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INTERNAL ASSESSMENT 4TH SEM 2020

SUB: MATH (H) COURSE TITLE : RIEMANN INTEGRATION AND SERIES OF FUNCTIONS

PAPER - SH/MTH/401/C-8 F.M.-10

Answer any one question (10 marks)

1. Let $f(x)$ be a function of period 2π such that

$$f(x) = \begin{cases} 0, & -\pi < x < 0 \\ x, & 0 < x < \pi \, . \end{cases}$$

a) Sketch a graph of $f(x)$ in the interval $-3\pi < x < 3\pi$

b) Show that the Fourier series for $f(x)$ in the interval $-\pi < x < \pi$ is

$$\frac{\pi}{4} - \frac{2}{\pi}\left[\cos x + \frac{1}{3^2}\cos 3x + \frac{1}{5^2}\cos 5x + \ldots\right] + \left[\sin x - \frac{1}{2}\sin 2x + \frac{1}{3}\sin 3x - \ldots\right]$$

c) By giving appropriate values to x, show that

(i) $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots$ and (ii) $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \ldots$

2. Write a note on convenience of Beta and Gamma functions.

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