SEM | III | CBCS | IT | POC | Dec'17 19/12/17

LIBRARY

Q.P. Code: 24574

Time: 3 Hours **Marks: 80**

N.B (1) Question No. 1 is compulsory

(2) Out of remaining questions attempt three

(3) Figures to right indicate full marks.

Q1 Solve any **four**

a) Compare ground wave & sky wave propagation **(5)**
b) Define modulation & explain any two need of modulation **(5)**
c) State in brief different types of noise. **(5)**
d) With reference to receiver define sensitivity, selectivity, fidelity and image frequency rejection **(5)**
e) Draw BASK & BFSK signal for 10111010. **(5)**

Q2 a) Explain with neat diagram Indirect method of FM generation **(10)**

b) Prove Friss formula with reference to noise factor in cascade. **(10)**

Q3 a) What is multiplexing in communication system? Explain in brief transmitter and receiver of FDM. **(10)**

b) A sinusoidal carrier has an amplitude of 20 V & frequency of 200 Khz. It is amplitude modulated by a sinusoidal voltage of amplitude 6 V & frequency 1 Khz. Modulated voltage is developed across a 80 Ω resistance 1. Write the equation of modulated wave 2. Determine modulation index 3. Draw the spectrum of modulated wave & 4. Calculate total average power. **(10)**

Q4 a) Explain generation & demodulation of PWM. **(8)**

b) In an AM receiver the loaded Q of antenna circuit at the input to mixer is 100. Calculate image frequency & its rejection at 1 MHz. **(8)**

c) State in brief different types of communication channel **(4)**

Q5 a) Explain delta modulator transmitter & receiver with neat block diagram **(10)**

b) State & prove following properties of Fourier transform. (i) Time shifting (ii) convolution in time domain **(10)**

Q6 Write short notes (**Any Four**) **(20)**

1. Sampling theorem
2. Frequency spectrum allocation
3. Tropospheric scatter propagation
4. Inter symbol interference
5. Noise figure & noise factor

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Q.P. Code : 552200

(3 Hours) [Total Marks : 80]

Note: 1) Question **No.1** is **compulsory.**
2) Out of remaining attempt **any three**.
3) Assume & mention suitable data wherever required.
4) **Figures** to **right** indicates **full marks**.

1. Attempt **any four** from the following. **20**
   (a) An amplifier has a bandwidth of 4 MHz with 10 K as the input resistor. Calculate the rms noise voltage at the input to this amplifier, if the room temperature is 25°C.
   (b) Explain Eye pattern with neat diagram.
   (c) Explain Quantization.
   (d) State and prove the differentiation in time domain property of the Fourier Transform.
   (e) What is diagonal clipping and explain how it can be avoided.

2. a) The AM Transmitter develops an unmodulated power o/p of 400 Watts across a 50 ohms resistive load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.8. Assuming fm= 5KHz and fc= 1MHz. **10**
   (i) Obtain the value of carrier amplitude Vc and hence write the expression for AM signal.
   (ii) Find the total sideband power.
   (iii) Draw the AM wave for the given modulation index.

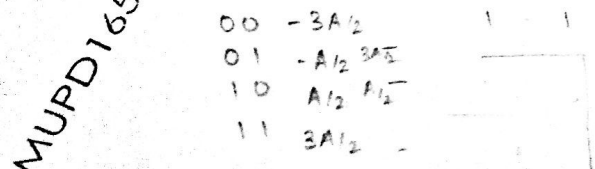
   (b) Explain any one generation method of SSBSC AM. **10**

3. a) Derive the mathematical expression for FM. **10**
   b) Explain Foster seeley descriminator with neat block diagram and compare the performance with Ratio detector. **10**

4. a) State and prove Sampling theorem and explain the aliasing error. **10**
   b) Explain generation and demodulation of PPM. **10**

5. a) Explain the Delta modulator Transmitter and receiver with neat block diagrams. **10**
   b) The binary data 11010101 is transmitted over a baseband channel. Draw the waveform for transmitted data using the following data formats. **10**

   (i) Unipolar NRZ (ii) Unipolar RZ (iii) Bipolar RZ (iv) Split phase Manchester (v) Polar quaternary NRZ.



