

Code: AE15

Subject: COMMUNICATION ENGINEERING

AMIETE - ET (OLD SCHEME)

Time: 3 Hours

DECEMBER 2011

Max. Marks: 100

NOTE: There are 9 Questions in all.

- Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.
- 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. In case a signal band limited to f_m is sampled at a rate less than $2f_m$, the constructed signal will be

- (A) Distortionless
- (B) Small in amplitude
- (C) Having higher frequency suppressed
- (D) Distorted

b. Intermediate Frequency (IF) in AM transmission is

- (A) 455 kHz
- (B) 400 kHz
- (C) 325 KHz
- (D) 10 kHz

c. Frequency shift keying is used mostly in

- (A) Radio Transmission
- (B) Telegraphy
- (C) Telephony
- (D) None of the above

d. VSB normally be used for

- (A) Point to point communication
- (B) Stereo broad casting
- (C) Radio broad casting
- (D) TV broad casting

e. One of the following can be used to generate SSB

- (A) Grid Modulation
- (B) Arm-Strong method
- (C) Reactance Modulation
- (D) Filter method

f. A 400W carrier is modulated to a depth of 75%, the total power is

- (A) 512.5 W
- (B) 600 W
- (C) 625 W
- (D) 650.5 W

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- g. A broad cast radio transmitter power is 10 KW. When the modulating percentage is 60. How much of this is carrier power?
- (A) 3 KW (B) 8.47 W
(C) 9.65 KW (D) 5 KW
- h. Modulation is the process of
- (A) Superimposing a low frequency on a high frequency
(B) Superimposing a high frequency on a low frequency
(C) Carrier interruption
(D) None of the above
- i. The modulation index m_f of frequency modulation, is defined as
- (A) δ/f_m (B) V_m/V_c
(C) f_c/f_m (D) f_m/f_c
- j. What is the duty cycle of radar with a Pulse Width (PW) of 3 μ sec and PRT of 6 ms?
- (A) 0.0005 (B) 0.00005
(C) 0.1 (D) 2.0

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

- Q 2.** a. Explain the noise bandwidth. (6)
- b. Calculate the noise voltage at the input of television RF amplifier using a device that has a 200 ohm equivalent noise resistance and 300 ohm input resistance. The band width of amplifier is 6 MHz and temperature is 17° C. (6)
- c. Describe the following: (4)
- (i) Selectivity
(ii) Sensitivity
- Q 3.** a. Explain the block diagram of filter method of generating an SSB signal. (8)
- b. Explain the circuit diagram of foster-seeley discriminator for the FM demodulation. (8)
- Q 4.** a. Draw and explain the block diagram of FM receiver. (8)
- b. In a broadcast super-heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input to the mixer) is 100. If the intermediate frequency is 455 KHz, calculate (8)
- (i) The image frequency and rejection ratio at 1000 KHz.
(ii) The image frequency and its rejection ratio at 25 MHz.

Code: AE15

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- Q5.** a. An analog signal is band limited to B Hz, sampled at the Nyquist rate, and the samples are quantized into 4 levels. The quantization levels Q1, Q2, Q3 and Q4 (messages) are assumed independent and occur with probabilities $P_1 = P_4 = 1/8$ and $P_2 = P_3 = 3/8$. Find the information rate of the source. (8)
- b. Draw and explain the block diagram of delta modulation. Also write its merits and demerits. (8)
- Q6.** a. State and explain sampling theorem. Also explain flat top sampling (8)
- b. Draw and explain the block diagram of PCM communication system. (8)
- Q7.** a. Write short note on any **TWO**:
- (i) Envelop detector
 - (ii) Pre-emphasis and de-emphasis
 - (iii) Ring modulator. (8)
- b. Describe briefly, Shannon-Fano, algorithm for efficiency encoding of message. Using this algorithm obtain the code for a source emitting six message with probability $1/2, 1/4, 1/8, 1/16, 1/32$ and $1/32$. Calculate the average information per message and efficiency of this code. (8)
- Q8.** a. Describe the block codes coding and decoding. (8)
- b. Obtain the impulse response of matched filter. (8)
- Q9.** a. Draw and explain the block diagram of MTI Radar. (8)
- b. Calculate the minimum receivable signal in radar receiver which has an IF bandwidth of 1.5 MHz and a 9-dB noise figure. (4)
- c. Write short notes on
- (i) PAM
 - (ii) PWM (4)