

[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 6867

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Your Roll No.....

Unique Paper Code : 222561

Name of the Course : **B.Sc. Physical Science (Electronics)**

Name of the Paper : Communication Electronics (ELPT-505)

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions.
3. **All** questions carry equal marks.

1. (a) The Fourier series for the saw-tooth wave is

$$v = \frac{V}{2} - \frac{V}{\pi} \left\{ \sin \omega t + \frac{1}{2} \sin 2\omega t + \frac{1}{3} \sin 3\omega t + \dots \right\}$$

Find seventh harmonic. Draw accurately to scale the spectrum up to the seventh harmonic. What is the value of the dc component ? (8)

- (b) Why is modulation necessary in electronic communication ? Explain the terms modulation and demodulation. (7)

2. Define amplitude modulation and modulation index. Find the equation for the amplitude modulated wave and draw its frequency spectrum. Obtain bandwidth, total current and total power in amplitude modulated wave. (15)

3. (a) A carrier wave is given by

$$y_c = 5.0 \times \cos(6 \times 10^6 \times t).$$

This carrier is amplitude modulated by a baseband signal given by

$$y_m = 3.0 \times \cos(100t).$$

Find the spectrum of AM signal so generated. Also find the value of modulation index. (7)

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- (b) Give advantages and disadvantages of SSB. Describe the filter method of SSB generation. (8)
4. (a) Define frequency modulation and explain it using relevant diagrams. Explain frequency deviation. Obtain an expression for the frequency modulated wave. (8)
- (b) Draw the circuit diagram of a varactor diode modulator and explain its working giving necessary theory. (7)
5. (a) Draw the block diagram of an AM transmitter and explain its functioning. (8)
- (b) Explain PWM and PPM using appropriate diagrams. (7)
6. (a) State and prove sampling theorem. (7)
- (b) Explain PSK. Explain with block diagram the functioning of PSK generator. (8)
7. Draw and explain the block diagram of an optical fibre communication link. What are conditions for total internal reflection? Derive an expression for acceptance angle and numerical aperture for an optical fibre. (15)
8. Write short notes on any **two** of the following :
- (a) TDMA
- (b) Cellular concept in mobile communication
- (c) Earth station uplink in satellite communication
- (d) Tuned RF receiver (7½, 7½)