Chendu College of Engineering & Technology

(Approved by AICTE, New Delhi and Affiliated to Anna University)
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SUBJECT NAME:COMMUNICATION THEORY **YEAR/SEM:** II/IV

SUBJECT CODE: EC 6402

UNIT I:l (AMPLITUDE MODULATION)

PART A

1. Compute the bandwidth of the AMP signal given by S(t)=23(1+0.8(310t)} cos (23000t)**(MAY/JUNE 2012)**
2. What are the causes of linear distortion?**(MAY/JUNE 2012)**
3. An Amplitude modulation transmitter radiated 1000 watts of unmodulated power. If the carrier is modulated simulatanesousl;y by two tones of 40% and 60% respectively, calculated the total power radiated.**(NOV/DEC2012)**
4. Calculate the local oscillator frequency if incoming frequency is F1 and translated carrier frequency isF2**(NOV/DEC2012)**
5. What are the advantage of Converting the low frequency signal into the high frequency signal?**(MAY/JUNE 2013)**
6. Compare bandwidth and power requirement in terms of carrier power pC.for AM.DSB-SC and SSB**(MAY/JUNE 2013)**
7. State the difference between single side band and vestigial side band transmission system**(MAY/JUNE 2014)**
8. For an AM system the instantaneous values of carrier and modulated signal are60sinwct and 40sinwct respectively. Determine the modulation index **(MAY/JUNE 2014)**
10. How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest frequency modulating a carrier i s 5 kHz?**(April/May2010)**
11. What are the causes of linear distortion?**(April/May2010)**
12. How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest frequency modulating a carrier i s 5 kHz?**(Nov/Dec2010)**
13. State the applications of FDM.(**(NOV/DEC2010)**
14. What are the vestigle side band **(April/May2011)**
15. Calculate the local oscillator frequency if incoming frequency is F1 and translated carrier frequency isF2**(April/May2011)**
16. Define modulation?
17. What are the types of analog modulation?
18. What are the advantages of VSB-AM?
19. Compare linear and non-linear modulators.
20. How will you generating DSBSC-AM ?
21. Define demodulation.
22. draw the block diagram of coherent detector.
23. Define multiplexing.
24. Define sensitivity.
25. ..Define selectivity.

PART B

1(i).Draw an envelope detector circuit used for demodulation of AM and explain its operation **(May/June2012)**
2...How SSB can be generator using Weavers method ? Illustrate with a neat block diagram **(May/june2012)**
3.What is frequency division multiplexing ?Explain(**(May/June2012)**
4. Compar various Amplitude modulation System**(May/june2012)**
5. Define Amplitude modulation .how an amplitude modulated signal can be generated using a non linear modulated circuit **(Nov/Dec 2012)**
6. What is DSB_SC signal? Write the working of a synchronous detector used to detect the DSB_SC signal with the the output amplitude spectrum of each block **(Nov/Dec2012)**
7. Discussin details about the frequency translation and frequency division multiplexing technique with neat diagram**(Nov/Dec2012)**
8. Compare Amplitude Modulation and frequency Modulation**(Nov/Dec2012)**
9. Discuss on the frequency components present in a periodic and non periodic signal? Derive the equation of an Am wave .Also draw the modulated Am wave for various modulation index**(May/june2013)**

10. The antenna current of an Am transmitter is 8 ampere when only the carrier is sent the current increase to8.93 A when the carrier is modulated by a single sine wave. Find the percentage modulation **(May/June2013)**
11. Draw the VSB spectrum and explain the significance **(May/June2013)**
12. How do you demodulate AM signal? Explain**(May/June2013)**
13. A1000KHZ carrier is simultaneously AM modulated with 300HZ, 800HZand 1.5 KHz audio sine wave. What will be the frequency present in the output **((May/June2013)**
14. Explain the need for carrier suppression in an AM system. Draw and explain the function of one such system **(May/June2014)**
15. Explain the working of a AM transmitter and that of a receiver with a suitable block schematic **(May/june2013)**
16. With the help of neat diagram, explain of an envelope detector? Why does negative clipping take place **(April/May2011)**

Unit-2: (ANGLE MODULATION)

