Code: DE61/DE112　　　　Subject: **ANALOG COMMUNICATIONS**

DiplETE – ET (Current & New Scheme)

Time: 3 Hours　　　　　**December 2016**　　　　Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1　　Choose the correct or the best alternative in the following:　　　　(2×10)

　　a. In a communication system, noise is most likely to affect the signal
　　　　(A) At the transmitter　　　　　　**(B)** In the channel
　　　　(C) In the information source　　　**(D)** At the destination

　　b. Indicate the true statement. Most receiver conforms to the
　　　　(A) Amplitude-modulated group　　**(B)** Frequency-modulated group
　　　　(C) Super heterodyne group　　　　**(D)** Tuned radio frequency receiver

　　c. When the modulation index of an AM wave is double, the antenna current is also double. The AM system being used is
　　　　(A) Single sideband, full carrier
　　　　(B) Vestigial sideband
　　　　(C) Single sideband, suppressed carrier
　　　　(D) Double sideband, suppressed carrier

　　d. One of the following is an indirect way of generation FM .This is the
　　　　(A) Reactance FET modulator
　　　　(B) Varactor diode modulator
　　　　(C) Armstrong modulator
　　　　(D) Reactance bipolar transistor modulator

　　e. Which of the following antenna is best excited from a waveguide?
　　　　(A) Biconical　　　　　　**(B)** Horn
　　　　(C) Helical　　　　　　　**(D)** Discone

　　f. Frequencies in the UHF range normally propagate by means of
　　　　(A) Ground waves　　　　**(B)** Sky waves
　　　　(C) Surface waves　　　　**(D)** Space waves

　　g. Microwave link repeater is typically 50km apart
　　　　(A) Because of atmospheric attenuation
　　　　(B) Because of output tube power limitation
　　　　(C) Because of the Earth's curvature
　　　　(D) To ensure that the applied dc voltage is not excessive

h. The most common modulation system used for telegraphy is
   (A) Frequency-shifting keying   **(B)** Two-tone modulation
   (C) Pulse-code modulation   **(D)** Single-tone modulation

i. Which of the following steps is not included in the process of reception?
   (A) Decoding   **(B)** Encoding
   (C) Storage   **(D)** Interpretation

j. The most commonly used filter in SSB generation is
   (A) Mechanical   **(B)** RC
   (C) LC   **(D)** Low-pass

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain the differences between digital communication and analog communication. **(4)**

b. Explain the need for modulation in a communication system. **(4)**

c. What do you mean by the shot noise? **(4)**

d. A receiver connected to an antenna whose resistance is 50 Ω has an equivalent noise resistance of 30 Ω. Calculate the receiver's noise figure in decibels and its equivalent noise temperature. **(4)**

Q.3 a. Define amplitude modulation and modulation index. Explain the definition with the help of a sketch of a sinusoidal modulated AM waveform. **(8)**

b. Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (i) 100 percent and (ii) 50 percent. **(8)**

Q.4 a. What is pre-emphasis? Sketch typical pre-emphasis circuits and also explain de-emphasis. **(8)**

b. Determine the value of the capacity reactance obtained from a reactance FET whose g_m is 12 millisiemens (12 mS). Assume that the gate-to-source resistance is one-ninth of the reactance of the gate-to-drain capacitor and that the frequency is $5MH_z$. **(8)**

Q.5 a. In a broadcast super heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input to the mixer) is 100. If the intermediate frequency is 455 kHz, calculate (a) the image frequency and (b) its rejection ratio at 25 MHz **(8)**

b. Briefly explain the function of each of the blocks in the superheterodyne receiver. **(8)**

Q.6 a. Briefly describe the following terms connected with sky-wave propagation: Critical frequency, maximum usable frequency, skips distance, transmission path and fading   **(2x4)**

  b. A rectangular waveguide is 5.1 cm by 2.4 cm (inside measurement). Calculate the cutoff frequency of the dominant mode.   **(8)**

Q.7 a. Explain the following term related to antennas:
  duality of antenna, radiation resistance, polarization and directivity.   **(2x4)**

  b. Write short note on following:
  (i) Horn antenna
  (ii) Broad Side Array   **(4x2)**

Q.8 a. Six message signals each of bandwidth 5 kHz are time division multiplexed and transmitted. Determined the signaling rate and the minimum channel bandwidth of the PAM/TDM channel   **(5)**

  b. Explain the differences between A-law and U-law?   **(5)**

  c. What is the fundamental difference between PAM, PWM & PCM?   **(6)**

Q.9 a. Draw the block diagram of a microwaves link repeater, indicating the function of each block.   **(8)**

  b. What is multiplexing? Why is it needed? What are its two basic forms?   **(8)**