

Code No: RT22045

R13

SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017

ANALOG COMMUNICATIONS

(Electronics and communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) With necessary equation, define transmission efficiency of an AM wave? (4M)
- b) What is Quadrature null effect? Explain (3M)
- c) For an angle modulated signal $s(t)=10\cos(2\pi 10^6 t + 5\sin 8\pi 10^3 t)$, determine the Frequency deviation and power? (4M)
- d) Why pre-emphasis and de-emphasis are needed in F.M but not in A.M? Explain. (4M)
- e) A super heterodyne receiver having R.F amplifier is tuned to 555kHz .The local oscillator is adjusted to 1010kHz. Then calculate the I.F and image frequency. (4M)
- f) Why noise immunity of PWM is better than that of PAM? (3M)

PART -B

2. a) Derive the equation and power relation of a single tone modulation of AM system. (8M)
- b) The antenna current of an AM transmitter is 9A when only carrier is transmitted but it increases to 10.6A when the carrier is modulated by a single sine wave. Find the percentage of modulation? Determine the antenna current when the percentage of modulation changes to 0.8? (8M)
3. a) Explain the principle of V.S.B Transmission. What are its advantages over S.S.B? (8M)
- b) With a neat block diagram, explain the operation of phase discrimination method. (8M)
4. a) With necessary equations. Explain the generation of N.B.F.M using narrow band P.M generator. (8M)
- b) Explain the comparisons between FM and A.M techniques. (8M)
5. a) What is noise? Explain the difference between thermal noise and shot noise. (6M)
- b) Explain about noise effect in DSB-SC and obtain necessary expression for figure of merit (10M)
6. a) What is the need for amplitude limiter in FM Receiver? Explain in detail. (8M)
- b) What are the salient features of broadcast radio receivers? Explain in detail. (8M)
7. a) For a PAM transmission of voice signal having maximum frequency equal to $f_m=3\text{KHz}$ calculate the transmission bandwidth. It is given that the sampling frequency $f_s=8\text{KHz}$ and the pulse duration $\tau=0.1 T_s$. (8M)
- b) Explain the generation of PAM with neat block diagram. (8M)

Code No: RT22045

R13**SET - 2****II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017****ANALOG COMMUNICATIONS**

(Electronics and communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART -A

1. a) What is an over modulation in an AM and what is its effect on AM signal. (4M)
- b) Draw the block diagram for the detection of SSB-SC signal using phase discrimination method. (4M)
- c) An unmodulated carrier frequency is given by 1MHz. After frequency modulation, maximum frequency is given by 1.4 MHz. Then find Δf and $f_{\min}$. (4M)
- d) Write short notes on (i) shot noise (ii) Thermal noise (4M)
- e) Define the term fidelity? (3M)
- f) Draw the waveforms of PPM and PWM signals for a sinusoidal modulating signal. (3M)

PART -B

2. a) With a neat block diagram, explain the operation of Frequency division multiplexing technique. (8M)
- b) Explain about diagonal clipping in a diode detector. How it can be eliminated? (8M)
3. a) A carrier signal $c(t)=20\cos 2\pi 10^6 t$ is modulated by a message $m(t)=5\cos 8\pi 10^3 t$ to generate DSB-SC signal. Sketch the spectrum and calculate band width, power, and modulation efficiency. (8M)
- b) Explain the applications of various A.M Systems. (8M)
4. a) Briefly explain about the spectra of NBFM and WBFM. (8M)
- b) Explain the demodulation of F.M signal with the help of PLL. (8M)
5. a) Derive the expression to find the figure of merit of a DSB-SC System. (8M)
- b) What is FM threshold effect? How threshold reduction is achieved in FM receiver? (8M)
6. a) Explain the function of Mixer stage in FM Receiver. (8M)
- b) What are the main functions served by an I.F amplifier? Explain in detail. (8M)
7. a) Explain the process of generation of PWM with neat diagrams. (8M)
- b) Write short notes on transmission bandwidth of PAM. (8M)

Code No: RT22045

R13**SET - 3****II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017****ANALOG COMMUNICATIONS**

