Time - 20 min
Marks - 5

(2) Consider the random process $X(t)$ in $\mathcal{L}^2[0,1]$.

$$X(t) = Y_1 \sin 2\pi t + Y_2 \sin 6\pi t$$

$Y_1$ and $Y_2$ are two random variables with the following statistics:

$$E(Y_1) = 0, \quad \text{var}(Y_1) = 4$$
$$E(Y_2) = 0, \quad \text{var}(Y_2) = 1$$

Suppose we want to digitally store the sample functions of this random process with mean square error $= 10^{-6}$. How many bits will be required to represent this random process?