

Code: DE61

Subject: ANALOG COMMUNICATIONS

DiplETE – ET

Time: 3 Hours

DECEMBER 2013

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. Which of the following steps is not included in the process of reception

- | | |
|--------------|--------------------|
| (A) Decoding | (B) Encoding |
| (C) Storage | (D) Interpretation |

b. The value of a resistor creating thermal noise is doubled. The noise power generated

- | | |
|-------------|----------------|
| (A) Halved | (B) Quadrupled |
| (C) Doubled | (D) Unchanged |

c. If the carrier of a 100% modulated AM wave is suppressed, the percentage of power saving will be

- | | |
|---------|----------|
| (A) 50 | (B) 150 |
| (C) 100 | (D) 66.6 |

d. The most commonly used filters in SSB generation are

- | | |
|----------------|--------------|
| (A) Mechanical | (B) L C |
| (C) R C | (D) Low Pass |

e. When the modulating frequency is doubled, the modulating index is halved, and the modulating voltage remains constant. The modulation system is

- | | |
|--------|---------|
| (A) AM | (B) PM |
| (C) FM | (D) PAM |

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- f. A superheterodyne receiver with an IF of 450 KHz is tuned to a signal of 1500 KHz. The image frequency is
- (A) 2100 KHz (B) 750 KHz
(C) 900 KHz (D) 1650 KHz
- g. Which of the following antennas is best excited from a waveguide?
- (A) Biconical (B) Horn
(C) Helical (D) Discone
- h. Standard rectangular waveguide has _____ aspect ratio
- (A) 1 : 2 (B) 2 : 1
(C) 3 : 4 (D) 4 : 3
- i. The wavelength of a signal propagating in a waveguide is always _____ its free space wavelength.
- (A) Greater than (B) Smaller than
(C) Equal to (D) Less than or equal to
- j. The Shannon Hartley law
- (A) refer to distortion (B) defines bandwidth
(C) describe signalling rates (D) refer to noise

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

- Q.2** a. What does modulation actually do to a message and carrier? (6)
- b. Explain the thermal agitation noise. (6)
- c. A receiver connected to an antenna whose resistance is 50 Ohms has an equivalent noise resistance of 30 Ohms. Calculate the receiver's noise figure in decibels and its equivalent noise temperature. (4)
- Q.3** a. The antenna current of an AM transmitter is 8A when only carrier is sent but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the % modulation and antenna current when % modulation changes to 0.8. Derive the formula used. (10)
- b. When the modulation percentage is 75, an AM transmitter produces 10 KW. How much of this is carrier power? What would be the percentage power saving if the carrier and one of the sidebands were suppressed before transmission took place. (6)

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- Q.4** a. Compare amplitude modulation system and frequency modulation systems. (8)
b. Explain the Pre-emphasis and De-emphasis. (8)
- Q.5** a. Explain, with a neat block diagram, the working of a TRF AM radio receiver. Write its disadvantages. (8)
b. Explain, with a neat block diagram, the working of FM Radio Receiver. (8)
- Q.6** a. Explain (i) Ungrounded Antennas and (ii) Grounded Antennas (8)
b. Describe the various factors that decide what should be 'optimum length' of a grounded medium frequency antenna. (8)
- Q.7** a. Explain the phenomenon of Ground wave propagation. (7)
b. Explain the following terms: (9)
(i) Radio Horizon
(ii) Troposphere scatter propagation
(iii) Reflection and Refraction of wave
- Q.8** a. What is telegraphy? Describe briefly the system and machines used for transmitting & receiving it. (2+4+3)
b. Explain waveguide couplings. (7)
- Q.9** Write short note any **TWO** of the following: (2×8)
(i) Pulse Code Modulation (P C M)
(ii) Troposcatter link
(iii) Satellite communication
(iv) TDM