GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VI • EXAMINATION – SUMMER 2013

Subject Code: 160802

Subject Name: Electronic Communication

Time: 10.30 am - 01.00 pm

Total Marks: 70

Date: 27-05-2013

- Instructions:
 - 1. Attempt all questions.
 - 2. Make suitable assumptions wherever necessary.
 - 3. Figures to the right indicate full marks.
- Q.1 (a) Explain operation of basic communication system. Describe fundamental 07 limitations of a communication system.
 - (b) A 300 W carrier is simultaneously modulated by two audio waves with modulation percentage of 50 and 60 respectively. What is the total sideband power radiated?
- Q.2 (a) A coil has a series resistance of 5á, a self capacitance of 7 pF, and an 07 inductance of 1μ H. Determine the effective inductance and effective Q-factor when the coil forms part of a series tuned circuit resonant at 25 MHz.
 - (b) Explain thermal noise. Two resistors, 22 ká and 47 ká are at room 07 temperature (300 K). Calculate, for a bandwidth of 100 kHz, the thermal noise voltage (i) for each resistor (ii) for the two resistors in series, and (iii) for the two resistors in parallel.

OR

- (b) Define Noise Figure. For a two stage amplifier, the first stage has a noise figure of 2 dB and a power gain of 12 dB, the second has a noise figure of 6 dB and a power gain of 10 dB. What is the overall noise figure (in dB)?
- Q.3 (a) An audio frequency signal 20 sin $(2 \times 500t)$ is used to amplitude modulate a 07 carrier of 50 sin $(2 \times 10^5 t)$. Calculate (i) Modulation index (ii) Sideband frequencies (iii) Amplitude of each sideband frequency (iv) Bandwidth required (v) Total power delivered into a load of 600 á.
 - (b) What are the advantages of single sideband (SSB) modulation over double 07 sideband with suppressed carrier (DSBSC)? Calculate the percent power saving for a DSBSC signal for the modulation percentage of (i) 100 % and (ii) 50 %.

OR

- Q.3 (a) Explain operation of an envelope detector circuit. Explain the importance of 07 RC time constants for the envelope detector circuit. Also state and explain various distortions encountered in the envelope detector.
 - (b) The antenna current of an AM transmitter is 8 A when only carrier is sent, but 07 is increased to 8.96 A when the carrier is modulated by a single tone sinusoid. Find the percentage modulation. Find the antenna current when the depth of modulation is changed to 0.8.
- Q.4 (a) Define frequency modulation. What are the advantages and disadvantages of 07 FM as compared to AM?

1

(b) A carrier is frequency modulated by a sinusoidal modulating signal of frequency 07 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid signal is increased by a factor of 3 and its frequency is lowered by 1 kHz. What is the new bandwidth?

OR

- Q.4 (a) Explain the significance of the terms -sensitivityø and -selectivityø as applied to 07 a receiver. Which of the receiver stages control these characteristics?
 - (b) A radio receiver is tuned to 792 kHz. For an intermediate frequency of 455 07 kHz calculate: (i) Image frequency (ii) Rejection ratio if loaded Q of RF section is 50 (iii) Rejection ratio at 25 MHz with same Q.
- Q.5 (a) State and explain Keplerøs laws in relation to artificial satellites orbiting the 07 earth. Differentiate between geosynchronous and geostationary satellite orbits.
 - (b) Find the Fourier transform of function x(t) = 4t.

OR

- Q.5 (a) What is transponder? Explain C band satellite transponder channels with 07 appropriate frequency allocation and polarization.
 - (b) State and explain properties of Fourier Transform. 07

07