AMIETE – ET (Current & New Scheme)

Time: 3 Hours   **December - 2017**   **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 one of the following is internal noise?
   (A) Industrial noise   **(B)** Thermal noise
   (C) Cosmic noise   **(D)** Atmospheric noise

   b. As compared to AM signal, SSB–SC signal requires
   (A) Less Bandwidth   **(B)** More Bandwidth
   (C) Equal Bandwidth   **(D)** No Bandwidth

   c. An FM signal with a modulation index m_f is passed through a frequency doubler. The wave in the output of the doubler will have a modulation index of
   (A) $(m_f)/2$ **(B)** m_f
   (C) $2 m_f$ **(D)** $4 m_f$

   d. The sensitivity of a super heterodyne receiver is determined by the
   (A) gain of IF amplifier   **(B)** gain of RF amplifier
   (C) noise figure   **(D)** All of these

   e. Impedance inversion may be obtained with a/an
   (A) short circuited stub   **(B)** open circuited stub
   (C) quarter wave line   **(D)** half wave line

   f. When a particular mode is excited in a waveguide, there appears an extra electric component in the direction of propagation. The resulting mode is
   (A) transverse-electric   **(B)** transverse-magnetic
   (C) longitudinal   **(D)** transverse - electromagnetic

   g. If the number of bits in a PCM system is increased from n to (n+1), then the signal to quantization noise ratio will be increased by a factor of
   (A) $(n+1)/(n)$ **(B)** $(n+1)^2/(n)^2$
   (C) 2   **(D)** 4

   h. To separate channels in an FDM receiver, it is necessary to use
   (A) AND gates   **(B)** bandpass filters
   (C) differentiator   **(D)** Integrator

i. In an AM signal when the modulation index is one, the maximum transmit power P_t is equal to (P_c is the carrier power)
(**A**) P_c (**B**) 1.5 P_c
(**C**) 2 P_c (**D**) 2.5 P_c

j. In a super heterodyne receiver the IF stage has better selectivity than RF stage because of
(**A**) increased frequency
(**B**) decreased frequency
(**C**) possibility of frequency constant passband
(**D**) possibility of High L to C ratio due to fixed frequency operation

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

Q.2 a. What are the different external noise sources? Explain in detail the extra terrestrial noise. **(8)**

     b. Explain in detail different parts of a communication system with neat block diagrams for each and every block of a typical communication system. **(8)**

Q.3 a. A 400 W carrier is modulated to a depth of 75 %. Calculate the total power in the modulated wave in Single Sideband Suppressed Carrier signal and conventional AM signal. **(8)**

     b. Draw the block diagram of SSB – SC generation using Filter system and explain the same in detail. **(8)**

Q.4 a. Explain the operation of Automatic Frequency Controller (AFC) system used in reactance modulators with a neat diagram. **(8)**

     b. Compare and contrast narrowband and wideband Frequency modulation systems. **(8)**

Q.5 a. Describe the operation of PLL FM demodulator with neat diagram. **(8)**

     b. For an AM broadcast–band, super heterodyne receiver with an IF, RF and the local oscillator frequency of 455 kHz, 600 kHz, and 1055 kHz, respectively,
(i) determine the image frequency. **(4)**
(ii) calculate the IFRR for a pre-selector Q of 100. **(4)**

Q.6 a. What is a transmission line? Explain in detail the characteristic impedance of a transmission line and methods to calculate it. **(8)**

     b. What is a quarter wave transformer? Explain one of its significant applications. **(8)**

Q.7 a. Describe the differences in the propagation and general behaviour between TE and TM modes in rectangular waveguides? **(8)**

     b. Describe the various methods of exciting the waveguides and explain under what circumstances each is most likely to be used? **(8)**

Q.8 a. Explain pulse width modulation along with proper waveform diagrams. **(8)**

     b. Explain Pulse code modulation with a neat diagram of a basic PCM system. **(8)**

Q.9 a. Explain in detail the role of submarine cables in long haul communication systems. **(8)**

     b. Explain in detail the elements of long distance telephony. **(8)**