MODULE 3

15. Find the autocorrelation of $x(t) = \text{rect}(t)$ and verify the relation between autocorrelation and power spectrum. (12 marks)

Or

16. Determine the autocorrelation, power spectral density and power of $x(t) = 6\sin(2t)$. Also plot its PSD. (12 marks)

MODULE 4

17. (a) Assume that the bandlimited signal $x(t) = \dfrac{\sin(20\pi t)}{(\pi t)}$ is sampled at 19 samples/second using ideal sampling. The sampled waveform forms the input to a Low Pass filter with cut-off frequency of 10Hz. Represent mathematically and diagrammatically the waveform obtained at the output of LPF in frequency domain. Comment on the result. (7 marks)

(b) Determine the convolution sum of two sequences $x(n) = \{1, \underset{\uparrow}{4}, 3, 2\}, h(n) = \{1, 3, 2, 1\}$.

(5 marks)

Or

18. (a) Obtain the convolution of the sequences $x(n) = u(n) - u(n-7), h(n) = u(n-1) - u(n-4)$.

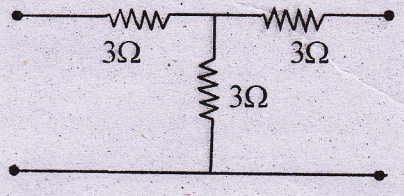
(6 marks)

(b) Find the cross-correlation of two finite length sequences $x(n) = \{1, 2, 1, 1\}, y(n) = \{1, 1, 2, 1\}$.

(6 marks)

MODULE 5

19. (a) Obtain the image impedance of the network shown below,



(6 marks)

(b) Draw the circuit and find the component valves of a constant-K low pass filter having nominal characteristic impedance of $R_0 = 500\Omega$ and cut-off frequency of $f_C = 500$ Hz.

(6 marks)

Or