UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : Seventh Semester – Fall 2021 Roll No. .....

Paper: Mathematics (Advance) **Course Code: BBA-403** **Time: 3 Hrs. Marks: 60**

Q.1. Solve the following: **(5x6=30)**

(i) Find the first and second order derivatives of $y = (1 + \sqrt{\cos x})^2$ at $x = 0, \frac{\pi}{2}$.

(ii) Then find the area between the curve $y = x(x-1)(x+1)$ and x-axis.

(iii) Find the first order partial derivative of $f(x, y) = 4 + \sqrt{xy}$.

(iv) Evaluate the integrals (i) $\int x \sin x dx$ (ii) $\int \sin^2 x \cos x dx$.

(v) Use numerical integration with $n = 4$ to approximate $\int_0^3 \sqrt{3 - x} dx$

Q.2. Solve the following: **(5x6=30)**

(a) If $y = e^{ax} \sin bx$ then find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. Also show that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + (a^2 + b^2)y = 0$.

(b) Evaluate the definite integrals $\int_0^1 (x^2 + x)dx$ and $\int_0^\pi \cos^2 x \sin x dx$.

(c) Maximize $f(x, y) = xy$ subject to the constraint $x + y = 10$.

(d) A random variable X has probability density function (p.d.f.)

$$f(x) = \begin{cases} k(1 + x^2), & \text{if } 0 \le x \le 1, \\ 0, & \text{if otherwise.} \end{cases}$$

Find (i) k (ii) $P(0 \le x \le \frac{1}{2})$ (iii) $P(\frac{1}{2} \le x \le \frac{1}{3})$.

(e) Use the method of least squares to find least squares linear regression line $y = ax + b$ for the data given below. Estimate the value of y when $x = 30$.

x	3	5	6	9	10	12	15	20	22	28
y	10	12	15	18	20	22	27	30	32	34