

EN09 101: ENGINEERING MATHEMATICS I

(Common for all branches)

SYLLABUS AND QUESTION BANK FOR MODULE 1V

Fourier Series

Syllabus: Periodic functions-Trigonometric series-Fourier Series-Even and odd functions-Fourier series of even and odd functions-Fourier series of functions having arbitrary period-Half range expansions-Harmonic analysis

Question Bank

1. Find Fourier series to represent $f(x)$ from $x=0$ to $x=2\pi$. (10 marks)
2. Show that for $f(x) = \begin{cases} x & 0 \leq x < \pi \\ \pi - x & \pi \leq x < 2\pi \end{cases}$, $a_n = 0$ and $b_n = \frac{2}{n}$. (10 marks)
3. Expand $f(x) = x$ as Fourier series of sine terms. (10 marks)
4. Find Fourier series to represent $f(x) = x^2$ in the interval $(-L, L)$. (5 marks)
5. Obtain the first 3 coefficients in the Fourier cosine series for 'y' where 'y' is given in the following table:

X:	0	1	2	3	4	5
Y:	4	8	15	7	6	2

 (10 marks)
6. Find Fourier series to represent $f(x) = x^2$ from $x=0$ to $x=2\pi$. (2 marks)
7. Show that the constant "C" can be expanded in an infinite series in the range $(-\pi, \pi)$. (5 marks)
8. Obtain Fourier series for the function $f(x) = \begin{cases} x & 0 \leq x < \pi \\ \pi - x & \pi \leq x < 2\pi \end{cases}$. (10 marks)
9. Expand $f(x) = x$ as Fourier series in the interval $(-l, l)$. (10 marks)
10. Expand $f(x) = x^2$ as a cosine series in $(0, \pi)$ and show that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$. (10 marks)

11. Using 6 ordinate scheme, analyse harmonically the data to two harmonics: (10 marks)

12. Find half range sine series for (10 marks)

13. Find the Fourier series for the function (10 marks)

14. Find half range cosine series for and deduce the sum

(10 marks)

15. Obtain the Fourier series expansion of the function .Hence show that

(10 marks)

16. Expand the function $f(x)$ defined by in Fourier series. (10 marks)

17. Compute the first three harmonics of the Fourier series for $f(x)$ from the following data:

x :	0	30	60	90	120	150	180	
f(x) :	0	5224	8097	7850	5499	2626	0	(10 marks)

18. If and Derive Fourier series for $f(x)$. (10 marks)

19. Find half range cosine series for (10 marks)

20. If show that (10 marks)

21. Expand as Fourier series.(5 marks)

22. Find Fourier series of periodicity 2 for $f(x)$ given (5 marks)

23. If

Show that (10 marks)

24. Expand the the following function as Fourier series.

(10 marks)

25. Find half range sine series for

(5 marks)