PART A:-

1. Illustrate the relationship between FM and PM, with block diagram **(May/June2012)**
2. What is meant by detection? Name the method for detecting FM signal **(May/June2012)**
3. How is narrow band Fm converted into the wideband FM?**(Nov/Dec2012)**
4. Acarrier is frequency modulated by a sinusoidal modulating frequency 2KHZ.**(Nov/Dec2012)**
5. Resulting in frequency deviation of 5KHZ what is the bandwidth occupied by the modulated waveform **(Nov/Dec2012)**
6. Define the modulation index of FM**(May/June2013)**
7. What is the need for preEmphasis**(May/June2013)**
8. Define White noise?**(May/June2014)**
9. If the maximum phase deviation in a phase modulation system when a modulating signal of an 10v is applied is 0.1 radian determine the value of phase deviation **(May /june2014)**
10. What is mean by detection? Name the method detecting FM signal? **(April/may2011)**
11. What is Rayrelay and Ricianmethod**(April/May2011)**
12 draw the block diagram of coherent detector.
13. Define multiplexing
14. Define sensitivity.
15. Define selectivity.
16. Define stability.
17. Define super heterodyne principle.
18. What are the drawbacks of emitter modulator?
19. Define frequency modulation
20. Define modulation index of frequency modulation
21. What do you meant by multitone modulation?
22. Define phase modulation.
23. How FM wave can be converted to PM wave?
24. How PM wave can be converted to FM wave?
25. What are the types of Frequency Modulation?

PART-B

1.Fig.shows the block diagram of WBFM modulator used to transmit audio signal containing frequency in the rane of 100HZto 15HZ .the desired FM signal frequencies in the range of 100mhz and a minimum frequencies deviation of 75hz Assume the modulation index**,(May/June2012)**
2. Draw the circuit diagram of foster Seeley Discriminator and explain its working principle with relevant Phasor Diagram**.(may/june2012)**
3. Derive the expression for wide band FM in terms of Bessel functions **(Nov/Dec2012)**
4. How can FM be derived from PM and vice verse? Explain in details **(Nov/Dec2012)**
5. Explain any two methods used for FM detection, with neat Sketches **(Nov/Dec2012)**
6. Derive the mathematical representation of FM signa**l (May/June2013)**
7. When the frequency in an FM system is400Hz and the modulating voltage is2.4V.the modulation indexis60.calculate the maximum deviation. What is the modulating index when the modulating frequency is reduced to250Hz and the modulating voltage is simultaneously **(May/June2013)**
8. Explain the Armstrong method to generate FM signal**(May/June2013)**
9. How is the phase and frequency modulation are related? Explain **(May/June2013)**
10. Explain the amstrongmethodof FM Signal**(May/june2014)**

11. Explain the function of any FM detector circuit**(May/June2014)**
12. Explain how FM is achieved using varactordiodes**(May/June2014)**
13. Make the atleasty five comparisons of AM and FM system **(May/June2014)**
14. Derive the single tone frequency modulation and draw it is frequency response**(may/june2011)**
15. An angle modulated wave is described by the equation V(t)=10Cos(2*10t+10Cos200t)
Find1. Power of the modulated signal
2. Maximum frequency deviation
3. Band width

UNIT3: (RANDOM PROCESS)

PART A:-

1. Define a random variable. Specify the sample space and the random variable for a coin tossing experiment **(may/June2012)**
2. Give the definition of noise equivalent temperature**(May/June2012)**
3. Define a random variable. Specify the sample space and the random variable for a coin tossing experiment **(Nov/Dec2012)**
4. Calculate thermal noise voltage across the simple RC circuit,**(Nov/Dec2012)**
5. Define white noise **(May/June2013)**
6. Define noise figure **(May/June2013)**
7. state the Shannon's theorem**(May/June2014)**
8. State the need for pre-emphasis and de-emphasis circuit in the field of communication **(May/june2014)**
9. What is the basic difference between an AM signal and a narrowband FM signal?
10. What are the two methods of producing an FM wave?
11. Compare WBFM and NBFM.
12. List the properties of the Bessel function.
13. Give the average power of an FM signal.
14. Define phase deviation.
15. Define frequency Deviation.
16. State the Carson's rule.
17. Define the deviation ratio D for non-sinusoidal modulation.
18. What is the use of crystal controlled oscillator?
19. . What are the disadvantages of FM system?
20. How will you generate message from frequency-modulated signals?
21. What are the types of FM detectors?
22. What are the types of phase discriminator?
23. What are the disadvantages of balanced slope detector?
24. Define probability.
25. Define probability density function.

