals involved in units:
 - $[\text{Ni}(\text{CN})_4]^{2-}$
 - $[\text{NiCl}_4]^{2-}$
 - $[\text{CoF}_6]^{3-}$
- With the help of crystal field theory predict the number of unpaired electrons in $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ complex ions.
- The formula $\text{Co}(\text{NH}_3)_5\text{CO}_3\text{Cl}$ could represent a carbonate and chloride. Give IUPAC names for them.
- Explain the following:
 - Nickel does not form low spin octahedral complexes. OR Ni^{2+} ion forms high spin outer orbital complex.
 - Co^{2+} is readily oxidised to Co^{3+} in the presence of strong ligand.
- On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_o < P$.
- When a coordination compound $\text{PtCl}_4 \cdot 6\text{NH}_3$ is mixed with AgNO_3 , 4 moles of AgCl are precipitated per mole of the compound. Write:
 - Structural formula of the complex.
 - IUPAC name of the complex.
- Explain the crystal field splitting in an octahedral field.
- How is the stability of a co-ordination compound in a solution decided? How is the dissociation constant of a complex defined?
- Draw the structures of isomers, if any, and write the names of the complex $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$
- Define the following terms with a suitable example of each: (a) Polydentate ligand (b) Homoleptic complex
- Write IUPAC name of the complex $[\text{Pt}(\text{en})_2\text{Cl}_2]$. Draw structures of geometrical isomers for this complex.
- Write IUPAC name of the complex $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$ Draw structures of geometrical isomers for this complex
- Using IUPAC norms write the formulae for the pentaamminenitrito-O-cobalt (III) chloride

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CLASS 12 (Math's) DPP (Academy) 05/08/2024

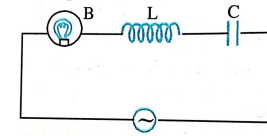
1. If the function $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$, where $a > 0$, attains its maximum and minimum at p and q , respectively, such that $p^2 = q$, then a equals
2. The real number x when added to its inverse gives the minimum value of the sum at x equal to
3. A function is matched below against an interval where it is supposed to be increasing. Which of the following pairs is incorrectly matched?
4. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides, having fence, are of same length x . The maximum area enclosed by the park is
5. The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is an increasing function in
6. Let $f: B \rightarrow R$ be defined by
$$F(x) = \begin{cases} k - 2x, & \text{if } x \leq -1 \\ 2x + 3, & \text{if } x > -1 \end{cases}$$
 If f has a local minimum at $x = -1$, Then a possible value of k is
7. The real number k for which the equation, $2x^3 + 3x + k = 0$ has two distinct real root in $[0, 1]$
8. If $x = -1$ and $x = 2$ are extreme points of $f(x) = \alpha \log|x| + \beta x^2 + x$, then
9. A wire of length 2 units is cut into two parts which are bent respectively to form a square of side = x units and a circle of radius = r units. If the sum of the areas of the square and the circle so formed is minimum, then.
10. The function defined by $f(x) = (x-2)e^x$ is
11. The function $f(x) = \frac{\ln(\pi+x)}{\ln(e+x)}$ is
12. AB is a diameter of a circle and C is any point on the circumference of the circle. Then
13. If $f(x) = a \log|x| + bx^2 + x$ has its extremum values at $x = -1$ and $x = 2$, then
14. The length of the longest interval in which the function $3 \sin x - 4 \sin^3 x$ is increasing is
15. If $f(x) = x^3 + bx^2 + cx + d$ and $0 < b^2 < c$, then in $(-\infty, \infty)$,
16. The function $f: [0, 3] \rightarrow [1, 29]$, defined by $f(x) = 2x^3 - 15x^2 + 36x + 1$, is

17. If $f: R \rightarrow R$ is a twice differentiable function such that $f''(x) > 0$ for all $x \in R$, and $f\left(\frac{1}{2}\right) = \frac{1}{2}$, $f(1)$ then
18. The number of points in $(-\infty, \infty)$, for which $x^2 - x \sin x - \cos x = 0$, is
19. Let $f(x) = \begin{cases} |x|, & \text{for } 0 < |x| \leq 2 \\ 1, & \text{for } x = 0 \end{cases}$. then at $x = 0$, f has
20. The least positive integral value of a such that $2x + \frac{a}{x^2} \geq 6, \forall x \in R$ is _____

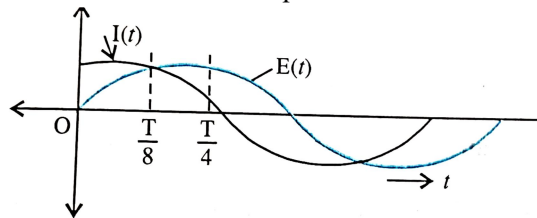
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CLASS 12 (Physics) DPP (Academy) 05/08/2024



1. What is the mean or average value of a.c. over a cycle and why?
2. Why ac measuring instruments have a non linear scale?
3. On which effect the ammeters are based? Give reason.
4. Can we use 15 *c/s a.c.* for lighting purpose?
5. Can we define the *r.m.s.* value of *a.c.* in terms of chemical effect of current?
6. If the frequency of the a.c. source in a series LCR circuit is increased, how does the current in the circuit change?
7. What is the maximum and minimum value of power factor? When does it happen?
8. A perfect self inductance when connected to an *a.c.* source does not produce any heating effect, yet reduces current in the circuit. Why?
9. With reference to the currents and voltages, write any fundamental difference between resistance and reactance.
10. 30. The Fig. shows two sinusoidal curves representing oscillations supply voltage and current in an a.c. circuit. Draw the phasor diagram to represent the current and supply voltage appropriately as phasors. State the phase difference between two quantities.



11. What does the quality factor (Q) signify in a LCR a.c. circuit?
12. How does the low power factor accounts for large power loss in lines ?
13. In the circuit shown in Fig. when the frequency of the supply is doubled, how should the values of L and C be changed so that glow in the bulb remains unchanged?

14. A bulb B and a capacitor C are connected in series to an a.c. source. A dielectric slab is now introduced between the plates of capacitor. How will the brightness of bulb be changed?
15. Sketch the graph to show the reactance of (i) a capacitor (ii) an inductor varies as a function of frequency?
16. Alternating current through pure inductor and pure capacitor is wattless. Why?
17. Why the core of transformer laminated ?
18. Why can't transformer be used to step down d.c. voltage?
19. In an ideal transformer, whatever is gained in the voltage is lost in the current. Comment.
20. Why the efficiency of real transformer is less than 100%?