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

DECEMBER 2010

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 half an hour 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. The function of input transducer in a Communication System is

(A) To transmit the message signal.
(B) To modulate the message signal.
(C) To convert message sound signal into electrical signal.
(D) None of the above

b. The auto correlation function of an energy signal has

(A) No symmetry **(B)** Conjugate symmetry
(C) Odd symmetry **(D)** Even symmetry

c. In commercial TV transmission in India, Picture and speech signal are modulated respectively as

(A) VSB and VSB **(B)** VSB and SSB
(C) VSB and FM **(D)** FM and VSB

d. The probability density function of the envelope of narrowband AWGN noise is

(A) Poisson **(B)** Gaussian
(C) Rayleigh **(D)** Rician

e. In a DM system, the granular (idling) noise occurs when the modulating signal.

(A) increase rapidly **(B)** remains constant
(C) decreases rapidly **(D)** the nature of modulating signal has nothing to do with the noise.

f. The error detection capability of (7, 4) linear block code is

(A) 1 **(B)** 2
(C) 3 **(D)** 4

g. Aperture effect occurs in communication system due to

(A) Sampling at less than Nyquist rate
(B) Flat top sampling.
(C) Finite bandwidth of transmission channel
(D) Short duration of pulses

h. The capacity of a communication channel with a bandwidth of 4 KHz and SNR of 15 is approximately

(A) 20 kbps **(B)** 16 kbps
(C) 10 kbps **(D)** 8 kbps

i. In commercial FM broad casting, the maximum frequency deviation is normally

(A) ± 5 KHz **(B)** ± 15 KHz
(C) ± 75 KHz **(D)** ± 200 KHz

j. One of the following systems is analog

(A) PCM **(B)** Delta
(C) DPCM **(D)** PAM

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

Q 2. a. Explain Amplitude modulation scheme and also discuss its modulation index. Derive the power relations in the A.M. wave. **(8)**

b. Explain the basic constituents of a Communication System with the help of block diagram. **(8)**

Q 3. a. Describe the different noises which may be created within a receiver or amplifier. Discuss the effect of these noises on the performance of receiver. **(6)**

b. What is Noise Figure? Derive the Noise Figure from the equivalent noise resistance. **(10)**

Q 4. a. Explain the Square Law diode modulator for AM generation. **(8)**

b. The total power content of an AM signal is 1000W. Determine the power being transmitted at the carrier frequency and at each of the sidebands frequencies when the percent modulation is 100% **(8)**

Q5. a. Derive the expression for the Frequency modulation. Explain the relationship between FM and PM. **(10)**

b. Explain the Balanced slope detector for the FM demodulation. **(6)**

Q6. a. Explain all three type of Sampling techniques. **(8)**

b. What is Pulse Amplitude Modulation (PAM)? Discuss the mathematical Analysis.

Q7. a. A DMS X has five symbols x_1, x_2, x_3, x_4 and , x_5 with P (x_1) = 0.4 P (x_2) = 0.19, P (x_3) = 0.16, P (x_4) = 0.15 and P (x_5) = 0.1
Construct the Shannon- Fano code for X and calculate its efficiency. **(10)**

b. Describe the Linear Block codes in brief. **(6)**

Q8. a. Explain the basic pulsed radar system & discuss, how it can be used as search radar. **(10)**

b. Explain the importance of Blanking pulses and Synchronising pulses in TV transmission. **(6)**

Q9. Write short notes on:

(i) Comparison of FM and PM
(ii) Delta Modulation
(iii) Radar Range equation
(iv) Reconstruction of original Signal from samples **(4×4)**