MHT CET Memory-Based Question Paper 2023
11 May 2023 Shift 1

Physics

- Find dissociation constant.
- What remains constant in an adiabatic process?
- Find the change in pressure if the volume is reduced by 32%. Assume $\gamma = 5/3$.
- Find L_0/L_1 for an open organ pipe.
- There was a question on the Balmer series.
- Calculate the image distance for the given object.
- Find the potential energy of charge q under given circumstances.

Chemistry

- Why is the Heisenberg reagent used?
- A question on Stephan's reaction was asked.
- Arrange the compounds in the increasing order of their ionic strength.
- Calculate BCC radius.
- Calculate spin magnetic moment.
- Calculate conductivity.
- How to (or which reaction is used to) prepare carboxylic acid?
- A question was on crossed cannizaro reaction.
- There were two questions on IUPAC naming.
- Identify the structure of gamahexene.

Mathematics

- If $(x + iy)^{1/3} = a + ib$, then find $x/a + y/b$.
- Find the area bounded by the region $y = x^2$ and $y = |x|$.
- $\int [(ex (x + 1)) / (\cos^2(xe^{-x})] dx$ = ?If $y(x) = 2^x + 2^y = 2$. then find the domain of x.
- If $a = i + j$ and $b = 2i - k$, then find the point of the intersection of the lines r x a = b x a and r x b = a x b.
- $f(y) = [(1 - \sin^{-1}x)/(1 + \sin^{-1}x)]$ then find $f'(y) = x = 0$ and $y = 1$.
- If $y = \log_{\sin x}\tan x$ then find dy/dx at $x = \pi/4$.
- In a lot of 20 bulbs, there are 6 defective bulbs. If two bulbs are drawn at random without replacement, what is the probability that it will be a defective bulb?
- Find the number of common tangents for two given circles.
- $\sec^2(\tan^{-1}2) + \text{cosec}^2(\cot^{-1}3)$ = ?
- $f(x) = x\, e^{x(1 - x)}$ and x belongs to IR, then find if f(x) is increasing or decreasing wrt to the given options.
- $\int \log \cot(\cot x)\, dx / \sin 2x$ = ?
- $f(x) = \int \sqrt{x} / (1 + x^2)$ then find f(3) - f(1) = ?
- Find the solution of differential equation $dy/dx = (1 + y^2)/(1 + x^2)$.
- If $\int dx / (x (1 - x^3)^{1/2}) = k \log [(1 - x^3 - 1)^{1/2}/(1 - x^3 + 1)^{1/2}]$, then find k.
- The angle between two lines represented by $x^2 + mx + y^2\tan^2\theta$ is 2θ. the value of m.
- Find the direction cosines of the given lines.
- Find the vector equation of line $2x + 4 = 3y + 1 = 6z - 3$.

- $\int [1 / (4 + 3\cos x)] dx = ?$
- How many of the total triangles will be equilateral triangles if any 3 vertices of a regular hexagon are joined randomly?
  Answer: 1/10
- A Matrix question, related to adjoint, determinant, etc. and of the elements of the matrix was Alpha, and the other values were given, including the values of the determinant and the adjoint of the matrix. Find the value of the alpha.
  Answer: 5