



- 1 (a) Define and explain the term : "noise equivalent bandwidth of a filter".  
8
- (b) A source with an internal resistance of  $50 \Omega$  and an internal e.m.f. of  $6 \mu\text{V}$  is supplying the signal voltage to an amplifier that has an input resistance of  $75 \Omega$ . The amplifier has an equivalent noise resistance of  $1470 \Omega$ . For a noise bandwidth of  $5 \text{ kHz}$ , calculate the output (S/N) ratio in dB at room temperature of  $290 \text{ K}$ .  
8

## UNIT - II

- 2 (a) A carrier signal  $A_c \cos \omega_c t$  is amplitude modulated by a message signal  $A_m \cos \omega_m t$ , where,  $A_m < A_c$ .
- (i) Write down the expression for the modulated signal.
- (ii) Write down the expression for the carrier component and the side-frequency components.
- (iii) Draw the phasor diagram of the modulated signal.  
8
- (b) A carrier signal is sinusoidally modulated to a depth of  $m = 0.8$ . What percentage of the total power of the modulated signal is in the two sidebands ?  
8

## OR

- 2 (a) State how a DSB-SC signal may be generated ?  
8
- (b) Write down an expression for the time-domain representation of a VSB signal.  
8

### UNIT - III

- 3 (a) Derive an expression for the time domain representation of a frequency modulated signal. 8
- (b) A message signal,  $x(t) = 100\text{sinc}2000t$  frequency modulates a carrier signal  $c(t) = 200\cos 2\pi \times 10^8 t$ , with a modulation index of 5.
- (i) Write down an expression for  $x_c(t)$ , the modulated signal.
- (ii) What is the bandwidth of this modulated signal ? 8

OR

- 3 (a) Define the term 'modulation index' for FM in the case of single-tone modulation and for a general modulating signal. 8
- (b) With the help of a neat block schematic diagram, explain the indirect method of generation of WBFM signals. 8

### UNIT - IV

- 4 (a) Draw the block diagram of the model used for the channel and the receiver to study the noise performance of various modulation systems. 8
- (b) What is meant by 'threshold effect' in FM receivers ? 8

OR

- 4 (a) What is the model used for an envelope detector ? 8
- (b) Explain the need for 'pre-emphasis and de-emphasis' in the case of FM systems. How is it implemented ? 8

## UNIT - V

- 5 (a) What is 'aliasing' ? How it can be reduced or avoided ? 8
- (b) State the low pass sampling theorem and briefly explain its significance. 8

OR

- 5 (a) Explain how a PAM signal may be generated. How can it be demodulated ? 8
- (b) Describe with the help of neat sketches of waveforms, any two methods of generation of PDM/PWM and PPM. 8