18 In the non-trivial separable solutions $U(x,t) = X(x)T(t)$ of the partial differential equation which are compatible with the boundary conditions, what is the form of $X(x)$, where n denotes a positive integer?

Options

A $X(x) = Ae^{nx}$

B $X(x) = Ae^{-nx}$

C $X(x) = A(e^{nx} + e^{-nx})$

D $X(x) = A(e^{nx} - e^{-nx})$

E $X(x) = Ae^{nx} + Be^{-nx}$

F $X(x) = A\cos nx$

G $X(x) = A\sin nx$

H $X(x) = A\cos nx + B\sin nx$

19 Select the option which is the general solution of the ordinary differential equation for $T(t)$ in the correct option for Question 16.

Options

A $T(t) = Ce^{(\mu+1)t}$

B $T(t) = Ce^{(\mu^2+1)t}$

C $T(t) = Ce^{-(\mu+1)t}$

D $T(t) = Ce^{-(\mu^2+1)t}$

E $T(t) = Ce^{(\mu-1)t}$

F $T(t) = Ce^{(\mu^2-1)t}$

G $T(t) = Ce^{-(\mu-1)t}$

H $T(t) = Ce^{-(\mu^2-1)t}$

20 Select the option which gives the general solution of the partial differential equation and the boundary conditions (but not the initial condition). In the options, a_n and b_n denote arbitrary constants.

Options

A $U(x,t) = \sum_{n=0}^{\infty} a_n \cos nx \; e^{(n^2+1)t}$

B $U(x,t) = \sum_{n=1}^{\infty} a_n \sin nx \; e^{(n^2+1)t}$

C $U(x,t) = \sum_{n=0}^{\infty} (a_n \sin nx + b_n \cos nx) e^{(n^2+1)t}$

D $U(x,t) = \sum_{n=0}^{\infty} a_n \cos nx \; e^{-(n^2+1)t}$

E $U(x,t) = \sum_{n=1}^{\infty} a_n \sin nx \; e^{-(n^2+1)t}$

F $U(x,t) = \sum_{n=0}^{\infty} (a_n \sin nx + b_n \cos nx) e^{-(n^2+1)t}$

G None of the above is the correct general solution of the partial differential equation which satisfies the boundary conditions.