Code No: R22041 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations January – 2014
ANALOG COMMUNICATIONS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Obtain a single tone AM modulated wave and draw the frequency spectrum of it.
   b) Explain the frequency division multiplexing with the neat block diagram. (7M+8M)

2. a) Explain the operation of the ring modulator with help of a neat block diagram.
   b) Explain COSTAS Loop. (8M+7M)

3. a) A received single tone sinusoidal modulated SSB-SC signal $\cos(\omega_c+\omega_m)t$ has a normalized power of 0.5 volt^2. The signal is to be detected by a carrier re insertion technique, find the amplitude of the carrier to be reinserted so that the power in the recovered signal at the demodulator output is 90 % of the normalized power. The DC component has to be neglected.
   b) Explain the frequency discrimination method of SSB wave. (8M+7M)

4. a) Explain the working of indirect or Armstrong method of FM generation.
   b) Explain the detection FM wave by using the PLL. (8M+7M)

5. a) Prove that the figure of merit of a AM wave for a single tone modulation with 100 % is 1/3.
   b) Discuss the threshold effect in angle modulation technique. (8M+7M)

6. a) Explain how the frequency is stabilized in FM Transmitter.
   b) Explain the AM transmitter for low level modulation. (8M+7M)

7. Explain the following terms associated with Radio receivers.
   a) Fidelity
   b) Image frequency rejection ratio.
   c) Double spotting
   d) AGC (4M+3M+4M+4M)

8. Explain the following
   a) Generation of the PAM.
   b) Comparison of PAM, PWM, PPM. (8M+7M)
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Code No: R22041 **R10** SET - 2

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Time: 3 hours Max. Marks: 75

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1. a) Show that for a single tone AM wave the efficiency is 33% for 100 % modulation.
   b) Explain the envelope detection of a AM wave. (7M+8M)

2. a) The modulating signal f(t) in DSBSC system is a multiple tone signal given by $f(t)= A_1 \cos(\omega_1 t)+ A_2 \cos(\omega_2 t)+ A_3 \cos(\omega_3 t)$, the signal f(t) modulated a carrier of $A_c \cos(\omega_c t)$. Plot the single sided trigonometric spectrum and find the bandwidth of modulated signal. Assume that the $\omega_3 > \omega_2 > \omega_1$ and $A_3 > A_2 > A_1$.
   b) Explain the coherent detection of DSBSC modulated wave and what is quadrature null effect. (7M+8M)

3. a) Compare the DSBSC, SSBSC with AM.
   b) Consider a base band signal m(t) containing frequency components at 100,200 &400Hz.this signal is applied to a SSB modulator together with a carrier at 100 kHz with only upper sideband is retained. If the coherent detection is used to recover the m(t) and the local oscillator frequency supplies a sine wave frequency of 100.02 kHz, determine the frequency components in the detected output. (7M+8M)

4. a) What is the relationship between the PM and FM.
   b) Sketch the FM and PM wave for a modulation signal m(t) as square wave as input.
   c) Compare AM with FM. (5M+5M+5M)

5. a) Draw and explain the model of DSBSC receiver using coherent detection and derive the expression for figure of merit.
   b) Show that the figure of merit for a FM receiver is $\frac{3}{2}\beta^2$. (8M+7M)

6. a) Explain the effect of feedback performance on the AM transmitter.
   b) Explain the working principle of indirect modulated FM transmitter. (8M+7M)

7. a) Explain the functions of receiver.
   b) When a superhetrodyne receiver is tuned to 555 kHz, its local oscillator provides a mixer with an input of 1010 kHz. what is the image frequency? The antenna of this receiver is connected to a mixer via a tuned circuit whose loaded Q is 40. What will be the rejection ratio of the calculated image frequency?
   c) Explain about Amplitude Limiting. (5M+5M+5M)

8. a) Explain the merits and demerits of PAM.
   b) Compare TDM with FDM. (8M+7M)
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Code No: R22041 **R10** SET - 3

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(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the square law modulator of generating AM wave with a neat circuit diagram.
   b) Determine the power content of carrier and each of the side bands for an AM signal having a percent modulation of 80 % and total power of 2500 W. (8M+7M)

