

Code: D - 12**Subject: COMMUNICATION ENGINEERING****Time: 3 Hours****June 2006****Max.****Marks: 100****NOTE: There are 9 Questions in all.**

- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.**
 - **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
 - **Any required data not explicitly given, may be suitably assumed and stated.**
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Q.1 Choose the correct or best alternative in the following: (2x10)

- a. In commercial FM broadcast systems, the modulating signal frequency is limited to about
- (A) 3,400 Hz. (B) 5,000 Hz.
(C) 15,000 Hz. (D) 20,000 Hz.
- b. In a certain system, the signal power is 13 dBm and the noise power is -1 dBm. The SNR will be
- (A) -13 dB. (B) 14 dB.
(C) 12 dB. (D) 12 dBm.
- c. A DSB signal can be demodulated by using
- (A) a synchronous detector. (B) a low pass filter.
(C) a phase shift discriminator. (D) an envelope detector.
- d. The time constant of a pre-emphasis circuit in FM systems is usually
- (A) 20 ms. (B) 1.25 ms.
(C) 75 μ s. (D) 1 μ s.
- e. The number of bits in a PCM system is increased from 7 to 8. As a result, the signal-to-quantization noise ratio increases by
- (A) 3 dB. (B) 6 dB.
(C) 8 dB. (D) 12 dB.
- f. A PLL can be used to demodulate
- (A) an AM signal. (B) a VSB-SC signal.
(C) a PCM signal. (D) an FM signal.
- g. Reflection coefficient on a transmission line

- (A) is always real and lies between 0 and 1.
 (B) is always real and lies between -1 and 0.
 (C) is always real and lies between -1 and $+1$.
 (D) can be complex-valued.
- h. A rhombic antenna
- (A) is a resonant antenna. (B) is a multiband antenna.
 (C) consists of $\lambda/2$ dipoles. (D) is used in the UHF band.
- i. The propagation time from one earth station to another via a geo-stationary satellite is about
- (A) 300 ms. (B) 1.25 ms.
 (C) $125 \mu\text{s}$. (D) $25 \mu\text{s}$.
- j. A cavity resonator finds application as
- (A) an wideband attenuator. (B) an isolator.
 (C) a directional coupler. (D) a frequency meter.

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Draw the block diagram of a superheterodyne radio receiver having one RF amplifier stage and also having AGC loop. List the stages that mainly control
- (i) adjacent channel selectivity (ii) image channel selectivity
 (iii) AGC performance and (iv) AF fidelity. (8)
- b. Describe shot noise and find out its rms value in a diode when the average current is 1 mA and the bandwidth is 10 kHz. (4+4)
- Q.3** a. Describe an envelope detector for detection of AM signals and clearly explain how diagonal clipping may arise. (8)
- b. Describe the 'THIRD METHOD' of generation of SSB signals. (8)
- Q.4** a. Explain the need for pre-emphasis (PE) and de-emphasis (DE) as used in FM systems. Give simple PE and DE circuits and their response. (8)
- b. Describe an FM signal. Sketch its spectrum marking important values and from this spectrum give an estimate of the bandwidth of the FM signal. (8)

- Q.5** a. State sampling theorem and explain natural and flat topped sampling. How do you reconstruct the original signal from its samples? **(2+2+2+2)**
- b. Describe a PCM system with the help of a suitable block diagram. What is companding, give its advantages. **(8)**
- Q.6** a. Describe a Phase-Locked Loop (PLL) with the help of a block diagram. Describe the function of each block. Give two applications of a PLL. **(8)**
- b. Find the input impedance of a short-circuited transmission line having parameters $L = 4 \mu\text{H}/\text{m}$ and $C = 100 \text{ pF}/\text{m}$. The length of the line $\lambda/10$. **(8)**
- Q.7** a. What do you understand by the dominant mode in a rectangular waveguide? How will you couple a rectangular waveguide to a source for exciting the dominant mode? **(8)**
- b. Describe three types of optical fibers and compare their dispersion characteristics. **(8)**
- Q.8** Explain the following terms in relation to sky wave propagation
- (i) Skip distance.
 - (ii) Fading.
 - (iii) MUF.
 - (iv) Critical frequency. **(4 x 4)**
- Q.9** Write short notes on **any TWO** of the following:
- (i) Dipole arrays.
 - (ii) Extension of monochrome television system to colour system.
 - (iii) Pulse Position Modulation (PPM). **(8 x 2)**