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S – 7626

Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, February 2024

Physics

Special Paper – I

PH 233 E – ADVANCED ELECTRONICS – I

(2018 – 2019 Admission)

Time : 3 Hours

Max. Marks : 75

PART – A

(Answer **any five** questions. Each carries **3** marks)

1. (a) What is modulation? Mention its advantages and disadvantages.
- (b) Give a short note on FM microwave repeaters.
- (c) What is quantization error?
- (d) What is noise in information carrying channel?
- (e) What is the role of optical solitons in optical communication systems?
- (f) What is discrete time Fourier transform?
- (g) Give the properties of z-transform.
- (h) Explain roaming and handoff mechanism in mobile cellular communications.

(5 × 3 = 15 Marks)

P.T.O.



PART – B

(Answer **three** questions. Each carry **15** marks)

2. (A) (a) With neat diagram, explain amplitude modulation.
(b) Differentiate amplitude modulation from frequency and phase modulation.

OR

- (B) (a) What are the advantages and disadvantages of microwave radio communications?
(b) With necessary theory, account on different types of pulse modulation.
3. (A) (a) Explain binary ASK, PSK and FSK schemes.
(b) Explain error control coding.

OR

- (B) (a) With necessary theory and diagram explain time division multiplexing (TDM) in pulse code modulation (PCM) telephone system.
(b) Explain bandwidth.
4. (A) (a) Give a detailed note on different generation cellular mobile systems.
(b) Give basic ideas of infinite impulse response filters.

OR

- (B) (a) Give classification of systems.
(b) Evaluate inverse z-transform.

(3 × 15 = 45 Marks)



PART – C

(Answer **three** questions. Each carry **5** marks)

5. (a) Find the transmission power efficiency and the average power in the carrier component of the transmitted signal in an AM station broadcasting with an average transmitted power of 10 kW. The modulation index is set at 0.735 for a sinusoidal message signal.
- (b) A 20MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100 kHz. Determine the approximate bandwidth of the FM signal if the frequency of the modulating signal is
- (i) 1 kHz
 - (ii) 10 kHz
 - (iii) 250 kHz
 - (iv) 400 kHz.
- (c) A soliton communication system is operating at $1.55 \mu\text{m}$ by using dispersion-shifted fibres with $D = 2 \text{ ps}/(\text{nm km})$. The effective core area of the fibre is $50 \mu\text{m}^2$. Calculate the peak power and the pulse energy required for launching fundamental solitons into the fibre. Assume hyperbolic secant pulses with a FWHM of 30 ps.
- (d) With an example explain how to obtain the Fourier transform of power and energy signals?
- (e) Explain :
- (i) Sectoring
 - (ii) Segmentation
 - (iii) Dualization
 - (iv) Frequency reuse



(f) Which of the following is periodic signal?

(i) $x_1(t) = \sin 15 \pi t$

(ii) $x_2(t) = \sin 20 \pi t$

(iii) $x_3(t) = \sin 2 \pi t$

(iv) $x_4(t) = \sin 5 \pi t$

(v) $x_5(t) = x_1(t) + x_2(t)$

(3 × 5 = 15 Marks)