2. a) A modulating signal m(t) is applied to a DSBSC system modulator operating at frequency (f_c) of 50 KHz. Sketch the spectrum of the modulated signal if m(t) = 2 cos (4000 π t)+5 cos (6000 π t).
   b) Explain the generation of the DSBSC wave can done using balanced modulator. (8M+7M)

3. a) Show that the VSB wave pulse carrier contains the base band information in its envelope.
   b) Explain the coherent detection of the SSBSC signals. (7M+8M)

4. a) Compare the narrowband FM with wide band FM. Also draw the phasor diagram for NBFM.
   b) Compute the bandwidth requirement for the transmitter of FM signal having a frequency deviation of 75 kHz and bandwidth of 10 kHz. What will be the change in bandwidth if f_m is doubled? Determine the band width when the modulating signal amplitude is doubled. (7M+8M)

5. a) A single tone modulating signal $f(t)= E_m\cos(\omega_m t)$ phase modulates at a carrier of $A_c \cos(\omega_c t)$. Show that the figure of merit is ½ m_f^2 where the m_f is the modulation index for FM.
   b) Draw the pre emphasis circuit and explain the operation. (8M+7M)

6. a) Explain how the frequency stability is obtained using AFC.
   b) Explain each block of the AM transmitter block diagram with high level modulation. (7M+8M)

7. a) Compare the AM receivers with FM receivers.
   b) What is AGC? Explain the types of AGC. (7M+8M)

8. a) Explain the operation of Time Division Multiplexing with the help of neat sketches.
   b) Write a short note on PWM generation techniques. (7M+8M)
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Code No: R22041 **R10** SET - 4

II B. Tech II Semester Supplementary Examinations January – 2014
ANALOG COMMUNICATIONS
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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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1. a) Explain the need of modulation.
   b) For a given AM broad cast station transmits a total power of 50 kW. When the carrier is modulated by a sinusoidal signal with modulation index of 0.707. Calculate:
   i) Carrier power. ii) Transmission efficiency iii) The peak amplitude of the carrier assuming the antenna to be represented by a (50+j0) Ω. (6M+9M)

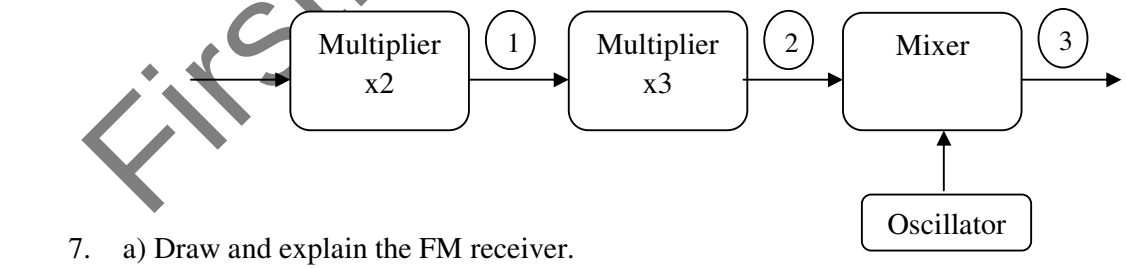
2. a) What is amount of power saving in DSBSC for 100 % modulation and what is bandwidth for it.
   b) Draw the circuit diagram of balanced ring modulator and explain the operation indicating all the waveforms and spectrums. (7M+8M)

3. a) Explain the method of SSB wave generation using phase discrimination method.
   b) What is VSB? Why the VSB technique is widely used in TV receivers. (8M+7M)

4. a) Explain the foster seely discriminator method of FM detection.
   b) In detail compare AM with FM. (8M+7M)

5. a) Explain the noise performance of SSBSC and prove that the signal to noise ratio is 1.
   b) Distinguish between pre emphasis and de emphasis in detail. (8M+7M)

6. a) Explain the variable reactance type FM transmitter.
   b) The following figure shows the block diagram of a frequency multiplication and heterodyne selection of a FM transmitter. Determine the carrier frequency and frequency deviation at points 1, 2, 3. Assume that the point 3 additive frequency is selected by mixer. (8M+7M)



7. a) Draw and explain the FM receiver.
   b) The broad cast super heterodyne receiver has a intermediate frequency of 455 kHz and it is tuned for 1500 kHz. Calculate the image frequency and Q of the circuit having image frequency rejection ratio of 75. (8M+7M)

8. Write a short notes on:
   a) Generation of PPM techniques. b) FDM (8M+7M)

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