K – 4905

Reg. No. : ....

Name : ....

Third Semester M.Sc. Degree Examination, February 2021

Physics

Special Paper I

PH 233 E : ADVANCED ELECTRONICS I

(2014-2017 Admission)

Time : 3 Hours   Max. Marks : 75

SECTION – A

I.   Answer **any five** questions. Each questions carries **3** marks.

(a)   What is need for Modulation?

(b)   What are the advantages of microwave radio communications?

(c)   What is Quantization in PCM?

(d)   Distinguish between ASK and FSK.

(e)   Write a short note on heterodyne detection in optional fiber communication.

(f)   What is roaming in mobile cellular communications?

(g)   Write a short note on classification of signals.

(h)   What is Fast Fourier Transform (FFT)?

(5 × 3 = 15 Marks)

P.T.O.

SECTION – B

Answer **all** questions. Each question carries **15** marks.

II. (A) With the help of necessary theory and diagram explain amplitude modulation. Also derive an expression for transmitted signal power efficiency.

OR

(B) With the help of schematic diagram, explain pulse amplitude modulation, pulse width modulation and pulse position modulation.

III. (A) (a) Write a short note on different multiplexing techniques in digital communication systems.

(b) Explain the role of time division multiplexing in PCM telephone system.

OR

(B) (a) With the help of block diagram, explain each component of optical fiber communication system.

(b) Write a short note on soliton based optical communication system.

IV. (A) Explain the different generation of cellular mobile systems and also give the advantages of a 5G network over 4G network.

OR

(B) (a) Explain the classification of signals.

(b) Write a short note on digital filters.

(3 × 15 = 45 Marks)

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SECTION – C

Answer **any three** of the following questions. Each question carries **5** marks.

V. (a) A commercial AM station is broadcasting with an average transmitted power of 10 kW. The modulation index is set at 0.707 for a sinusoidal message signal. Find the transmission power efficiency and the average power in the carrier component of the transmitted signal.

(b) A 20 MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100 kHz. Determine the modulation index and the approximate bandwidth of the FM signal if the frequency of the modulating signal is : (i) 1 kHz; (ii) 50 kHz; (iii) 500 kHz.

(c) A PCM system is to have a signal-to-noise ratio of 40 dB. The signals are speech, and an rms-to-peak ratio of –10 dB is allowed for. Find the number of bits per code word required.

(d) A telephone signal with a cutoff frequency of 4 kHz is digitized into 8-bit samples at the Nyquist sampling rate $fs = 2W$. Assuming raised-cosine filtering is used with a roll-off factor of unity, calculate (i) the baseband transmission bandwidth and (ii) the quantization S/N ratio.

(e) With help of a neat diagram, illustrate the frequency reuse in mobile cellular communication.

(f) Find the period of given signals (i) x1(t) = sin 15pt (ii) x2(t) = sin 20pt (iii) x3(t) = sin 2 pt (iv) x4(t) = sin 5pt (v) x5(t) = x1(t) + x2(t)

(3 × 5 = 15 Marks)

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