

Code: DE61

Subject: ANALOG COMMUNICATIONS

**DiplETE – 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)  $P_n = \frac{1}{KT\delta f}$  (D)  $P_n = \frac{1}{\sqrt{KT\delta f}}$
- 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

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- 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

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

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- 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)

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- Q.4** a. What is image frequency? How does it occur? How it is eliminated? (4)
- 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  $0.2\lambda$  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