ROLL NO. _____

Code: AE65/AE116 **Subject: ANALOG COMMUNICATIONS**

AMIETE – ET (Current & New Scheme)

Time: 3 Hours **June 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. For an AM signal with 100% modulation, the transmitted power is _____times the power of un-modulated carrier

(A) Same **(B)** $\sqrt{2}$ times
(C) 1.5 times **(D)** Twice

b. The noise figure of a receiver is 1.6. Its equivalent noise temperature is (Assume the operating temperature is 290 k)

(A) 464.00 k **(B)** 174.00 k
(C) 108.75 k **(D)** 181.25 k

c. Saving in power of the SSB – SC system when compared with AM system when modulated at 80% is

(A) Nil **(B)** 80%
(C) 76% **(D)** 50%

d. In phase shift SSB modulator, the input signals to one of the product modulators are phase shifted by

(A) 90^0 **(B)** 45^0
(C) 180^0 **(D)** 60^0

e. An FM signal with deviation δ is passed through a mixer and has its frequency reduced 5 fold. The deviation in the output of the mixer is,

(A) δ **(B)** 5^{δ}
(C) $\delta/5$ **(D)** 10^{δ}

f. A super heterodyne receiver uses an IF frequency of 455 kHz. The receiver is tuned to a transmitter having a carrier frequency of 2400 kHz. High-side tuning is to be used. The image frequency will be

(A) 2855 kHz **(B)** 3310 kHz
(C) 1845 kHz **(D)** 1490 kHz

g. The main disadvantage of the two-hole directional coupler is

(A) Low directional coupling **(B)** Poor directivity
(C) High SWR **(D)** Narrow bandwidth

h. Which one of the following waveguide tuning component is not easily adjustable?

(A) Screw **(B)** Stub
(C) Iris **(D)** Plunger

i. In PCM the quantization noise depends on
(A) Sampling Rate **(B)** Number of Quantization levels
(C) Signal Power **(D)** None of these

j. To separate channels in an FDM receiver, it is necessary to use
(A) AND gates **(B)** Bandpass filters
(C) Differentiation **(D)** Integration

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

Q.2 a. Draw and explain the basic block diagram of communication system. What is modulation? **(8)**

b. Define Signal to noise ratio and write the expression for the same. Calculate the noise figure using the signal to noise ratio. **(8)**

Q.3 a. A certain transmitter radiates 9 kW with the carrier unmodulated and 10.125 kW, when the carrier is sinusoidally modulated. Calculate the modulation index, percentage of modulation. If another sine wave corresponding to 40% modulation is transmitted simultaneously, determine the total power radiated. **(8)**

b. Explain the advantages and disadvantages of Single Side Band Suppressed Carrier modulation over conventional Amplitude modulation systems. **(8)**

Q.4 a. What is the difference between direct and indirect methods of FM modulation? Explain the drawbacks of direct method of FM generation. **(8)**

b. Explain the operation of stereo multiplex FM transmission system using a neat block diagram. **(8)**

Q.5 a. Explain the operation of super heterodyne receiver with neat diagram. **(8)**

b. Explain the FM stereo reception using neat block diagram. **(8)**

Q.6 a. Define the characteristic Impedance of a transmission line. When is the input impedance of a transmission line equal to its characteristic Impedance? **(8)**

b. What is standing wave? Explain the causes of standing wave, and method to measure it. **(8)**

Q.7 a. Compare the practical advantages and disadvantages of circular waveguides with those of rectangular waveguides. **(8)**

b. Differentiate between the concepts of group velocity and phase velocity as applied to waveguides. Derive the universal formula for the group velocity. **(8)**

Q.8 a. Explain pulse position 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. Show, how first-order TDM signals may be generated and then demultiplexed in the receiver? **(8)**

b. Explain in detail, how INTELSAT satellites help in long haul communication systems? **(8)**