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6. Answer **any four**
   (a) Explain wired communication channel.
   (b) Derive Friss formula.
   (c) Explain QPSK.
   (d) Compare TDM and FDM.
   (e) Explain BFSK Transmitter.

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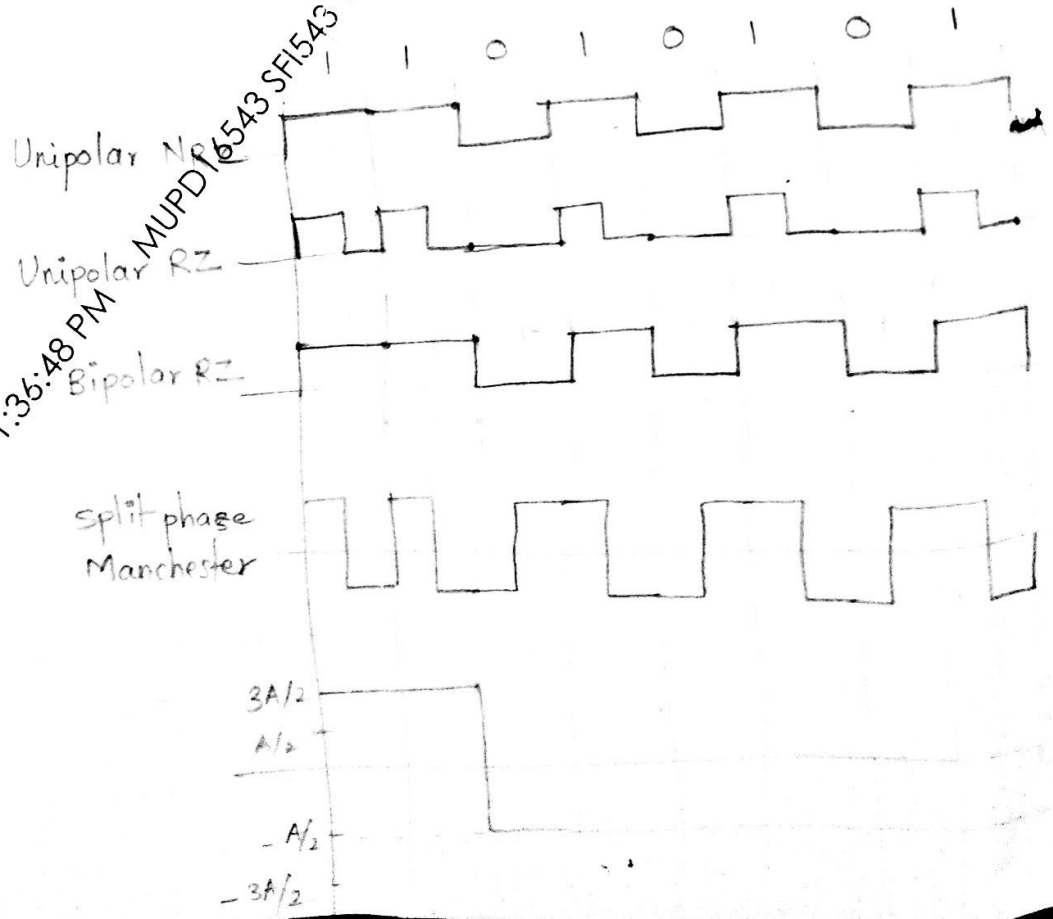
5 - 30 }
6 - 30 40
~~7 - 30~~ 10
8 - 30 40
~~9 - 30 40~~ 20
180

