United International University

School of Science and Engineering

Final Examination Trimester- Spring 2022

Course: MATH -1151

Total marks - 40; Duration – 2 hours

Answer all the questions

1. (i) Given that $\frac{dy}{dx} = \sqrt{8x+1}$. Express y in terms of x.

(ii) Evaluate $\int_{-3}^{0} |x+4|\, dx$ by sketching the bounded region.

[8]

2.

A particle moves in a straight line so that t seconds after passing through a fixed-point O, its velocity v m/s, is given by $v = (t+1)\sqrt{t}$. Find

(i) The initial velocity of the particle.

(ii) The acceleration of the particle at $t = 4$.

(iii) The distance s travelled by the particle in the first 6 seconds by integrating v.

[1+3+4 = 8]

3.

(a) Differentiate the followings with respect x:

(i) $y = e^{2x}\, sin(3x+1)$

(ii) $y = ln\sqrt[3]{1+4x^2-x^4}$

(b) Evaluate the followings:

(i) $\int \frac{(2x+1)^2}{\sqrt{x}}\, dx$

(ii) $\int (x^2-1)\, cos3x\, dx$

[4+4=8]

4.

(i) Evaluate $\int_1^2 x^2 \ln x\, dx$

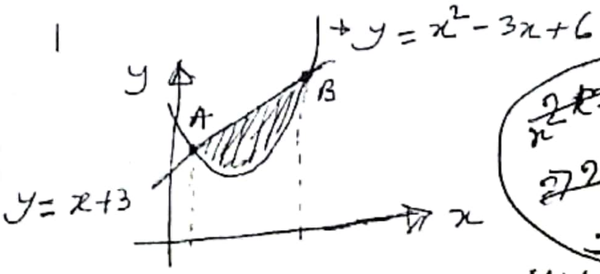
(ii) By using appropriate substitution evaluate $\int_0^{\frac{\pi}{4}} cosx\, \sqrt{sinx+3}\, dx$

[4+4=8]

5.

(i) Sketch the graph of $y = x^2$ and $y = 2x$ and then find the area enclosed or bounded by the curves.

(ii) The figure shows the graph of the curve $y = x^2 - 3x + 6$ and the line $y = x + 3$.



(a) Find the x-coordinate of A and B

(b) The area of the shaded region

[4+4= 8]

$x^2 - 1 = v$

$\Rightarrow 2x = \frac{dv}{dx}$

$\int (x+4)$

$= \frac{x^2}{2} + 4x$

$= \frac{1}{2} - \left(\frac{9}{2} - 12\right) = \frac{1}{2} - \left(\frac{9-24}{2}\right)$

$= \frac{1}{2} - \frac{-15}{2}$