This question paper contains 3 printed pages.]

Your Roll No. .....

1408 **A**

B.Sc. (Hons.)/III

ELECTRONIC SCIENCE—Paper 3.3 (XVII)

(Communication)

Time : 3 *Hours* *Maximum Marks* : 38

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt ***Five*** *questions in all, including Question No.* ***1*** *which is compulsory.*

Use of scientific calculator is allowed.

1. (a) Define unit impulse function. 1

   (b) Derive the transfer function of a LPF and an HPF designed using an R and a C. 2

   (c) Draw the composite video signal for colour T.V. System. 2

   (d) Write the full form of CCITT. 1

   (e) What is the nature of noise for an ideal receiver? 2

   (f) Design an FM generator circuit using 555 timer. 2

2. (a) The V-I characteristics of a non-linear resistor is as follows : 3½

   $I = 15 + 25\,V + 5V^2 + 10V^3$

[P.T.O.

An input voltage $V = (1 + 2 \cos \omega_0 t)$ is applied to this resistor.

(i) Write the o/p current equation.

(ii) Plot the frequency spectrum of input and output current.

(b) An square wave of frequency ω_0, is passed through a HPF with cut-off frequency 2.5 ω_0.

Write the equation of current at the output of HPF and draw frequency spectrum.

This current is now fed to an LPF of cut-off frequency 0.5 ω_0.

Write the equation of current at the output of LPF and draw frequency spectrum. 3½

3. (a) Discuss the various types of internal noises. 3½

(b) Get an expression for addition of noise due to several amplifiers cascaded in series. 3½

4. (a) A 75 MHz carrier signal having an amplitude of 50 V is modulated by a 3 KHz audio signal having an amplitude of 20 V.

(i) Sketch audio signal.

(ii) Sketch carrier.

(iii) Construct and sketch modulated wave.

(iv) Determine modulation index.

(v) Draw frequency spectrum of carrier, audio signal and modulated wave. 4

(b) What is a balanced modulator? Draw its circuit diagram and obtain an expression for DSBSC. 3

5. (a) An FM transmitter has a frequency deviation of 20 KHz. Determine the percent modulation of this signal if it is broadcasted in 88—108 MHz band. 2

(b) Show that in FM, the toal power remains the same; however there is just a redistribution of power among the side bands. 2

(c) Write a short note on superheterodyne receiver. 3

6. (a) How would you use an AND gate to obtain PAM? 1

(b) Draw the block diagram of a TDM system. 2

(c) What is aliasing effect and how would you remove it? 2

(d) Draw circuit diagram for generation of PWM and PPM. 2

7. (a) What is the frequency of colour burst? 1

(b) Give three types of colour T.V. systems. 1

(c) Discuss QAM. 2

(d) Define Luminance and Chrominance signals for PAL system of colour T.V. 2

(e) What is image frequency of an AM receiver? 1

8. Short notes (any *two*) 3½ + 3½

(a) Average detector for amplitude demodulation.

(b) Third method for SSB generation.

(c) Foster Seeley discriminator.