

Metropolitan University Sylhet
 Summer Term Final Exam 2021
 Program: CSE (54 and Eve 29) + EEE
 Course Code: MBA 031
 Time: 2 Hours + (10 minutes submitting time)

(Answer any four questions)

1. (a) If $y = \cos(bx + c)$, find $D^n y$. 5

(b) If $y = \cos\{\log(x + b)\}$, then prove that $(x + b)^2 y_{n+2} + (2n + 1)(x + b)y_{n+1} + (n^2 + 1)y_n = 0$. 5

2. (a) Verify Euler's theorem for the homogeneous function $u(x, y) = ax^2 + 2hxy + by^2$. 5

(b) If $u = \tan^{-1} \frac{x^2 + y^2}{x - y}$, then determine what will be $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$? 5

3. (a) If $f(x) = x^3 + 5x^2 + 6x$; find all the values of 'c' in the interval $[-2, 0]$ such that $f'(c) = 0$. 5

(b) Verify Mean Value theorem for the function $f(x) = x^3 + 4x^2 - 5x$ in the interval $(-3, 3)$. 5

4. Integrate any two of the followings: 10

$$(i) \int \frac{5x-7}{x^2-2x+35} dx, \quad (ii) \int \frac{1}{\sqrt{x^2-7x+12}} dx \quad (iii) \int \frac{x+1}{\sqrt{3+8x-4x^2}} dx$$

5. Integrate the followings :

$$(i) \int \frac{1}{2-5\cos x} dx \quad (ii) \int \frac{5}{3-4\sin x} dx \quad \text{10}$$

6. Find the values of 10

$$(i) \int_0^{\frac{\pi}{2}} \frac{1}{1+\cot \theta} d\theta \quad (ii) \int_0^{\frac{\pi}{2}} \sin^3 x \cos^6 x dx$$