SSCE 1693 : Test 1 (15%)   Session/Sem : 20192020/I
Answer all the questions.   Time : 75 minutes

1. By using the **definition of hyperbolic function**, prove that

$$\cosh 2x = \cosh^2 x + \sinh^2 x.$$

[3 marks]

2. Use the **identity of inverse hyperbolic function** to solve

$$\cosh^{-1}(2 - x^2) = \ln 2,$$

for $|x| \leq 1$.   [4 marks]

3. Differentiate with respect to x for

$$y = \frac{x \cosh x}{\sin^{-1}(4x^2)}.$$

[4 marks]

4. The parametric equations of a curve are given by

$$x = \ln(1 - t) \qquad \text{and} \qquad y = \tanh^{-1}(\sqrt{t}).$$

Find $\dfrac{dy}{dx}$ in terms of t.   [4 marks]

5. Evaluate

$$\int_0^{1/2} \frac{\cos^{-1} x}{\sqrt{(1 - x^2)}} \, dx.$$

[5 marks]

6. Evaluate

$$\int \frac{4x^2 + 2x}{(x - 1)(x^2 + 1)} \, dx.$$

[6 marks]

7. Find

$$\int \frac{dx}{\sqrt{x^2 + 6x + 5}}.$$

[4 marks]