Test / Exam Name: Revision   Standard: 12th Science   Subject: Mathematics

Q1. Find the intervals in which the following functions are increasing or decreasing. **5 Marks**
$f(x) = x^3 - 12x^2 + 36x + 17$

Q2. Find the points of local maxima or local minima and corresponding local maximum and local minimum **5 Marks**
values of the following functions. Also, find the points of inflection,
$f'(x) = x^4 - 62x^2 + 9x + 15$

Q3. The equation of the path traced by a roller-coaster is given by the polynomial $f(x) = a\,(x + 9)\,(x + 1)\,(x - 3)$. **5Marks**
If the roller-coaster crosses y-axis at a point (0, -1), answer the following:
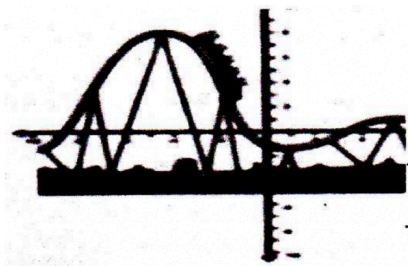
1. Find the value of 'a'.
2. Find f''(x) at x = 1.

Q4. If $y = (x)^{\cos x} + (\cos x)^{\sin x}$, find $\frac{dy}{dx}$. **5 Marks**

Q5. Using integration, find the area of the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$, included between the lines x = - 2 and x = 2. **5 Marks**

Q6. If $x = 3\cot - 2\cos^3 t, y = 3\sin t - 2\sin^3 t$ find $\frac{d^2y}{dx^2}$. **5 Marks**

Q7. If $y^x = e^{x-e}$, prove that $\frac{dy}{dx} = \frac{(1+\log y)^2}{\log y}$ **5 Marks**

Q8. Find $\frac{dy}{dx}$ **5 Marks**
$y = x^n + n^x + x^x + n^n$

Q9. **5 Marks**
If $A = \begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 2 \\ -3 & 1 & -1 \end{pmatrix}$, find A^{-1} and hence solve the system of equations 2x + y - 3z =13, 3x + 2y + z = 4,
x + 2y - z = 8.

Q10 In each of the show that the given differential equation is homogeneous and solve each of them. **5 Marks**
$(x - y)\,dy - (x + y)\,dx = 0$

Q11 Find one-parameter families of solution curves of the following differential equation: (or solve the following **5 Marks**
differential equation)
$x\frac{dy}{dx} + 2y = x^2 \log x$

Q12 Evaluate :$\int \left(\sqrt{\cot x} + \sqrt{\tan x} \right) dx$ **5 Marks**

Q13. **5 Marks**
Evaluate: $\int_0^{\frac{\pi}{2}} (2\log \sin x - \log \sin 2x)dx$

Q14 Evaluate the following intregals: **5 Marks**
$\int \frac{x^2+1}{(2x+1)(x^2-1)}\,dx$

Q15 Solve the following equation for x: **5 Marks**
cos (tan^{-1} x) = sin $\left(\cot^{-1} \frac{3}{4}\right)$

Q16. **5 Marks**
If $A = \begin{pmatrix} \cos \alpha & -\sin \alpha & 0 \\ \sin \alpha & \cos \alpha & 0 \\ 0 & 0 & 1 \end{pmatrix}$, find adj.A and verify that $A(\mathrm{adj.}\ A) = (\mathrm{adj.}A)A|A = |I_3$.

Q17 A relation R is defined on a set of real numbers R as   R = {(x, y) : x . y is an **5 Marks**
irrational number}.Check whether R is reflexive, symmetric and transitive or not