17P410 (Pages: 2) Name…………..……….

Reg. No………………..

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2019
(CUCSS - PG)

(Physics)

CC15P PHY4 E14 / CC17P PHY4 E14 – COMMUNICATION ELECTRONICS
(Regular/Improvement/Supplementary)

(2015 Admission onwards)

Time: Three Hours   Maximum: 36 Weightage

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

1. Briefly explain the frequency spectrum of AM wave.

2. Prove that the balanced modulator produces an output consisting of sidebands only, with the carrier removed.

3. Show that FM has an infinite number of side bands with frequency ratio 1:2:3:….., What will be the recurrence frequency?

4. What is the need of quantization in PCM? How it is achieved?

5. Distinguish between PAM and PWM.

6. Explain Automatic Gain Control (AGC). Why it is important in receivers?

7. What is the importance of frequency multiplication and mixing in FM transmitters?

8. Explain sampling theorem. What is Nyquist rate?

9. What are the steps involved in the process of computing convolution? Illustrate with example.

10. Show that an LTI system is stable if and only if *'its impulse rate is absolutely summable'*.

11. Explain Yagi-Uda array.

12. Distinguish between ground waves, sky waves and space waves.

(12 x 1 = 12 Weightage)

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

13. Discuss the SSB principle. Explain any two methods of SSB generation.

14. Explain the super heterodyne principle. Explain the working of a super heterodyne receiver with the help of a block diagram. Also explain the signal spectrum.

15. Explain the principle of pulse Amplitude Modulation (PAM)? How it is achieved using product modulator? Why a wide bandwidth system is needed in PAM? How it is achieved?

16. Explain the reflection and refraction of radio waves from Ionosphere. Obtain expressions for critical frequency and maximum usable frequency

(2 x 6 = 12 Weightage)

Section C.
Answer any *four* questions. Each question carries 3 weightage.

17. Evaluate average power, effective voltage and current in sinusoidal AM.

18. In an FM system when the Audio Frequency (AF) is 500 Hz and the AF voltage is 2.4V the deviation is 4.8 KHz if the AF voltage is now increased to 7.2V, what is the new deviation? If the AF voltage is raised to 10V while the AF is dropped to 200Hz, what is the new deviation? Find the modulation index in each case.

19. For the analog signal x=5 Cos 100πt, Determine:
    i)   Minimum sampling rate to avoid aliasing.
    ii) The discrete time signal if it is sampled at a frequency f_s=200Hz

20. Determine the response of an LTI system having impulse response h(n) ={1} to the input signal x(n) = {1,2,3,4,5}

21. Write a brief note on Analog to Digital conversion (ADC). What are the steps involved in AD conversion?

22. What are antenna arrays? Define array factor. Prove that maximum value of array factor is $\sqrt{n}$, where n is the number of elements in the array.

(4 x 3 = 12 Weightage)

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