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**Question Paper Code : 60460**

B.E. /B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Electronics and Instrumentation Engineering

EC 2315/EI 55/10133 EE 501 — COMMUNICATION ENGINEERING

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define maximum usable frequency.
2. Define standing waves.
3. Define modulation index for amplitude modulation.
4. State Carson's rule.
5. State sampling theorem.
6. What is a T carrier?
7. What is the difference between syntax and semantics?
8. What is the difference between a command and a response with SDLC?
9. Define the aspect ratio.
10. What are the three basic sections of a satellite system?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with the necessary waveforms the time and frequency domain representation of signals. (8)
- (ii) A generator of 1V, 1kHz supplies power to a 100 km long line terminated in  $Z_0$  and having the following constants  $R = 10.4\Omega/km, L = 0.00367 H/km, G = 0.8 \times 10^{-6} mho/km, C = 0.00835 \times 10^{-6} F/km$ . Calculate  $Z_0, \alpha, \beta, \lambda$  and  $v$ . (8)

Or

- (b) (i) Derive the general expression of voltage and current at any point of transmission line. (10)
- (ii) Write a note on space wave propagation. (6)

12. (a) With waveforms and circuit diagrams explain the amplitude modulation and demodulation. (16)

Or

- (b) With relevant diagrams explain the direct and indirect methods of generating frequency modulated waves. (16)

13. (a) Explain FSK modulator and demodulator in detail.

Or

- (b) For a QPSK system and the given parameters  $C = 10^{-12} W$ ,  $f_1 = 60 \text{ kbps}$ ,  $N = 1.2 \times 10^{-14} W$ ,  $B = 120 \text{ kHz}$ , determine

- (i) carrier power in dBm
- (ii) noise power in dBm
- (iii) noise power density in dBm
- (iv) energy per bit in dBJ
- (v) carrier to noise power ration in dB
- (vi)  $E_b / N_0$  ratio.

14. (a) Discuss in detail about the configurations, topologies and transmission modes of data communication circuits. (16)

Or

- (b) (i) Determine the Block check sequence (BCS) for the following data and cyclic redundancy check (CRC) generating polynomials:

$$\text{data } G(x) = x^7 + x^5 + x^4 + x^2 + x^1 + x^0$$

$$\text{CRC } P(x) = x^5 + x^4 + x^1 + x^0. \quad (10)$$

- (ii) Explain in detail about the ISDN architecture. (6)

15. (a) What are the benefits of satellite communication systems? How is the location of a satellite tracked from the earth station? Write the satellite link equations. (16)

Or

- (b) List the merits and demerits of optical communication systems. What are the essential components required for establishing an optical link. What are the various losses associated with it? (16)