$P_c = \frac{E_c^2}{2R} \Rightarrow E_c = \sqrt{2P_cR}$

$P_{SB} = \frac{E_c^2 m^2}{4} =$



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Q.P. Code : 552202

(3 Hours) [Total Marks : 80]

Note: 1) Question **No.1** is **compulsory.**
2) Out of remaining attempt **any three**.
3) Assume & mention suitable data wherever required.
4) **Figures** to **right** indicates **full marks.**

1. Solve **any four** **20**
   a) Compare analog and digital communication system.
   b) Define modulation. Explain and justify any two need of modulation.
   c) Explain in brief Pre-emphasis and De-emphasis in FM.
   d) Explain in brief the process of quantization.
   e) What is line coding. Draw the NRZ and Manchester signal for the following binary signal 10111010.

2 a) Explain the term thermal noise. Prove that the noise voltage $V_n = \sqrt{4kTBR}$. For electronic device operating at a temperature of 17°C with a bandwidth of 10 KHz, determine **10**
1. Thermal noise power in dBm. 2. RMS noise voltage for a 100 Ω internal resistance and a 100 Ω load resistance.

b) State and prove time scaling property of Fourier transform. Determine the Fourier transform for a rectangular pulse of amplitude 'A' and time period 'T' is from-T/2 to+ T/2 **10**

3. a) An AM signal appears across a 50 Ω load and has the following equation $v(t) = 12(1 + \sin 12.566 \times 10^3 t) \sin 18.85 \times 10^6 t$ volts **10**
   i) Sketch the envelope of this signal in time domain.
   ii) Calculate modulation index, sideband frequencies, total power and bandwidth.

   b) What are the limitations of TRF' receiver. Explain how these limitations are avoided using super heterodyne receiver. **10**

4. a) With the help of neat circuit diagram explain the working of Ratio detector. **10**
   b) What is multiplexing in communication system. Draw and explain in brief the transmitter and receiver of FDM. **10**

5. a) State and prove sampling theorem for low pass band limited signal .Explain aliasing error. **10**

   b) What are the various pulse modulation techniques? Explain how PPM is obtained from PWM. **10**

6. a) Explain in brief the generation and detection of Delta modulation. **10**

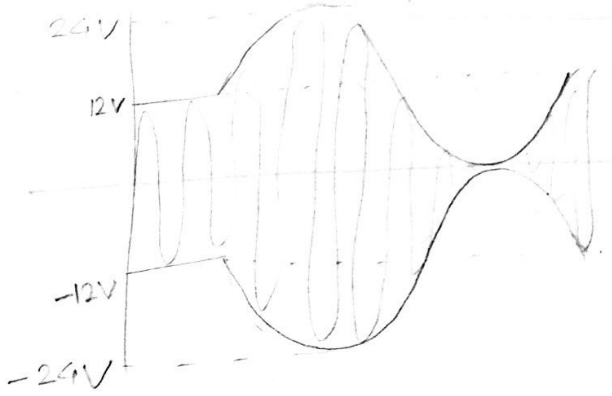
   b) Explain the generation and detection of ASK signal with block diagram and waveforms. **10**

Q 3 a) $V_{AM} = V_c(1 + m \sin \omega_m t) \sin \omega_c t$

$V(t) = 12(1 + \sin 12.566 \times 10^3 t) \sin 18.85 \times 10^6 t$

load Resistance = 50 Ω

1) time Domain Envelope :-



$m = \frac{V_m}{V_c}$, $m = 1$

$V_m = V_c$

$V_{max} = 24V$

$V_{min} = 0$

$2\pi f_m = 12.566 \times 10^3$

$\therefore f_m = \frac{6.283 \times 10^3}{\pi} = 2 kHz$

$2\pi f_c = 18.85 \times 10^6$

$f_c = \frac{9.425 \times 10^6}{\pi} = 3 MHz$

2) M.I (m) = 1

3) Sideband frequencies :- $f_c - f_m$ & $f_c + f_m$

$\therefore f_{LSB} = 2998 kHz$, $f_{USB} = 3002 kHz$.

