NEW STANDARD ACADEMY

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CLASS 12 DPP (Academy) 26-08-2025

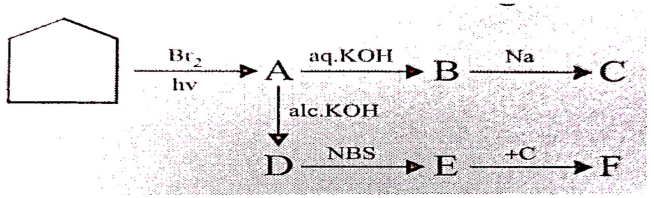
PHYSICS

1. Obtain an expression for the ratio of intensities at maxima and minima in an interference pattern.
2. A slit S is illuminated by a monochromatic source of light to give two coherent sources $P_1$and P_2 . These given bright and dark bands on a screen. At a point R, on the screen, there is a dark fringe. What relation must exist between the lengths P_1R and P_2R ?
3. In young's double slit experiment how is the fringe width change when
   a) Light of smaller frequency is used
   b) Distance between the slits is decreased?
4. Write two points of difference between interference and diffraction.
5. Consider interference between two sources of intensities *I and 4I.* What will be the intensity at points where phase differences are:
   a) $\frac{\pi}{2}$ b) π
   c) Can white light produce interference? What is the nature?
6. The refractive index of glass is 1.5. What is the speed of light in glass? Speed of light in vacuum is $3.0\times 10^{8} ms^{-1}$.
7. What is the Brewster angle for air to glass transition? (Refractive index of glass = 1.5)
8. Estimate the distance for which ray optics is good approximation for an aperture of 4mm and wavelength 400nm.
9. In double-slit experiment using light of wavelength 600nm, the angular width of a fringe formed on a distant screen is 0.1°. What is the spacing between the two slits?
10. In deriving the single slit diffraction pattern, it was stated that the intensity is zero at angles of n λ/a . Justify this by suitably dividing the slit to bring out the cancellation.

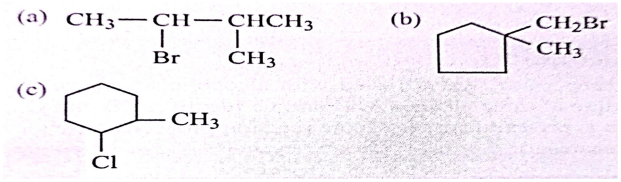
CHEMISTRY

1. The heterolytic bond dissociation energy of C - Cl bond in vinyl chloride 207 kcal/mol as compared to 191 kcal/mol in the case of C-Cl bond in ethyl chloride. Given explanation for this observation is

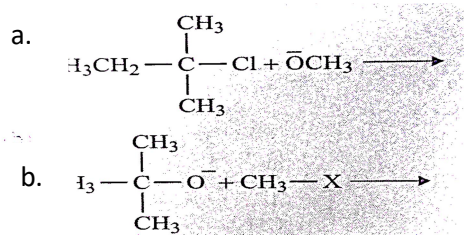
2. Identify A,B,C,D,E and F in the following series of reaction.



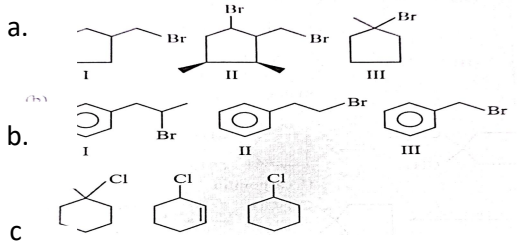
3. Give the major product (with proper explanation) when following halogen compounds are treated with sodium ethoxide.



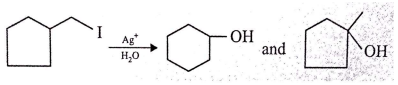
4. What are the products of the following reactions?



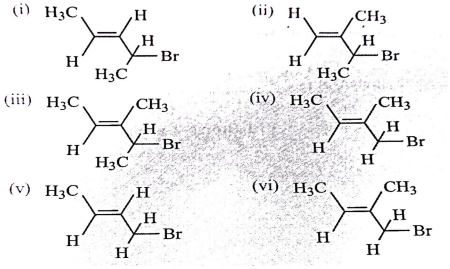
5. Heating alkyl chlorides or bromides in water leads to their conversion into alcohol through S_N1 reaction. Order each of the following set of compounds with respect to solvolytic reactivity is?



6. When alkyl halides are treated with aqueous $AgNO_3$, silver halide precipitates and an alcohol is formed. From what you know about the S_N1 reaction, propose a mechanism for the following conversion.



7. 2-Bromopentane, when treated with alcoholic KOH yields a mixture of three alkenes A, B and C. Identify A,B and C. Which is predominant? (Assume reaction proceeds through E_2 mechanism)
8. Vinyl chloride does not give S_N reaction but allyl chloride gives. Explain.
9. When CH_3-CH=CH-CH_2Cl reacts with alcoholic KCN,a mixture of isomeric products is obtained Explain.
10. Write the IUPAC names of the following:



BIOLOGY

1. What does secondary productivity in an ecosystem indicate? List any two factors by which productivity is limited in aquatic system.
2. State the differences between the first trophic levels of detritus food chain and grazing food chain.
3. Give difference between food web and food chain.
4. Construct an ideal pyramid of energy when 1,000,000 joules of sunlight is available. Label all the trophic levels.
5. the water body. Name the pioneer and climax species in a water body. Mention the changes observed in the biomass and the biodiversity of the successive seral communities developing in
6. Construct a pyramid of biomass starting with phytophlankton. Label three trophic levels. Is the pyramid upright or inverted? Why
7. What is primary productivity? Give the range of primary productivity in different ecosystems of the world.
8. Name the type of food chains responsible for the flow of larger fraction of energy in an aquatic and a terrestrial ecosystem respectively. Mention one difference between the two food chains.
9. Why are herbivores considered similar to predators in the ecological context? Explain.
10. List the features that make a stable biological community.

MATHS

1. Write the degree of the following differential equations:
   (i) $5x\left(\frac{dy}{dx}\right)^2 - \frac{d^2y}{dx^2} - 6y = logx$
   (ii) $x^3\left(\frac{d^2y}{dx}\right)^2 + x\left(\frac{dy}{dx}\right)^4 = 0.$
2. Find the sum of the order and the degree of the following differential equations
   (i) $y = x\left(\frac{dy}{dx}\right)^2 + \frac{d^2y}{dx^2}$
   (ii) $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 + x^4 = 0.$
3. Write the sum of the order and the degree of degree of the differential equation
   $\left(\frac{dy}{dx}\right)^5 3xy\left(\frac{d^3y}{dx^3}\right)^2 + y\left(\frac{d^2y}{dx^2}\right)^4 = 0$
4. Find the product of the ordert and degree of the differential equation:
   $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^2 + y^2 = 0$
5. Show that $y = \frac{A}{x+A}$ is a solution of the differential equation $xy_1+y=y^2$.
6. *Show that* $x^2 = 2y^2$logy is a solution of the differential equation $(x^2+y^2)\frac{dy}{dx} - xy = 0.$
7. *Show that y = x sin x is a solution of the differential equation xy' =y+x*$\sqrt{x^2 - y^2}$.
8. Show that $x^2-y^2 = c(x^2+y^2)^2$ is a solution of the diferential equation.$(x^3-3xy^2)\,dx = (y^3-3x^2y)dy$
9. Verify that y = Acos x-B sin x is a solution of the differential equation $\frac{d^2y}{dx^2} + y = 0.$
10. Show that $y = ae^{2x}+be^{-x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0.$