

2019/2020 ENG 307 TEST1 (ANSWER ALL QUESTIONS/11<sup>th</sup> March 2020/Time: 1hr)

1) Using your knowledge of beta and gamma function, evaluate  $\int_0^{\frac{1}{2}} x^4 (1-2x)^3 dx$ . (5 marks)

$$\frac{1}{(s-1)^2} + \frac{3}{(s-1)^2 + 9} + \frac{s-2}{(s-2)^2 + 25}$$

2) Find the Laplace Transform of the function:

$f(t) = te^t + \sin(3t)e^t + \cos(5t)e^{2t}$  (5 marks)

3) Apply partial differentiation and Lagrange multiplier to determine the optimum of the function:  $f(x, y) = xy + 14$  subject to  $x^2 + y^2 = 18$  (5 marks)

$$L = \frac{x}{2} - 9 + 14$$

$$s^2 - 2s + 1 + 9$$