

# Vidyalankar

S.Y. Diploma : Sem. IV [EJ/EX/ET/EN/IS/IC/IE/IU]

## Analog Communication

Prelim Question Paper

Time: 3 Hrs.]

[Marks : 100

- Instructions :**
- (1) All questions are compulsory.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data if necessary.
  - (5) Preferably, write the answers in sequential order.

1. (a) Attempt any **SIX** of the following: [12]
- (i) Draw the basic block diagram of communication system.
  - (ii) Define baseband signals.
  - (iii) Define pulse modulation and state its types.
  - (iv) Define lock range and capture range.
  - (v) Why FM reception is noise free?
  - (vi) Write a short note on Baluns.
  - (vii) Why electromagnetic waves are said to transverse waves?
  - (viii) Define Directivity and power gain.
- (b) Attempt any **TWO** of the following: [8]
- (i) Draw and explain electromagnetic spectrum used in electronic.
  - (ii) List types of microwave antennas and explain dish antennas.
  - (iii) Compare ground wave and space propagation on basis of frequency range and method of wave propagation.
2. Attempt any **FOUR** of the following: [16]
- (a) Explain resonant antennas with the help of neat diagram.
  - (b) Define PPM. Explain how PPM can be generated from PWM.
  - (c) Differentiate between simplex and duplex mode of communication with neat sketch.
  - (d) Draw and explain super heterodyne receiver.
  - (e) Draw and explain equivalent circuit of a transmission line. Also draw the circuit for audio frequency and radio frequency.
  - (f) Write a mathematical expression for frequency modulated wave and explain its meaning.
3. Attempt any **FOUR** of the following: [16]
- (a) A modulating signal  $10 \sin(2\pi \times 10^2 t)$  is used to modulate a carrier signal  $30 \sin(2\pi \times 10^6 t)$ . Find the modulation factor, percentage modulation,  $f_{USB}$ ,  $f_{LSB}$  and amplitude of sidebands. Also find the bandwidth of the modulated signal.
  - (b) Define Image frequency. The RF, Local oscillator frequency, IF frequencies for AM receiver are 800KHz, 1255KHz and 455KHz respectively, determine Image frequency.
  - (c) Explain the meaning of term wave attenuation.
  - (d) What is stubs? Add a note on single stub matching and double stub matching.

- (e) A practical antenna has directive gain of 5dB radiate 1200 watt power. How much power an isotropic antenna should radiate in order to have the same power density at the same distance?
- (f) Compare AM and FM.

4. Attempt any **FOUR** of the following: [16]

- (a) Draw the circuit diagram of Ratio detector and write its advantages.
- (b) The equation of an angle modulated voltage is  $e = 10 \sin (10^8 t + 3 \sin 10^4 t)$ . What form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation and the power dissipated in  $100\Omega$  resistor.
- (c) For a transmission line, incident voltage  $E_i = 6v$  and  $E_r = 3v$ . Calculate:
  - (i) Reflection coefficient
  - (ii) Standing Wave Ratio.
- (d) Explain following terms :
  - (i) Wave front
  - (ii) Inverse Square law
- (e) Draw the radiation patterns of various resonant dipoles.
- (f) Write a short note on fading.

5. Attempt any **FOUR** of the following: [16]

- (a) Draw and explain Noise Triangle.
- (b) Draw block diagram of FM receiver and write function of any two block.
- (c) Explain the quarter wavelength transformer for impedance matching.
- (d) Write a short note of Horn antennas.
- (e) What is AGC? State it's type.
- (f) Draw voltage and current standing waves of a transmission line terminated in an open circuit. State four characteristics of this transmission line.

6. Attempt any **FOUR** of the following: [16]

- (a) Draw a transistorized PAM modulator circuit and describe its operation.
- (b) Explain the term :
  - (i) Image Frequency
  - (ii) Double Spotting
- (c) Draw and explain block diagram of receiver.
- (d) Draw the equivalent circuit of following lines:
  - (i) Short circuited  $(\lambda/4)$  line
  - (ii) Open circuited  $(\lambda/4)$  line
  - (iii) Short circuited line with length greater than  $\left(\frac{\lambda}{4}\right)$ .
  - (iv) Open circuited line with length greater than  $\left(\frac{\lambda}{4}\right)$ .
- (e) Explain error tracking with respect to intermediate frequency.
- (f) Compare the bandwidth that would be required to transmit baseband signal with a frequency range from 300 Hz to 3 KHz using:
  - (i) Narrow band FM with maximum deviation of 5KHz
  - (ii) Wideband FM with maximum deviation of 75KHz

