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Paper ID [EC504]

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M.Tech. (Sem. - 1st)

ADVANCED COMMUNICATION SYSTEMS (EC - 504)

Time : 03 Hours

Maximum Marks : 100

Instruction to Candidates:

- 1) Attempt any Five questions.
- 2) All questions carry equal marks.

Q1) (a) List the advantages and disadvantages of digital communication system.

(b) An amplitude modulated waveform has the form:

$$X_c(t) = [10 (1 + 0.5 \cos 2000 \pi t + 0.5 \cos 4000 \pi t) \cos 20000 \pi t]$$

- (i) Sketch the amplitude spectrum of $X_c(t)$.
- (ii) Find the power content of each spectral component including the carrier.

Q2) Shanon and Nyquist work on channel capacity and place an upper limit on the bit rate of a channel based on two different approaches. How are the two related? Prove your statement.

Q3) (a) Consider a series in which the input is at a power level of 4 mW, the first element is a transmission line with a 12-dB loss, second element is an amplifier with a 35-dB gain and the third element is a transmission line with a 10-dB loss. Find the output power.

(b) What is delta modulation? How it is implemented and also list its advantages?

Q4) (a) What is VSAT? Explain with the help of a suitable diagram.

(b) A signal $s(t)$, $e^{-at} u(t)$ where $u(t)$ is the unit step function, is applied to the input of a low-pass filter having $|H(\omega)| = \frac{b}{\sqrt{\omega^2 + b^2}}$. Calculate the value of the ratio, $\frac{a}{b}$, for which 50% of the input energy is transferred to the output.

Q5) (a) What do you understand by 3G systems? Explain.

(b) In an SDH section, a cumulative time jitter of 25 fs/bit causes a positive pointer adjustment twice in every frame (i.e. every 125 μ s). Calculate the maximal regenerator spacing for regenerator placement in the particular SDH section.

Q6) What is multiplexing? Compare and contrast various multiplexing techniques used in communication.

Q7) (a) Can a 4 port circulator be obtained by combining two 3 port circulators? Explain with suitable diagram.

(b) What is uplink and downlink? Is there any difference between uplink and downlink frequency? Justify.

Q8) Draw the block diagram of a satellite transmitting station and explain each block in detail.