Con/5248–07. (REVISED COURSE) CD–5769

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Draw block diagram of FM receiver. Explain each block. Draw waveform at various stages. 7
(b) Explain capture effect. 3
(c) Define fourier transfom and inverse fourier transform. Prove the time shifting property of fourier transform. 6
(d) Explain the use of companding in PCM. 4

2. (a) Consider an angle modulated signal $X_c(t) = 10\cos(W_c t + 3\cos W_{mt})$ $f_m = 1000$ Hz. Assume the modulation to be FM – 10
(i) Determine the modulation index and transmission bandwidth - when W_m is increased by factor of 4.
(ii) Determine the modulation inder and transmission bandwidth when W_m is decreased by factor of 4.
Give your inference on modulation index and bandwidth.
(b) Draw the ISB Receiver. Explain in brief the operation of receiver. Give its application. 10

3. (a) Design a practical diode dectector for Amplitude Modulation. Derive maximum modulation index and derive modulation index to avoid distortion. 10
(b) Derive expression for amplitude modulated wave and the total power transmitted. 10

4. (a) Define the following terms – 5
(i) Bit/frame
(ii) Frame synchronization
(iii) Bit rate.
(b) A PCM system uses a 7-bit binary encoder following a uniform quantizer. If the bit rate of the system is 49 Mb/sec determine the maximum message bandwidth for a satisfactory system operation. 10
(c) A PCM system samples the signal at the rate of 8000 Frames/Sec. for a given condition draw a PCM transmitter and receiver system. 5

5. Write short notes on (any **four**) : 20
(a) VSB transmission
(b) Squelch circuit
(c) Balance slope detector
(d) Adjacent and Co-channel interferrence
(e) Inospheric propagation
(f) Self exited mixer.

6. (a) State and explain the sampling theorem. 10
(b) Draw PWM system. Explain and draw the wave forms. 10

7. (a) What is the meaning of polarization of Antenna ? Which are the different types of polarization ? What is the advantage of using different polarization. 10
(b) Find the length of a half wave dipole at 30 MHz, 300 MHz. Give your inference from the analysis. 5
(c) Draw the frequency spectrum of PWM waveform. 5
A signal $g(t) = 20 \sin(500 \pi t)$ is to be sampled periodically and reproduced from these sample values. Find the maximum allowable time interval between the sample value.