UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Third Semester – Spring 2022

Roll No. .....

Paper: Elementary Mathematics-II (Calculus)
Course Code: MATH-211 **Time: 3 Hrs. Marks: 60**

THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Solve the following: (6x5=30)

1. Find the domain of the real valued function given by $f(x) = \sqrt{4 - x^2}$.

2. Solve the equation $|2x| + |x - 3| = 0$ for $x < 0$.

3. Find the derivative of the function $e^{(x \cos 5x)}$ with respect to x.

4. Evaluate the integral $\int x^2 \ln x dx$.

5. Evaluate the definite integral $\int_0^{\pi} \sin 3x \cos 5x dx$.

6. Let the radius of the circle be increasing at the rate of 2 m/s. How fast is the area of that circle increasing when the radius of the circle is 40 m?

Q.2. Solve the following: (3x10=30)

1. Examine whether the given function is continuous at $x = 0$,

$$f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0; \\ 2, & x = 0. \end{cases}$$

2. Find $\frac{dy}{dx}$ by implicit differentiation for the the curve $y \sin^{-1}(x) - x \tan^{-1}(y) = 1$.

3. Show that the function $f(x) = |x|$ is continuous but not differentiable at $x = 0$.