4) Total power: $P_{AM} = P_c\left(1 + \frac{m^2}{2}\right) = \frac{V_c^2}{2R}\left(1 + \frac{m^2}{2}\right) = \frac{12^2}{2 \times 50}\left(1 + \frac{1}{2}\right)$

$= \frac{144}{100}(1.5)$

$= 2.16$ Watt

5) Bandwidth ; $BW = 2f_m = 4 kHz$ //

Q. P. Code: 35136

Time: 3 hours Total Marks : 80

N.B. (1). Question No.1 is compulsory.
(2). Out of remaining attempt any three.
(3). Assume & mention suitable data wherever required.
(4). Figures to right indicates full marks.

Q1 Write any **four** of the following 20

a) Explain pre-emphasis & de-emphasis
b) Explain shot noise & transit time noise in brief
c) State drawbacks of delta modulation system & how it is removed
d) Explain principles of Sky wave propagation in brief.
e) State and prove differentiation property in time domain of Fourier transform Pg 2.38

Q2

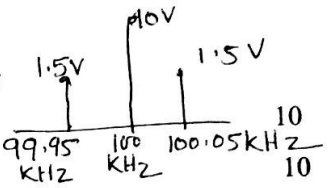
a) Explain PWM generation & degeneration method in detail 10

b) Explain PCM Encoder & PCM decoder with block diagram 10

Q3

a) a sinusoidal carrier has an amplitude of 10 V & a frequency of 100 KHz. It is amplitude Modulated by a sinusoidal voltage of amplitude 3V & a frequency of 500 Hz. Modulated Voltage is developed across 75 Ω. Pg. 1.26 (Ex 1.4.5.11) J.S. Katre

(i) Write the equation of modulated wave $e_{AM} = 10[1 + 0.3\cos 1000\pi t]\cos(2\pi \times 10^3 t)$
(ii) Determine modulation index $m = 0.3$
(iii) Calculate total average power $P_t = 0.6967\,W$
(iv) Power carried by sidebands $\longrightarrow P_{SB} = 0.03W$
(v) Spectrum of modulated wave



10

b) Explain in detail indirect method of generation of FM with suitable diagram 10

Q4

a) What is multiplexing in communication system? Draw and explain transmitter and Receiver of FDM 10

b) Explain with reference to AM receiver (i) fidelity (ii) selectivity (iii) sensitivity iv) Image frequency and its rejection. (v) Double spotting 10

