Your Roll No. ....

3249   **J**

M.Sc. / IV

APPLIED PHYSICS—Course IV S–12

(Electronics II)

Time : 3 *Hours*   *Maximum Marks* : 100

(Write your Roll No. on the top immediately

on receipt of this question paper.)

Attempt any five questions.

1. (a) Explain how optical information is converted into electrical information through a Vidicon TV camera tube? Also explain the concept of scanning and synchronization pulses.   · 8

    (b) Explain Flicker and how is it rectified?   5

    (c) Explain the various components of a composite video signal. What ratio has been set for picture to sync signal and why?   7

2. (a) Discuss the Square-Law technique to extract a baseband signal from amplitude modulated signal.

                                                            6

(b) Distinguish between PAM, PWM and PPM techniques with help of suitable waveforms. 7

(c) Explain Adaptive Delta Modulation Technique. 7

3. (a) Derive the general expression for FM wave. Also show the relationship between Phase modulation and Frequency modulation. 8

(b) A single-tone FM is represented by the voltage equation as :

$v(t) = 12 \cos (6 \times 10^8\, t + 5 \sin 1250\, t)$

Determine : (i) Carrier Frequency, (ii) Modulating Frequency, (iii) Modulation Index, (iv) Maximum Deviation. 8

(c) Specify the need for modulation. 4

4. (a) What do you mean by Multiple Access Techniques? Elaborate Reference burst structure and Traffic burst structure used in TDMA. 9

(b) Define EIRP. Derive the expression for free space loss and power received by the receiving antenna during sattelite communication. 7

(c) Define Frame efficiency and TDMA superframe.

4

5. (a) Explain Differential Phase Shift Keying (DPSK). 6

(b) Differentiate between coherent and non-coherent reception of PSK.   6

(c) Explain Binary Amplitude Shift Keying. Give similarities between BFSK and BPSK modulation techniques.   8

6. (a) A silica optical fibre has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine :

(i) The critical angle at the core-cladding interface.

(ii) Numerical Aperture for the fibre.

(iii) Acceptance angle in air for the fibre.   6

(b) Explain various types of linear and non-linear scattering losses observed in optical fibres in brief.

14

7. (a) Explain the following terms in brief : $4 \times 4 = 16$

(i) Nyquist rate and Aliasing.

(ii) Numerical Aperture.

(iii) Uplink and Downlink frequency.

(iv) Modulation Index.

(b) A typical PCM system, sampling at 8000 samples/sec uses 6 bits/word for transmission. Determine the bit rate and Nyquist bandwidth.   4

8. Write short note on *any four* of the following :

$$4 \times 5 = 20$$

(i) Sampling theorem.

(ii) Geostationary orbit.

(iii) Fibre Splices.

(iv) Horizontal Sync details for a video signal.

(v) Differential Pulse Code Modulation.