(Electronics and communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART -A

1. a) Why an AM signal is get severely affected due to noise. (3M)
- b) Explain the applications of A.M ,DSB-SC,SSB-SC. (3M)
- c) Compare F.M and A.M. (4M)
- d) Explain the necessity of pre-emphasis? (4M)
- e) Explain the image frequency rejection of a radio receiver. (4M)
- f) Compare continuous wave and pulse modulation techniques. (4M)

PART -B

2. a) A carrier signal $c(t)=20\cos 2\pi 10^6 t$ is modulated by a message signal having three frequencies 5kHz,10 kHz and 20 kHz. The corresponding modulation indices are 0.4,0.5 and 0.6. Sketch the spectrum and calculate bandwidth, power and modulation efficiency. (8M)
- b) Explain the benefits of suppressed carrier AM systems. (8M)
3. a) Derive the equation for SSB-SC signal for an modulating sinusoidal input $m(t)=A_m \cos(\omega_m t)$. (8M)
- b) Compare AM, D.S.B-SC, S.S.B-SC and V.S.B transmission. (8M)
4. a) Define angle modulation? Explain different types of angle modulations with mathematical expressions. (8M)
- b) A Sinusoidal carrier of 20V, 2 MHz is frequency modulated by sinusoidal message signal of 10V, 50 kHz and $K_f=55$ kHz/V. Find Δf , β , band width and power. (8M)
5. a) Explain about the noise performance of an FM receiver. (8M)
- b) Derive the expression for the figure of merit of an SSB-SC System. (8M)
6. a) With neat block diagram, explain the operation of super heterodyne F.M. receiver. (8M)
- b) In a broad cast Super Heterodyne Receiver having no RF amplifier is tuned to 555kHz. The local oscillator frequency is adjusted to 1010kHz and the quality factor is 50. Calculate the intermediate frequency, image frequency and image rejection ratio. (8M)
7. a) Define Pulse Amplitude Modulation (PAM)? Give merits and demerits of PAM. (8M)
- b) With neat block diagram and waveforms, explain the generation of a PWM signal (8M)

Code No: RT22045

R13**SET - 4****II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017****ANALOG COMMUNICATIONS**

(Electronics and communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART -A

1. a) A 400W carrier is modulated to a depth of 75%. Calculate the total power in the modulated wave. (4M)
- b) Explain the method of frequency translation? (3M)
- c) Draw the phasor diagram of narrow band FM (4M)
- d) Define SNR and Figure of merit of a communication system? (4M)
- e) What is image frequency and how it can be rejected? (3M)
- f) Explain the single polarity and double polarity PAM. (4M)

PART -B

2. a) What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum (8M)
- b) An audio frequency signal $10\sin(1000\pi t)$ is used to amplitude modulate a carrier of $50\sin(5\pi 10^5 t)$. Calculate (i) Modulation index (ii) Side band frequencies (iii) BW required and (iv) Total power delivered to the load of 600Ω (8M)
3. a) Draw the circuit diagram of Ring modulator. Explain its operation including all the waveforms. (8M)
- b) With neat diagrams, explain about the VSB modulation system and also explain its applications. (8M)
4. a) Explain how a PLL can be used as an FM demodulator. (8M)
- b) In angle modulation, explain frequency deviation, percent modulation, phase deviation and modulation index. (8M)
5. a) Why pre-emphasis and de-emphasis are needed in F.M but not in A.M? Explain. (8M)
- b) Explain about noise effect in AM and obtain expression for figure of merit. (8M)
6. a) How F.M Receivers are different from A.M receivers? Explain in detail. (8M)
- b) Define the terms sensitivity, selectivity and fidelity of a radio receiver. (8M)
7. a) Compare PAM, PWM and PPM systems. (8M)
- b) For a PAM transmission of voice signal having maximum frequency equal to $f_m=3\text{KHz}$ calculate the transmission bandwidth. It is given that the sampling frequency $f_s=8\text{KHz}$ and the pulse duration $\tau=0.1 T_s$. (8M)