

UG SEM III INTERNAL EXAMINATION 2021  
RAIGANJ SURENDRANATH MAHAVIDYALAYA  
SUBJECT - MATHEMATICS  
COURSE - DC-05 (REAL ANALYSIS)

Time - 1 hour

F.M-18

Answer the following questions:

1. Give the definition of Piecewise monotone functions.

2

2. Examine the convergence of  $\int_1^{\infty} x^2 e^{-x} dx$ .

2

3. Show that the function  $f$  defined as follows

$$f(x) = \frac{1}{2^n}, \text{ when } \frac{1}{2^{n+1}} < x \leq \frac{1}{2^n}, (n = 0, 1, 2, \dots)$$

$$f(0) = 0$$

is integrable on  $[0, 1]$ , although it has an infinite number of points of discontinuity.

2

4. Show that  $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = \beta(m, n)$ , for  $m, n > 0$

2

5. Expand the periodic function, of period  $2l > 0$

$$f(x) = \left| \cos\left(\frac{\pi x}{l}\right) \right|, \text{ in a Fourier series.}$$

5

6. State and Prove Cauchy's Criterion for Uniform Convergence.

5