Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER 2013

Subject Code: 151004 Date: 20-05-2013

Subject Name: Electronic Communication

Time: 10.30 am - 01.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Derive Friiss formula for noise factor of cascaded amplifier. **07**

(b) Prove that ESD of any signal g(t) is the fourier transform of the autocorrelation function $R_g(\tau)$. **07**

Q.2 **(a)** Draw the circuit diagram of capacitive tap and derive the equation for transfer impedance. **07**

(b) Explain Double-conversion superhetrodyne receiver using block diagram. **07**

OR

(b) Explain Automatic Gain Control using necessary circuit diagram. **07**

Q.3 **(a)** With the help of neat diagram and waveform explain the operation of envelop detector. **07**

(b) Explain the indirect method of FM generation. (Armstrong method). **07**

OR

Q.3 **(a)** Draw the circuit diagram of ring modulator using diode and explain its operation. **07**

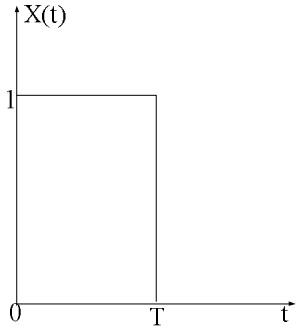
(b) Explain FM detection using PLL. **07**

Q.4 **(a)** state and prove the following properties of Fourier transform: **07**
(1) Time shifting (2) Frequency shifting

(b) An audio signal *15sin2π (1500t)* amplitude modulates a carrier *60 sin2π (100,000t)*. **07**
i) Sketch the audio signal.
ii) Sketch the carrier.
iii) Construct the modulated wave.
iv) Determine the modulation index and percentage modulation.
v) What are the frequencies of the audio signal and the carrier?

OR

Q.4 **(a)** Determine the fourier transform of rectangular pulse shown below. **07**



Q.4 **(b)** A 107.6 MHz carrier is frequency modulated by a 7 KHz sine wave. The resultant FM signal has a frequency deviation of 50 KHz. **07**

i) Find the carrier swing of the FM signal.

ii) Determine the highest and lowest frequencies attained by the modulated signal.

iii) What is the modulation index of the FM wave?

Q.5 **(a)** Write a short note on self-capacitance of a coil. **07**

(b) Two resistors of 20 and 50 kΩ are at room temperature. For a bandwidth of 100 kHz, calculate the thermal noise voltage generated by (a) each resister, (b) the two resistors in series, and (c) the two resisters in parallel. **07**

OR

Q.5 **(a)** A series circuit consisting of a coil and a variable capacitance having reactance X_c. The coil has resistance of 10Ω, inductive reactance of 20Ω. It is observed that at certain value of capacitance current in the circuit is maximum, find (i)the value of capacitance (ii) impedance of the circuit (iii) power factor (iv)current, if applied voltage is 100V,50Hz. **07**

(b) Define thermal noise and describe its relationship to temperature and bandwidth. **07**

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