

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-IV • EXAMINATION – SUMMER • 2014****Subject Code: X41101****Date: 17-06-2014****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) Explain super-heterodyne FM receiver with necessary block diagram. **07**
 (b) What is modulation? What is the need of modulation? **07**
- Q.2** (a) Define demodulation. Explain envelop detector for AM demodulation. What is the effect of value of RC time constant? **07**
 (b) What are the different methods of SSB generation? Explain filter method with block diagram **07**
- OR**
- (b) Derive the equation for AM wave and draw the frequency spectrum for the AM wave. **07**
- Q.3** (a) Three resistors have values $R_1=10K\Omega$, $R_2=15K\Omega$, and $R_3=24K\Omega$. It is known that the thermal noise voltage generated by R_1 is $0.3 \mu V$. Calculate the thermal noise voltage generated by the three resistors connected in:
 a) series **07**
 b) parallel
- (b) The output current of a 60% modulated AM generator is 1.5A. To what value will this current rise if the generator is modulated additionally by another audio wave, whose modulation index is 0.7? **07**
- OR**
- Q.3** (a) A modulating signal is given by $e_m = \sin \omega_m t + 3 \sin 3\omega_m t$ and the carrier by $e_c = 10 \sin \omega_c t$, and $f_c=500$ KHz and $f_m = 4$ KHz. Draw the spectrum for modulated wave and determine the average powers for a) carrier, b) each sideband, given that load resistance is 50Ω . **07**
 (b) What is a signal? Explain different types of signal distortion over a communication channel. **07**
- Q.4** (a) Define Pre-Emphasis and De-emphasis. Why we need this network in FM? **07**
 (b) Find the Fourier transform of the signal: **07**
 a) $y(t) = A * \sin \omega_0 t$
 b) $x(t) = 5[u(t+3) + u(t+2) - u(t-2) - u(t-3)]$
- OR**
- Q.4** (a) Describe the following properties of Fourier transform: **07**
 (1) Time differentiation (2) Frequency shifting
 (b) What is multiplexing? Write a short note on FDM. **07**
- Q.5** (a) Explain briefly thermal noise, partition noise and solar noise. Why they are generated? **07**
 (b) Draw parallel tuned circuit and derive the equation for resonant frequency and Q factor. **07**

OR

- Q.5** **(a)** Derive the formula for the instantaneous value of an FM voltage and define the modulation index. **07**
- (b)** Draw series tuned circuit and derive the equation for resonant frequency and Q factor. **07**
