

Fourier series

Question Bank

Engineering Mathematics-II (B.tech)

1. Find a_0 in the Fourier series of :

$$f(x)=0, -\pi \leq x \leq 0$$

$$i \frac{\pi}{4}x, 0 \leq x \leq \pi$$

2. Find a_0 in the Fourier series of $f(x)=e^x$ in $-\pi < x < \pi$.

3. Obtain the Fourier series of :

$$f(x)=-\pi, -\pi < x < 0$$

$$i \pi, 0 < x < \pi$$

4. Obtain the Fourier series expansion for the function :

$$f(x)=1+x^2 \in (-2,2)$$

5. Obtain the Fourier series expansion for the function :

$$f(x)=1-\frac{2x}{\pi}, -\pi < x < 0$$

$$i 1+\frac{2x}{\pi}, 0 < x < \pi$$

6. Find half range cosine series for : $f(x)=x \sin x$ in $0 < x < \pi$

7. Express the function $f(x)=\frac{1}{2}(\pi-x), 0 < x < 2\pi$ in Fourier series

8. Find sine expansion of $lx-x^2$ in $(0,l)$

9. If $f(t)=1-t^2$ find Fourier series of $f(t), -1 \leq t \leq 1$

10. Express $f(x)=2-x$ in Fourier series for $(0,2), f(x)=f(x+2)$

11. In the cosine series of :

$$f(x)=1, 0 < x < 1$$

$$i \pi, 1 < x < 2 \quad \text{Find the value of } a_0$$

12. Find the value of a_0 in the Fourier series for $f(x)=|x| \in (-\pi, \pi)$

13. Find the Fourier series for the function $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in $0 < x < 2\pi$

14. Find Fourier series for :
 $f(x) = -x, -\pi < x < 0$

$$\hookrightarrow 0, 0 < x < \pi$$

15. Obtain the Fourier series expansion for the function :

$$f(x) = \cos x, -\pi < x < 0$$

$$\hookrightarrow -\cos x, 0 < x < \pi$$

16. Find half range sine series for :

$$f(x) = x, 0 \leq x \leq l/2$$

$$\hookrightarrow l-x, l/2 < x < l$$

17. Define Fourier series of $f(x)$ in $(0, 2\pi)$

18. If Fourier series of $f(x) = x$ in $(-\pi, \pi)$ is: $f(x) = 2 \sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{n} \sin(nx)$

then prove that: $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$

19. Define Dirichlet's conditions.

20. Find the Fourier series of the function $x^2 \in (0, a)$

21. Find the Fourier series of the function :

$$f(x) = x, 0 \leq x \leq \pi$$

$$\hookrightarrow 2\pi - x, \pi \leq x \leq 2\pi$$

22. Find the Fourier series expansion of $\cosh x$ in $-\pi \hookrightarrow \pi$

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