Code: AE15 **Subject: COMMUNICATION ENGINEERING**
Time: 3 Hours **Max. Marks: 100**

| DECEMBER 2008 |

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.**
- **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 best alternative in the following:** **(2x10)**

a. In a communication system, noise is likely to affect the signal

 (A) At the transmitter **(B)** In the channel
 (C) In the information source **(D)** At the destination

b. In a moving target indicator radar, the coho operates at:

 (A) low frequency **(B)** RF
 (C) IF **(D)** received frequency

c. If in AM, P_t is the total power = 1.5 times carrier power P_c, then the modulation index is

 (A) 0.5 **(B)** 0.8
 (C) 1 **(D)** > 1

d. To couple a co-axial line to a parallel-wire line, it is best to use a

 (A) Slotted line **(B)** Balun
 (C) Directional Coupler **(D)** Quarter wave Transformer

e. One of the following cannot be used to remove the unwanted sideband in SSB

 (A) Filter method **(B)** Phase shift method
 (C) Third method **(D)** Balance modulator

f. A pre-emphasis circuit provides extra noise immunity by

 (A) Boosting the higher frequency at the transmitter **(B)** Boosting the higher frequency at the receiver
 (C) Boosting the higher frequency in the channel **(D)** Cutting the higher frequency at the transmitter

g. If the peak transmitted power in a radar system is increased by a power of 16, the maximum range will be increased by

 (A) $\sqrt{2}$ **(B)** 2

(C) 4   **(D)** 16

h. In a communication channel in free space, antennas radiate and receive effectively when antenna dimensions

   (A) Are of the order of magnitude of transmitter signal
   (B) Are greater than magnitude of transmitted signal
   (C) Are shorter than magnitude of transmitted signal
   (D) Have no bearing with the magnitude of transmitted signal

i.   Which of the following codes is a 5-bit code

   (A) The binary code   **(B)** ASCII code
   (C) Baudot code   **(D)** EBCDIC

j.   Which of the following signals is not transmitted in a colour TV.

   (A) Y   **(B)** Q
   (C) R   **(D)** I

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

Q 2.   a. Define Noise in electrical terms. List the various ways in which noise can be classified.   **(5)**

   b. Discuss in brief various types of Internal noise that are found in a receiver.   **(7)**

   c. An amplifier operating over the frequency range from 18 to 20 MHz has a   10 KΩ input resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is $27^\circ C$? **(4)**

Q 3.   a. Describe Vestigial Sideband transmission.   **(8)**

   b. Explain multiplexing of many baseband signals over a single communication channel, with the help of   a   block diagram.   **(8)**

Q 4.   a. Discuss FM Stereophonic Broadcasting in detail.   **(8)**

   b. Determine the value of the capacity reactance obtainable from a reactance FET whose g_m is 12 millisiemens (12 mS). Assume that the gate-to- source resistance is one-ninth of the resistance of the gate-to-drain capacitor and that the frequency is 5 MHz.   **(8)**

Q5.   a. What is flat-top sampling?   **(4)**

   b. Describe the technique by which advantage may be taken of the sampling principles for the purpose   of   Time   Division Multiplexing.   **(8)**

   c. In a Delta modulation system with 4 KHz, 1 V_{max} amplitude modulating signal, 64000/sec sampling determine
   (i) minimum step-size to avoid slope overload
   (ii) signal to quantisation noise ratio.   **(4)**

Q6.   a. Using Shanon - Hartley theorem, explain why doubling the bandwidth of a noise-limited channel will not automatically double the channel capacity, if the transmitting power is kept constant? **(8)**

   b. A system has a bandwidth of 4KHz and SNR of 28dB at the input to the receiver. Calculate
   (i) Its information carrying capacity.
     (ii) The capacity of the channel if its bandwidth is doubled, while the transmitted signal power remains constant.
   (8)

Q7.   a. Write explanatory note on Composite Video signal.   **(8)**

   b. Explain Beam Scanning.   **(8)**

Q8.   a. With the help of a block diagram, explain the working of a Basic Pulsed Radar System.
            (8)

   b. What is white noise? Calculate the probability of error of the matched filter. **(8)**

Q9.   Write notes on

   (i)   PCM   **(8)**
   (ii)   Block Codes.   **(8)**