Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: EC208

Course Name: ANALOG COMMUNICATION ENGINEERING (EC)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

			Marks
1	a)	Explain different types of noises that are generated in an amplifier.	(8)
	b)	Draw the circuit diagram of a diode detector and explain its working.	(7)
2	a)	Two resistors of values 10kΩ and 20kΩ in an amplifier are kept at 50°C. The bandwidth of the amplifier is 1 MHz. Find the equivalent thermal noise voltages generated by these resistors when they are connected (a) in series and (b) in parallel.	(6)
	b)	Derive the spectrum for sinusoidally modulated AM wave and also derive the expression for the total average power.	(9)
3	a)	Define noise factor and derive the expression for the output noise power of an amplifier in terms of noise factor.	(6)
	b)	Draw the block diagram of AM transmitter and explain it.	(6)
	c)	The tuned circuit of the oscillator in an AM transmitter employs a 50μH coil and a 10nF capacitor. The output of the oscillator is modulated by speech signal frequencies up to 4 kHz, what is the frequency range occupied by the sidebands	(3)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	With the help of a block diagram, explain the phase shift method of SSB generation. Derive the expression for the output voltage.	(9)
	b)	Prove that the average power in an FM wave is equal to its un-modulated carrier power.	(6)
5	a)	What are the drawbacks of a tuned radio frequency (TRF) receiver? With the block diagram of a super-heterodyne receiver, explain that they do not suffer from these drawbacks.	(10)
	b)	Calculate the percentage power saving when the carrier and one of the sidebands	(5)

are suppressed in an AM wave with modulation index equal to (a) 1 and (b) 0.25.

6 a) With the block diagram of transmitter and receiver, explain pilot carrier SSB system. (10)

b) Make a comparison of AM with FM (5)

PART C

Answer any two full questions, each carries 20 marks.

7 a) With the block diagram, explain Armstrong method for FM generation. (10)

b) Draw the circuit diagram of amplitude limiter and explain its working. (10)

8 a) With the help of circuit diagram, explain the working of a varactor diode modulator. (10)

b) Using expressions, compare FM and PM and show that FM may be generated using PM. (5)

c) What are the basic functions of a telephone set? (5)

9 a) With the help of a circuit diagram, explain the working of a JFET reactance modulator. (10)

b) Explain the working of a cordless telephone. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EC208

Course Name: ANALOG COMMUNICATION ENGINEERING (EC)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

1 a) 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 ambient temperature is 27^0 C. (5)

b) Define AM. Draw a neat AM waveform its frequency spectrum for sinusoidal AM. Also derive the expression for AM. (10)

2 a) Derive the expression for power, voltage and current in AM. (5)

b) The antenna current of an AM transmitter is 8Amp when only the carrier is sent, but it increases to 8.93 Amp when the carrier is modulated by a single sine wave. Find the percentage modulation. (5)

c) Write short note on the following: (5)
i) Short noise ii) Burst noise

3 a) Draw the block diagram of an AM transmitter. Explain the working of each block. (10)

b) Write at least four reasons for which modulation is needed in an analog communication system. (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) With help of the block diagram explain SSB reception using phasing method and derive the expression forits final output. (7)

b) Define image frequency and image rejection ratio. (4)

c) Compare AM and FM with any 4 main points. (4)

5 a) With the help of a block diagram, explain the working of pilot carrier SSB transmitter and receiver. (7)

b) Define FM. Draw a neat FM waveform and derive the expression for FM. (8)

6 a) Draw the block diagram of SSB reception using third method (Weaver's method). Derive the expression of its output and explain the working principle. (7)

b) Draw the block diagram of a superheterodyne receiver and explain the working of each block. (8)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Derive the expression for sinusoidal PM and show the equivalence between FM and PM. (10)

b) With neat circuit diagram explain the working of a Foster-Seeley discriminator. Also draw the discriminator response (V/f). (10)

8 a) Draw the block diagram of FM transmitter using indirect method and explain its working. (10)

b) Describe the working of a varactor diode modulator in FM. (10)

9 a) Describe the working of a Transistor modulator in FM. (10)

b) Draw and explain pre-emphasis and de-emphasis circuits used in FM. (5)

c) Explain the working principle of DTMF. (5)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code: EC208

Course Name: ANALOG COMMUNICATION ENGINEERING (EC)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any 2 questions. Question No.1 is compulsory.

1 a) Starting from the representation of sinusoidally modulated AM wave: - (10)
i) Find the frequency spectrum for sinusoidal AM
ii) Derive the equation for total transmitted power

b) Give reason for the occurrence of double spotting in AM receivers. (5)

2 a) Draw the block diagram and explain the working of a low-level AM transmitter. (10)

b) A transmitter with a 10KW carrier transmits 11.2 KW when modulated with a single sine wave: - (5)
i) Calculate the modulation index.
ii) If the carrier is also simultaneously modulated with another sine wave at 50% modulation, calculate the total transmitted power

OR

3 a) Explain the working of a diode detector for AM demodulation with diagrams. (10)

b) A 12 GHz receiver consists of first stage with gain G1 =30 dB and noise temperature T1 =20 K, a second stage with gain G2 = 10 dB and noise temperature T2 = 360K and third stage with gain G3 = 15 dB and noise temperature T3 = 1000 K. Calculate the effective noise temperature and noise factor of the system. Take the reference temperature as 290 K. (5)

PART B

Answer any 2 questions. Question No.4 is compulsory.

