MHT CET 2026 Mathematics Answer Key PDF

Mathematics

1. **Option (A)** 1250
   Explanation:
   The growth of bacteria is modeled by $N(t) = N_0 e^{kt}$. Substituting the given counts at $t = 3$ and $t = 5$ allows us to find $e^k = 2$ and $e^{3k} = 8$, which yields the initial count $N_0 = 10000/8 = 1250$.

2. **Option (C)** $\frac{1}{2}\sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}} + C$
   Explanation:
   Factoring x^2 out of the square root transforms the integrand into $\frac{x^{-3} - x^{-5}}{\sqrt{2-2x^{-2}+x^{-4}}}$. Substituting $u = 2 - 2x^{-2} + x^{-4}$ with $du = 4(x^{-3} - x^{-5})dx$ easily solves the integral to $\frac{1}{2}\sqrt{u} + C$.

3. **Option (A)** $\frac{37}{12}$ **sq. units**
   Explanation:
   The curve intersects the X-axis at $x = -1, 0, 2$. Integrating the absolute value of the function over the intervals $[-1, 0]$ and $[0, 2]$ yields areas of $5/12$ and $8/3$, which sum up to a total area of $37/12$ sq. units.

4. **Option (B)** $2\sqrt{x} - 3\sqrt[3]{x} + 6\sqrt[6]{x} - 6\log|x^{1/6} + 1| + C$
   Explanation:
   Applying the substitution $x = t^6 \implies dx = 6t^5 dt$ converts the integral into $6\int \frac{t^3}{t+1} dt$. Utilizing polynomial long division and integrating term by term leads directly to the given result upon back-substitution.

5. **Option (A)** 16 **m**, 16 **m**
   Explanation:
   For a fixed perimeter, the rectangle that encloses the maximum area is always a square. Given a total perimeter of 64 m, the side length must be $64/4 = 16$ m, giving dimensions of 16 m $\times$ 16 m.

6. **Option (C)** $\frac{3}{2}$
   Explanation:
   Factoring the denominator of the second term yields $x(x - 1)(x - 2)$. Finding a common denominator simplifies the expression inside the limit to $\frac{x+1}{x(x-1)}$, which evaluates directly to $3/2$ as x approaches 2.

7. **Option (D)** $9 : 8$
   Explanation:
   Comparing the given equation with the standard homogeneous form yields $A = 1/a, H = 1/h, B = 1/b$. Since one slope is twice the other, using the sum and product of slopes relation leads directly to the ratio $ab : h^2 = 9 : 8$.

8. **Option (C)** $-\frac{1}{3}$
   Explanation:
   The eigenvalues of the matrix satisfy the quadratic equation $3\lambda^2 - 2\lambda + k = 0$. Since $\det(A) = 1$, the product of the eigenvalues equals 1, which gives consistency under the determinant condition as $(k/3)^3 = 1$ leading to $k = -1/3$.

9. **Option (A)** $25\pi - 96$
   Explanation:
   The area is obtained by integrating the difference between the circle $y = \sqrt{25 - x^2}$ and the parabola $y = 4\sqrt{x}$ over the region of intersection. Evaluating this definite integral yields the enclosed area $25\pi - 96$.

10. **Option (A)** $-5\hat{i} + 5\hat{j} + 5\hat{k}$
    Explanation:
    A vector perpendicular to both $\vec{a}$ and $\vec{b}$ is determined by their vector cross product $\vec{a} \times \vec{b}$. Evaluating the determinant of the cross-product matrix results directly in $-5\hat{i} + 5\hat{j} + 5\hat{k}$.