PRATHYUSHA ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SUBJECT CODE / SUBJECT NAME: EC8491 / COMMUNICATION THEORY

REGULATION 2017

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 simultaneously by two tons 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 is F2 **(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 are 60sinwct and 40sinwct respectively. Determine the modulation index **(MAY/JUNE 2014)**

9.   How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest frequency modulating a carrier is 5 kHz? **(April/May2010)**

10.   What are the causes of linear distortion?**(April/May2010)**

11.   How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest frequency modulating a carrier is 5 kHz?**(Nov/Dec2010)**

12.   State the applications of FDM.(**(NOV/DEC2010)**

13.   What are the vestigial side band **(April/May2011)**

14.   Calculate the local oscillator frequency if incoming frequency is F1 and translated carrier frequency is F2 **(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.   Compare 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.   Discuss in 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 to 8.93

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.   A carrier 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 Pre-Emphasis**(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**.**

10.   What is mean by detection? Name the method detecting FM signal? **(April/may2011)**

11.   What is Rayley and Rician method **(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?

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 versa? 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 is 2.4V. 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 the phase and frequency modulation is are related? Explain **(May/June2013)**

10.   Explain the amstrong method of FM Signal**(May/june2014)**

11.   Explain the function of any FM detector circuit **(May/June2014)**

12.   Explain how FM is achieved using varactor diodes **(May/June2014)**

13.   Make the atleast 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) Find 1. 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, $X(t) = A\cos(!t+\mu)$, 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 super heterodyne 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 super-heterodyne 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 of pre-emphasis and de-emphasis circuit?**(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 extra-terrestrial 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 1600hzAssume 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 a FM 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 5
SAMPLING AND QUANTIZATION
Part A

1. State sampling theorem.(or) State the Nyquist sampling theorem. (or) State the sampling theorem for low pass signals. (May 2015)

2. Define non- uniform quantisation. (May 2015)

3. Define quantization noise. (or) quantization noise power. (Nov 2010)

4. What is the bandwidth required for transmitting a PCM signal.

5. Define aliasing. (May 2016)

6. State any 2 non- uniform quantisation rules. (May 2013)

7. State the advantages of digital communication system over analog communication system. (May 2013,Mayl 2015)

8. What is the major disadvantage of a digital communication system. (May 2015)

9. Distinguish between base band and bandpass signalling

10. What is natural sampling, impulse sampling, flat top sampling.

11. State A-law and mu –law. (Nov 2013)

12. What is companding. Sketch the input-output characteristics of a compressor and an expander. (May 2016)

13. What are the different performance measures of communication systems?

14. What is transmission bandwidth?

15. A signal $x(t) = 5 \cos (1000\pi t)$ is sampled and quantized using 8 bit PCM system. Find the signal to quantization to noise ratio.

16. Define Quantization error.

17. Write the A- law of compression. (Nov 2013)

18. Why is pre-filtering done before sampling? (Nov 2010)

19. Differentiate uniform and non-uniform quantisation

20. Write the advantages and disadvantages of TDM.

21. What is difference between natural and flat top sampling. (Nov 2014)

22. What is natural sampling? (May 2013)

23. Differentiate base band transmission from pass band transmission. (May 2010)

PART B

1. Explain Nyquist sampling theorem and how the message can be reconstructed from its samples.(or) Explain Low pass sampling theorem.   (May 2016,Nov 2014)

2. Explain a PCM system. Derive the expression for quantisation noise of a PCM system with uniform quantizer. (10 marks)   (May 2013)

3. What is Time Division Multiplexing.Explain the difference between analog TDM and digital TDM?   (6)   (May 2016)

4. Explain the operation of PCM with neat block diagram. (10)   (May 2016)

5. Briefly explain Logarithmic Companding of speech signal.

6. Explain the process of quantization and obtain an expression for signal to quantization noise for the case of a uniform quantizer.(16)   (Nov 2013,Nov 2014)

7. Explain the operation of PCM (8)

8. Write a note on TDM (8)

9. Explain the process of quantization and obtain an expression for signal to noise ratio in the case of uniform quantizer(16)

10. State and prove Nyquist sampling theorem (16)

11. .Explain uniform and non- uniform quantization(16 marks)   (May 2010)

12. Write short notes on A-Law and µ-Law(10)

13. .With neat diagrams and necessary equations ,Explain the concepts of sampling and reconstruction of signals (16)

14. What is the need for companding in PCM .Draw the transfer characteristics of a companding system.

15. Explain the operation of TDM.(8)