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Q5

a) Draw the ASK, FSK & PSK waveforms for digital data **11010011** 06

b) What do you mean by inter symbol interference & how it is avoided 08

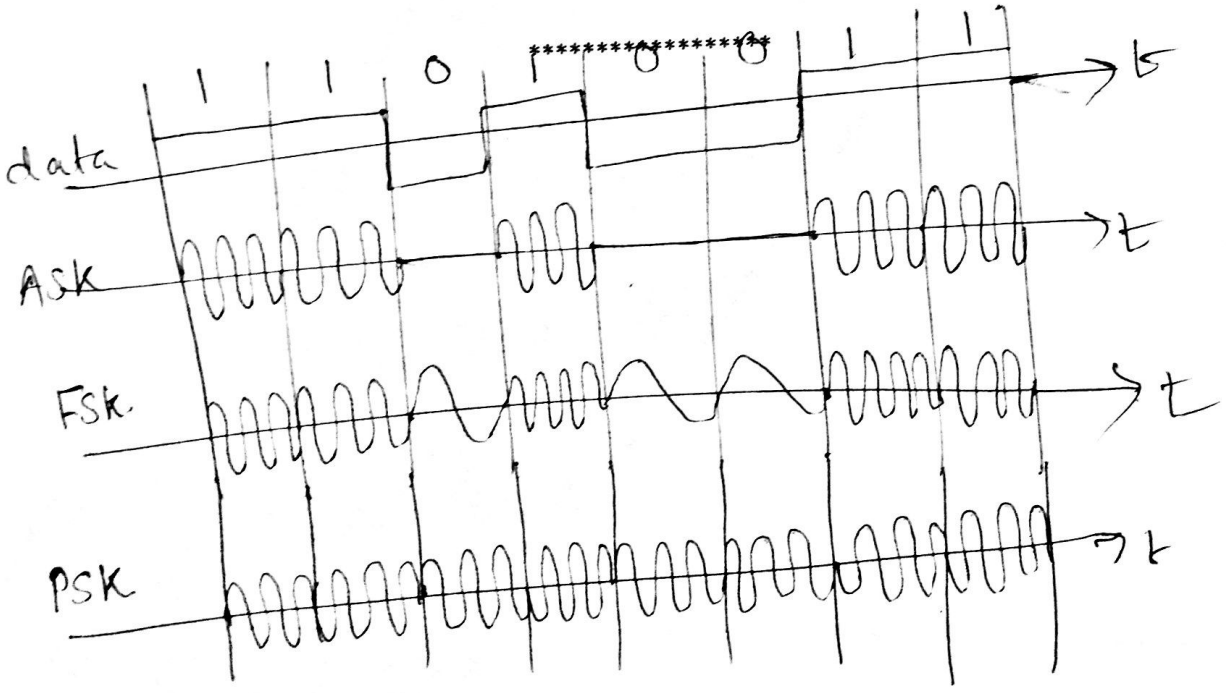
c) What do you mean international standards for communication system? How frequencies are allocated? 06

20

Q6 Write short notes on **(any four)**

a) friss formula b) sampling theorem c) line codes d) types of communication channel

e) Space wave propagation



Q. P. Code : 37358

Time : 3 hours Marks : 80

N.B. (1). Question No.1 is compulsory.

(2). Out of remaining attempt any three.

(3). Assume & mention suitable data wherever required.

(4). Figures to right indicates full marks.

Q.1. Solve any four **[20]**

a). Compare analog modulation and digital modulation.

b). Explain FM noise triangle

c). Compare eye pattern with neat diagram..

d). Explain the process of quantization..

e). Explain bitrate and baud rate.

Q.2 **a)**. Explain the following 1). Shot noise 2). Equivalent noise temperature. [5]

b). Derive the formula for equivalent noise temperature. An amplifier has a noise figure of 6dB..Calculate its equivalent noise temperature. [5]

c). State and prove the following properties of Fourier transform with example

i) Time shifting ii) Differentiation in time domain [10]

Q.3. a) The AM Transmitter develops an unmodulated power o/p of 400 Watts across a 50Ω resistive load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.8. Assuming f_m= 5 KHz and f_c= 1MHz.

(i) Obtain the value of carrier amplitude Vc and hence write the expression for AM signal.

(ii) Find the total sideband power.

(iii) Draw the AM wave for the given modulation index. [10]

b). What are the drawbacks of TRF receiver. How it is overcome by super heterodyne receiver. Explain in brief.. **[10]**

Q.4 **a).** With the help of neat block diagram explain in brief indirect method of FM generation. **[10]**

b). what is multiplexing in communication system. Describe the multiplexing hierarchy for digital multiplexing. **[10]**

Q.5. **a).** State sampling theorem and explain anti- aliasing filter. **[6]**

b).A bandpass signal has a spectral range that extends from 20 KHz to 82KHz. Find the sampling frequency fs. **[4]**

c). Draw the block diagram of PWM generator. Explain the working giving waveforms at the output of each block. [10]

Q6 **a).**How is adaptive delta modulation is better than linear delta modulation? Draw block diagram of adaptive delta modulation and explain each block in detail. **[10].**

b) . Explain the generation and detection of FSK signal. **[10]**

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