4 a) With block diagram, explain the working of a super heterodyne receiver and list their advantages. (10)

b) Write the advantages of double conversion receiver. (5)

5 a) With neat block diagram, explain the generation of SSB using phasing method. (10)

b) Explain the factors that affect the sensitivity and selectivity of a super heterodyne receiver. (5)

OR

6 a) With block diagram, explain the working of a balanced modulator circuit using FETs, for the generation of double sideband suppressed carrier. (10)

b) Compare the merits and demerits of AM and FM. (5)

PART C

Answer any 2 questions. Question No.7 is compulsory.

7 a) With a block diagram, explain the FM demodulator using PLL. (10)

b) Explain with diagrams, how the response of parallel tuned circuit is made use for the demodulation of FM. (10)

8 a) With block diagram, explain the working of a Foster Seeley discriminator. (10)

b) With supporting equations and block diagram, explain how the FM can be obtained using PM. (10)

OR

9 a) Explain FM modulator circuit using JFET reactance modulator, taking particular case of Z_1 as capacitive reactance and Z_2 as pure resistance. (10)

b) Explain with circuit diagrams and response, the pre-emphasis and de-emphasis in FM. Also write the need for pre-emphasis and de-emphasis in FM. (10)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

Course Code**: EC 208**

Course Name**: ANALOG COMMUNICATION ENGINEERING (EC)**

Max. Marks:100 Duration: 3 Hours

PART A

Answer any 2 questions. Question No.1 is compulsory.

1. (a) The noise output of a resistor is amplified by a noiseless amplifier having a gain of 60 and a bandwidth of 20kHz, A meter is connected to the output of the amplifier reads 1mV rms (a) The bandwidth of the amplifier is reduced to 5kHz, its gain remaining constant .What does the meter read now? If the resistor is operated at 80^0C, what is its resistance? (8)

   (b)When the percentage modulation is 75, an AM transmitter produces 10kW. How much of this is carrier power? What would be the percentage saving in power if the carrier & one of the sidebands were suppressed before transmission took place? (7)

2. (a) Define Noise Figure & Noise factor. Derive the expression for overall Noise Factor (F) of cascaded amplifiers. (8)

   (b) Why modulation used in analog communication? What are the sources of noise that affect the communication quality? (7)

3. (a) Derive the equation for AM wave. Plot the frequency spectrum of AM if the carrier is of maximum amplitude 5V, 100 kHz is simultaneously modulated by three modulating signals of amplitude 2V, 5kHz; 1.5V, 2kHz & 1V, 1kHz respectively. Obtain the bandwidth &effective modulation index. (8)

   (b)With neat diagram explain working of envelope detector. The output of a diode envelope detector with a load resistance of 5 kΩ, is fed through a dc blocking capacitor to an amplifying stage which has an input resistance of 10kΩ. Determine the maximum depth of modulation the detector can handle without negative peak clipping? What is the other error associated with envelope detector? How it can be avoided? (7)

PART B

Answer any 2 questions. Question No.4 is compulsory.

4. (a) Prove that balanced modulator suppresses the carrier. (7)

   (b) An AM radio uses a superhetrodyne receiver. The mixer translates the carrier frequency f_c to a fixed IF of 455 kHz by using a local oscillator of frequency f_{LO}. The broadcast-band frequencies range from 555 kHz to 1605 kHz. (a) Determine the range of frequency tuning and capacitor tuning that must be provided in the local oscillator (i) when f_{LO} is higher than f_c (and (ii) when f_{LO} is lower than f_c. Based on the results obtained in (a), explain why the usual AM radio receiver uses f_{LO} higher than f_c. (8)

5. (a) With a neat diagram explain the Weaver's method for SSB generation. State the advantages and disadvantages of this method (10)

   (b) What is ISB? Compare SSB and ISB. (5)

6. (a) With neat block diagrams, compare single versus double conversion super heterodyne receivers. (8)

   (b) If the signal v(t)= 20 sin(2π x 10^6t + 10 sin2π x 10^3t) represents a FM signal, determine i)The carrier frequency ii) The modulating frequency iii) The modulation index, iv) band width required, v) average power if the load resistance is 50Ω. Also write the expression for FM signals if the modulating frequency is doubled. (7)

PART C

Answer any 2 questions. Question No.7 is compulsory.

7. Describe the working of a Varactor Diode FM Modulator and balanced slope detector. (20)

8. (a) With a neat block diagram explain FM transmitter using indirect method. (10)

   (b) Given FM and PM modulators with the following parameters: Deviation sensitivity as 1.2 kHz/v & 1.2rad/volt respectively. Carrier: 20 cos(2π x 500x10^3t) ; Modulating signal: 5cos (2π x 10^3t) (i) Determine the modulation indices, bandwidth and sketch the output spectrum for both modulators. (ii) Half the modulating frequency and Determine the modulation indices and sketch the output spectrum for both modulators. Assume random value for the Bessel coefficients (10)

9. (a) Why pre-emphasis and de-emphasis are used in FM? Draw the circuit diagrams and the characteristics of pre-emphasis and de-emphasis circuits. (10)

   (b) Describe functional block diagram of a standard telephone set. (10)

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