C 80724 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, MARCH 2020

(CUCSS)

Physics

PHY 4E 14—COMMUNICATION ELECTRONICS

(2017 Admission onwards)

Time : Three Hours Maximum : 36 Weightage

Section A

Answer **all** *questions.*
Each question carries weightage 1.

1. What are advantages of SSB modulation ?
2. Write a short note on ratio detector.
3. How is entropy defined in information theory ?
4. What are the differences between PAM and PCM ?
5. What are the advantages of using Superhelerodyning ?
6. What are the Disadvantages of the FM Transmitter ?
7. What is the criteria for classifying a signal as either an energy signal or as a power signal ?
8. How is conversion between continuous and discreet time frequency signals achieved ?
9. Write a note on reflection and refraction of radio waves by ionosphere.
10. Draw a schematic of the radiation pattern changes with length of a dipole antenna.
11. Can an Oscillating Electric Dipole behave as a source of EM radiation. Justify your answer.
12. Enlist advantages and disadvantages of Log periodic antenna.

(12 × 1 = 12 weightage)

Section B

Answer any **two** *questions.*
Each question carries weightage 6.

13. With a neat diagram explain the theory of single side band generation and detection. Enlist the disadvantages of SSB.
14. With schematic diagram explain the theory of PCM high lightening sampling, quantization and coding.

Turn over

15. Explain in detail the AM communication receiver. Explain the role of automatic gain control technique in AM.

16. Explain how 'The Convolution Sum" between $x(k)$ and $h(k)$ is obtained.

(2 × 6 = 12 weightage)

Section C

Answer any **four** *questions.*
Each question caries weightage 3.

17. A sinusoidal modulating waveform of amplitude 5 V and a frequency of 2 KHz is applied to FM generator, which has a frequency sensitivity of 40 Hz/volt. Calculate the frequency deviation, modulation index, and bandwidth.

18. For a signal $x(t) = 3 \cos 2000\,\pi t + 5 \sin 6000\,\pi t - 10 \cos 12000\,\pi t$ what is Nyquist rate for this signal ? What are The frequencies of the analog signal ?

19. A superheterodyne receiver is designed to receive signals with carrier frequencies between 4 and 6 MHz with transmitted bandwidths of 100 kHz each. Its IF frequency is 850 kHz. What range of local oscillator frequencies is required using high side injection (fLO > fc) ?

20. Determine if the following signal is an Energy signal. Power signal or neither, and evaluate E and P.

$$a(t) = 3 \sin(2\pi t), -\infty < t < \infty,$$

21. Find the radiation resistance and power radiated by a conductor of length 0.1 m. and carrying current $10 \cos(2\pi\, 10^9 t)$?

22. A dipole having a 3 cm. length is operated at 1 GHz. Calculate its radiation resistance.

(4 × 3 = 12 weightage)