PART B:

1. List the different types of random process and give the definition **(May/june2012)**
2. Write short notes on shot noise **(May /june2012)**
3. Write the definition, power spectral density and autocorrelation function for white noise and narrow band noise **(May/June2012)**
4. What causes thermal noise in a material? Write the expression for RMS value of the noise
5. Derive the expression for shot noise voltage**(Nov/Dec2012)**
6.Give the properties of auto correlation function**(Nov/Dec2012)**
7. A mixer stage has a noise fig of 20 db and this is preceded by an amplifier that has a noise fig of 9db and an amplifier gain of 15db.calculate the overall noise figure referred to the input **(Nov/Dec2012)**
8.A receiver has a noise fig of12db and it is fade by allow noise amplifier that has again of 50db and a temperature of 90k.Calculate the noise temp.of the receiver and the overall noise tempn of the receiving system take room temp is290K**(Nov/Dec2012)**
9. write short noise and thermal noise**(may/june2013)**
10. Derive the relationship between noise fig and equivalent noise temp **(may/june2013)**
11. Explain the following terms mean correlation covariance,ergodicityc**(may/june2013)**
12. How do you represent narrowband noise **(may/june2013)**
13. Define and explain the following :**(may/june2014)**
i. Gaussian noise and Gaussian distribution
ii. Thermal noise

iii. Shot noise
14. What type of Gaussian noise follow
15. a) (i) Give a random process, X(t) = Acos(!t+µ), where A and ! are constants and µ is a uniform random variable. Show that X(t) is ergodic in both mean and autocorrelation (ii) Write a short note on shot noise and also explain about power spectral density of shot noise. **(April/may2010)**

Unit4: (NOISE CHARACTERIZATION)

PART A:-

1.What are the characteristics of superheterodyne receivers?
2. What are the methods to improve FM threshold reduction?
3. compare the noise performance of DSBSC receiver using coherent detection with AM receiver using envelope detection?**(april/may 2011)**
4.what are the methods to improve FM threshold reduction? **(april/may 2011)**
5.define threshold effect in AM receiver?**(Nov/Dec 2011)**
6.what is FM threshold effect? **(Nov/Dec 2011)**
7.what are the characteristics of superheterodyne receivers?
8.what are the methods to improve FM threshold reduction?
9. define threshold effect in FM receiver?
10.define pre-emphasis and de-emphasis.**(april/may 2010)**
11.draw the circuit diagram of pre-emphasis filter?**(april/may 2010)**
12.what is meant by capture effect?**(Nov/Dec 2010)**
13.what is the significance ofpre-emphasis and de-emphasiscircuit?**(Nov/Dec 2010)**
14.what is coherent system?**(may/june 2013)**
15.what is carson's rule?**(may/june 2013)**
16.What are the disadvantages of FM system?
17.How will you generate message from frequency-modulated signals?
18.What are the types of FM detectors?
19.What are the types of phase discriminator?
20.What are the disadvantages of balanced slope detector?
21.Define probability density function.
22.Define noise.
23.Give the classification of noise.
24.What are the types of External noise?
25.What are types of internal noise?
26.What are the types of extraterrestrial noise and write their origin?

