Code: DE61   **Subject: ANALOG COMMUNICATIONS**

DipIETE – ET (NEW SCHEME)

Time: 3 Hours   **JUNE 2012**   **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. Fidelity in a communication receiver is provided by_____

   (**A**) audio stage   (**B**) mixer stage
   (**C**) detector stage   (**D**) none of these

b. In PCM system, the biggest disadvantage compared to analog modulation is_____

   (**A**) large bandwidth   (**B**) incompatibility with TDM system
   (**C**) inability to handle analog signal (**D**) larger noise

c. The highest modulating frequency used in AM broadcast system is_____

   (**A**) 10 kHz   (**B**) 15 kHz
   (**C**) 5 kHz   (**D**) 2 MHz

d. Antenna can be treated as_____

   (**A**) closed transmission line   (**B**) shorted transmission line
   (**C**) earthed transmission line   (**D**) opened out transmission line

e. Noise Power is represented as_____

   (**A**) $P_n = KT\delta f$ (**B**) $P_n = \sqrt{KT\delta f}$

   (**C**) $P_n = \dfrac{1}{KT\delta f}$ (**D**) $P_n = \dfrac{1}{\sqrt{KT\delta f}}$

f. Which of the following mode permits beyond-the-horizon propagation?

   (**A**) Troposphere scatter   (**B**) Satellite communication
   (**C**) Surface wave   (**D**) None of the above

g. The field strength in a surface wave at a point is directly proportional to_____

(A) antenna height   (B) wave frequency
(C) current of antenna   (D) distance of the point from antenna

h. In FM sound broadcasting system, the maximum frequency deviation is usually_____

(A) 15 kHz   (B) 75 kHz
(C) 200 kHz   (D) 5.2 kHz

i. The typical number of carriers (in each direction) in a Microwave Link is at least_____

(A) 1   (B) 2
(C) 4 to 12   (D) 12 to 100

j. The Magic T is_____

(A) H Plane T   (B) Combination of H Plane T and E Plane T
(C) E Plane T   (D) None of these

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

Q.2 a. Why Signal-to-Noise Ratio is kept as high as possible under a given set of conditions? **(4)**

b. Draw the block diagram of communication system and explain its function in brief. **(6)**

c. An antenna with equivalent noise temperature of 75 K is connected to a receiver input with equivalent noise temperature of 300 K. Calculate
   (i)   overall noise temperature
   (ii) noise factor and
   (iii) noise figure. **(6)**

Q.3 a. Draw the block-diagram of phase cancellation SSB-generator and explain how the carrier and the unwanted side band are suppressed. **(8)**

b. Derive the relationship between Total Power, Unmodulated Carrier Power and Modulated Index in AM wave. **(6)**

c. An unmodulated carrier of 75 W has 100 W of total Power when modulated, then calculate its modulation index (m) in percentage. **(2)**

Q.4 a. What is image frequency? How does it occur? How it is eliminated? **(8)**

b. For an AM broadcast Superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100 and the intermediate frequency (IF) is 455 kHz. The Super-heterodyne receiver is to be improved for HF reception, so that its image rejection at 25 MHz is as good as it was at 1100 kHz, find the loaded Q which an RF amplifier for this receiver would have to have. **(8)**

Q.5 a. Define pre-emphasis and de-emphasis. Explain their importance in FM Transmitters and Receivers. **(8)**

b. What is slope detection? How does it work? What are its advantages and disadvantages? **(8)**

Q.6 a. What is an Antenna Array? Explain the difference between Driven and Parasitic elements in Antenna Array. **(6)**

b. Explain the terms
(i) Antenna Beamwidth
(ii) Effective Isotropic Radiated Power. **(6)**

c. Find the dimensions of three element Yagi Uda antenna for 100 MHz operation using 0.2λ inter element spacing. **(4)**

Q.7 a. Draw and explain the field patterns for common modes in a rectangular waveguide. **(8)**

b. Describe the advantages and disadvantages of Ground Wave Propagation. **(4)**

c. Two point on earth are 1500 km apart, and are to communicate by means of HF. For a single hop transmission, the critical frequency at that time is 7 MHz and conditions are idealized. Calculate the MUF for those two points if the height of the ionospheric layer is 500 km. **(4)**

Q.8 a. Compare characteristics of PAM, PWM and PPM. **(8)**

b. What is pulse width modulation? How is it demodulated? **(4)**

c.   Explain how PSK is used in Telex system? **(4)**

Q.9   Write short note on the following: **(2×8)**

(i) Regional and domestic satellites
(ii) Time Division Multiplexing