Time – 1 hour

F.M- 18

Answer the following questions:

1. Give the defination of Piecewise monotone functions.

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2. Examine the convergence of $\int_{1}^{\infty} x^2 e^x dx$.

2

3. show that the function f defined as follows

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

$$f(0) = 0$$

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.

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