1. State Dirichlet condition's for a given function to expand in Fourier series.

2. State Euler's formulas for the Fourier coefficients.

3. Find a_n for the Fourier series of periodicity 3 for the function $f(x) = 2x - x^2$ in $(0, 3)$.

4. Find a_0 for the periodic function $f(x) = e^{-x}$ in $(0, 2\pi)$.

5. Find the Fourier series of period 2π for the function $f(x) = x(2\pi - x)$ in $(0, 2\pi)$. Deduce the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + ...\infty$.

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

7. Find the Fourier series of period $2l$ for the function $f(x) = |x|$ in $(-l, l)$. Hence find the value of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + ...\infty$.

8. Find the Fourier series of period $2l$ for the function $f(x) = e^{ax}$ in $(0, 2l)$.

9. Find the Fourier series of period 2π for the function $f(x) = |\sin x|$ in $(-\pi, \pi)$.

10. Find the Fourier series of period 2π for the function $f(x) = \cos ax$ in $[-\pi, \pi]$, when a is not an integer. Deduce that the sum of the series $\sum_{n=1}^{\infty} \frac{1}{9n^2 - 1}$.