

5. a) What is transponder?
 b) What are various available communication satellites orbits and what are the ones most commonly exploited? Also give reason in support of your answer.
 c) Compare CDMA, FDMA and TDMA.
 d) An earth surface antenna has a diameter of 30 m and has an overall efficiency of 68% and is used to receive a signal at 4150 MHz. At this frequency, the system noise Temperature is 79 k when the antenna points at the satellite at an elevation angle of 28° . What are earth station G/T ratio under these conditions? If heavy rain causes the sky temperature to increase so that system noise temperature rises to 88 k. What is new G/T ratio?

OR

A satellite is moving in a circular orbit at a height of 150 km above the earth surface. If the radius of earth is 6360 km, determine the orbital velocity and the orbital period of the satellite ($G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}$, $M = 5.98 \times 10^{24}$)

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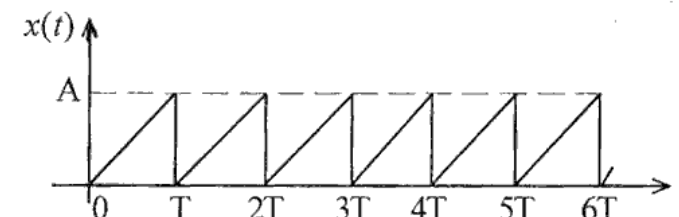
EX - 601
B.E. VI Semester
 Examination, June 2015
Communication Engineering

Time : Three Hours

Maximum Marks : 70

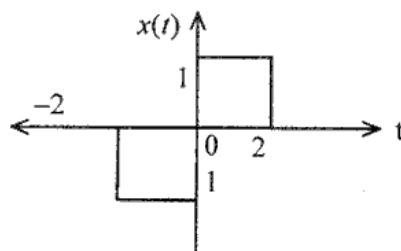
- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
 ii) All parts of each questions are to be attempted at one place.
 iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
 iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Define Gaussian PDF.
 b) Write down the properties of Fourier Transform.
 c) Explain central limit theorem.
 d) Obtain the fourier series of the Sawtooth waveform.



OR

Obtain the Fourier Transform of the signal shown below.



2. a) What is vestigial sideband modulation?
- b) Explain and draw the phasor diagram of Narrowband FM.
- c) What is pre-emphasis and de-emphasis.
- d) An AM transmitter supplies 10kW of carrier power to a 50Ω load. It operates at a carrier frequency of 1.2 MHz and is 60% modulated by a 2 kHz sine wave.
 - i) Sketch the signal in frequency domain with frequency and power scales. Show the power in dBW.
 - ii) Calculate the total average power in the signal in Watts and dBW.
 - iii) Calculate the RMS voltage of the signal.
 - iv) Calculate the peak voltage of the signal.

OR

A 20 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 5V and maximum deviation is 10 kHz, write the equation for this frequency modulated wave. If the modulating frequency is now changed to 2 kHz and carrier voltage is changed to 10 V all else remaining constant, write a equation for this wave. Calculate the power dissipated across 100Ω resistor by both FM waves.

3. a) What are the limitations of TRF receiver?
- b) An AM broadcast receiver has an IF of 465 kHz and is tuned to 1000kHz and the RF stage has one tuned circuit with a Q of 50. Find the image frequency.
- c) Explain AFC.
- d) A receiver has tuned to 3-30 MHz frequency range with IF frequency of 40.525 MHz.
 - i) Find the range of local oscillator frequency and image frequency. It is an AM receiver with each channel occupying 10kHz of Bandwidth.
 - ii) Draw frequency response of IF and AF amplifiers.

OR

A radio station is assigned a frequency of 1500 kHz. When an inexpensive radio receiver is tuned to 1500 kHz, the station is heard loud and clear. This same station is also heard (not as strong) at another dial setting. State with reason at what frequency this station can be heard? The IF frequency is 455 kHz.

4. a) What is oversampling and undersampling?
- b) Define A-law and μ -law.
- c) What is noise figure, noise bandwidth and effective noise temperature?
- d) Derive an expression for signal to noise ratio for quantisation error in PCM.

OR

Derive an expression for figure of merit for FM.