Total Pages—5

PG/IIIS/ELC/301/24

M.Sc. 3rd Semester Examination, 2024

ELECTRONICS

(*Electronic Communication*)

PAPER – ELC-301

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

Answer any **four** questions : 2×4

1. For an amplitude modulated signal prove that $P_t = P_c\left(1 + \frac{m^2}{2}\right)$, where the symbols have their usual meaning. 2

2. Write down the Carson's rule in association with FM band width. 2

3. What is the need of pre-emphasis and de-emphasis filters in FM broadcasting ? 2

4. Discuss some advantages of digital communication system over analog communication system. 2

5. How TDMA is different from TDM ? 2

6. What is VSB in connection with AM ? Mention its application. 1 + 1

GROUP – B

Answer any **four** questions : 4 × 4

7. With a neat sketch discuss the generation of DSB-SC-AM signal using ring modulator. 1 + 3

8. With a neat sketch discuss how an envelope detector works ? How can you select its 'R' and 'C' value. 3 + 1

9. An angle-modulated signal with carrier frequency $w_c = 2\pi \times 10^5$ is described by the equation

$\phi_{Em}(t) = 10 \cos\{w_c t + 5 \sin 3000t + 10 \sin 2000 \pi t\}$

Find the power of the modulated signal, frequence deviation, deviation ratio and estimate the band width of $\phi_{Em}(t)$. 1 + 1 + 1 + 1

10. (*a*) What is the difference between attenuation and dispersion in electronic system ?

(*b*) For transmitting a wide band signal, which among these two are more problematic ? 2 + 2

11. What is quantization noise ? Show that quantization noise power $N_q = \frac{mp^2}{3L^2}$, where

m_p is the peak amplitude of the signal and L is the quantization levels. 2 + 2

12. What is non-uniform quantization ? Write down the μ law and A-law ? What is companding ? 1 + (1 + 1) + 1

GROUP – C

Answer any **two** questions : 8 × 2

13. (*a*) Write the difference between noise temperature and noise figure.

(*b*) Show that for a cascade of sub-system, the noise figure of the first sub-system determines the overall noise figure of the system.

(*c*) What do you mean by filtered noise ?
2 + 4 + 2

14. With proper block diagram discuss the operating principle of a super-heterodyne receiver. What is image station ? How the signals from the image station can be removed ? Discuss the modulation and demodulation techniques in QAM. 3 + 1 + 1 + 3

15. What is indirect method of FM generation ? What do you mean by NBFM and WBFM ? With a neat diagram discuss the Armstrong method of WBFM generation. 1 + (1 + 1) + 5

16. Write down the difference between DPCM and delta modulation. What do you mean by digit interleaving and word interleaving ? Explain the T1 system signaling format with necessary diagrams. 1 + 1 + 6

[Internal Assessment — 10 Marks]