PART B:

1. Determine the range of tuning of a local oscillator of a super Heterodyne receiver when flo>fc.the broad cast frequency range is 542Hzto 1600hz
Assume if=455Khz(**May/June2012)**
2. What is capture effect in FM**(May/June2012)**
3. Compare the noise performance of DSBSC receiver using coherent detection with AM receiver using envelope detection**(Nov/Dec2012)**
4.Define pre-emphasis and de emphasis**(Nov/Dec2012)**
5.Draw the super heterodyne receiver and explain the operation of each block**(may/june2013)**
6.Derive the figure of merit for non coherent system with suitable assumption**(may/june2013)**
7. Derive the figure of merit of aFM system **(may/june2013)**
8. Explain FM threshold**(may/june2013)**
9. Explain the advantages of the usage of super heterodyne receiver may **(may/june2014)**
10. Explain the envelope detection with a suitable diag**(may/june2014)**
11. Express method of coherent detection **(may/june2014)**
12. Compare at least three important characteristics of various fm systems **(may/june2014)**
13. Derive an expression for SNR at input (SNRc) and output of (SNRo) of a coherent detector
14. Explain pre-emphasis and De-emphasis in detail.**(April/May2010)**
15. Compare the performances of AM and FM systems **(April/May2010)**

UNIT V: (INFORMATION THEORY)

PART A:-

1.A source generate three message with probability 0.5,0.25,0.25 calculate source entropy.**(MAY/JUNE 2012)**
2.State the advantages of Lempel – Zip-Coding **(MAY/JUNE 2012)**
3.State source coding theorem **(Nov/Dec 2012)**
4.Define Shannon's channel coding theorem. **(Nov/Dec 2012)**
5.Define entropy and its property **(May/June 2013)**
6.Define mutual information and channel capacity **(May/June 2013)**
7.Define Noise figure **(May/June 2014)**
8.Define the sensitivity characteristics of radio receiver **(May/June 2014)**
9.Define transit time of a transistor.
10.Define flicker noise.
11.State the reasons for higher noise in mixers.
12.Define signal to noise ratio.
13.Explain thermal noise.
14.Give the expression for noise voltage in a resistor.
15.Explain White Noise.
16.What is narrowband noise?
17.Give the representation of narrowband noise in terms of envelope and phase components.
18.Give the Friss formula in terms of noise temperature.
19.What is intermediate frequency?
20.Define Partition noise.
21.Give the expression for noise voltage when several sources are cascaded.
22.Define random variable
23.DEfine Random process.
24.Give the Laws of probability.
25.What is frequency translation?

PART B:

1.A database management system as following alphabet with probability of occurrence as shown below

Symbol: So	S1	S2	S3	S4	S5	S6
Probability: 0.125	0.0625		0.125	0.0625	0.125	0.125	0.125

Generate huff-man code with minimum code variance. Determine the code variance and code efficiency
2.Derive Shannon hartly theorem for the channel capacity of the continuous channel having an average power limitation perturpted by an attitive band limited white Gaussian noise. Explain band with signal to noise ratio. Trade off for this theorem.**(MAY/JUNE 2012)**
3.Consider a discrete memory less source with seven possible symbols Xi ={1,2,3,4,5,6,7} with associated probability pr ={0.37,0.33,0.16,0.07,0.04,0.02,0.01}. Construct the Huffman's code and determine the coding efficiency and redundancy. **(Nov/Dec 2012)**
4.A discrete memory less source emits 5 symbols whose associated probabilities are as given below. Construct Shannon fano code and determine the efficiency. **(Nov/Dec 2012)**

Symbols:	X0	X1	X2 `X3	X4
Probabilities:	0.4	0.19`0.16	0.15	0.1

5.Derive the channel capacity of a continuous band limited white Gaussian noise channel. **(Nov/Dec 2012)**
6.Discuss about rate distortion theory **(Nov/Dec 2012)**
7.State Shannon's theorems and explain**(May/June 2013)**
8.Consider the following binary sequence 11101001100010110100… use the Lempel-Ziv algorithm to encode this sequence. Assume that the binary symbols 0 and 1 are already in the codebook. **(May/June 2013)**
9.A telephone network has a bandwidth of 3.4 KHz. Calculate the information capacity of the telephone channel for a signal-to-noise ratio of 30 db**(May/June 2013)**
10.Calculate the minimum signal-to-noise ratio required to support information transmission through the telephone channel at the rate of 9600 bits/sec with bandwidth of 9.6 KHz. **(May/June 2013)**
11.Explain Huffman coding system with an example **(May/June 2014)**
12.Explain the need for source coding and channel coding **(May/June 2014)**
13.Explain how channel capacity could be improved. Explain the S/N trade off in detail **(May/June 2014)**