

# SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution) Coimbatore – 35

### **DEPARTMENT OF MATHEMATICS**

### UNIT -V LAPLACE TRANSFORM

CONVOLUTION :

Defn. If fit) and g(t) are two functions defined for  $t \ge 0$  then the convolution of g(t) & g(t) is defined as  $f(t) * g(t) = (f * g)(t) = \int_{0}^{t} f(u)g(t-u) du$ Note: f(t) \* g(t) = g(t) \* f(t)Convolution Theorem: If f(t) & g(t) are two taplace transformable functions defined for  $t\ge 0$  then L ff(t) \* g(t) f & g(ven by) L ff(t) \* g(t) = L ff(t) f \* L [g(t)] $L^{-1} [F(s) \cdot G(s) f = L^{-1} [F(s) f * L^{-1} [G(s) f]$ 



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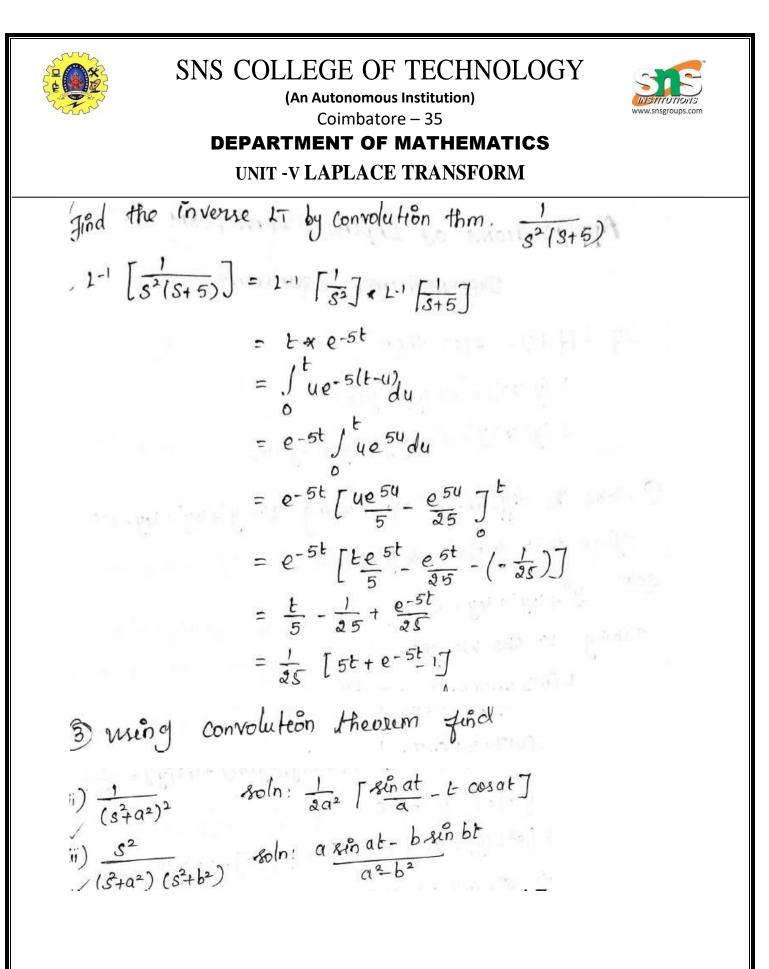
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#### DEPARTMENT OF MATHEMATICS

UNIT -V LAPLACE TRANSFORM

() cusing convolution theorem find 1-1 [3+a2)2]  $\frac{Soln:}{L^{-1} \left[ \left( \frac{S}{S^2 + a^2} \right)^2 \right]} = L^{-1} \left[ \frac{S}{S^2 + a^2}, \frac{1}{S^2 + a^2} \right]$  $= L^{-1} \left[ \frac{S}{S^2 + a^2}, \frac{1}{S^2 + a^2} \right] \left[ \frac{By}{L} \right] Convolution the second second$ = cos at sin at  $= \frac{1}{a} \cos \frac{\pi a}{a}$   $= \frac{1}{a} \cos \frac{\pi a}{a}$   $= \frac{1}{a} \cos \frac{\pi a}{a} \sin \frac{\pi a}{a}$   $= \frac{1}{a} \int \cos \frac{\pi a}{a} \sin \frac{\pi a}{a} (t-u) du$   $= \frac{1}{a} \int \frac{1}{a} \sin \frac{\pi a}{a} \sin \frac{\pi a}{a} (t-u) du$   $= \frac{1}{a} \int \frac{1}{a} \sin \frac{\pi a}{a} \sin$ = - trinat.



23MAT102/ Complex Analysis and Laplace Transform