

The Fourier sine series for the function

$$f(x) = \begin{cases} \frac{2x}{\pi} & (0 \leq x \leq \frac{1}{2}\pi) \\ 2 - \frac{2x}{\pi} & (\frac{1}{2}\pi < x \leq \pi) \end{cases}$$

$n \quad 1 \quad 3 \quad 5 \quad 7$   
 $\quad \quad 1 \quad -1 \quad 1 \quad -1$   
 $(-1)^{n-1} \sin(2n-1)x$   
 $(2n-1)^2$

(used in the initial condition) over the range  $0 \leq x \leq \pi$  is

$$f(x) = \frac{8}{\pi^2} \left( \sin x - \frac{1}{3^2} \sin 3x + \frac{1}{5^2} \sin 5x - \dots \right)$$

$f(x) = \frac{8}{\pi^2} \sum \frac{(-1)^{n-1}}{(2n-1)^2} \sin(2n-1)x$

- 21 Select the option which gives the value of  $a_n$ , in the notation of the correct option for Question 20, when  $n = 1, 5, 9, \dots$ , in the solution of the given partial differential equation which satisfies the boundary conditions and the initial condition. C
- 22 Select the option which gives the value of  $a_n$ , in the notation of the correct option for Question 20, when  $n = 3, 7, 11, \dots$ , in the solution of the given partial differential equation which satisfies the boundary conditions and the initial condition. F
- 23 Select the option which gives the value of  $a_n$ , in the notation of the correct option for Question 20, when  $n$  is even, in the solution of the given partial differential equation which satisfies the boundary conditions and the initial condition. A

Options for Questions 21 to 23

- A 0      B  $\frac{8}{\pi^2 n}$       C  $\frac{8}{\pi^2 n^2}$       D  $\frac{8}{\pi^2 n^3}$
- E  $-\frac{8}{\pi^2 n}$       F  $-\frac{8}{\pi^2 n^2}$       G  $-\frac{8}{\pi^2 n^3}$

- 24 Either select the option which gives the value of  $b_n$ , in the notation of the correct option for Question 20, in the solution of the given partial differential equation which satisfies the boundary conditions and the initial condition, or select option G if you think that the coefficients  $b_n$  do not occur in the correct option for Question 20.

Options

- A  $\frac{8}{\pi^2 n}$       B  $\frac{8}{\pi^2 n^2}$       C  $\frac{8}{\pi^2 n^3}$
- D  $-\frac{8}{\pi^2 n}$       E  $-\frac{8}{\pi^2 n^2}$       F  $-\frac{8}{\pi^2 n^3}$

- G The coefficients  $b_n$  do not occur in the correct option for Question 20.

$$a_n =$$