Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Electronics Engg.) (2012 Onwards)
B.Tech.(ECE/ETE) (2011 Onwards)
(Sem.–4)
ANALOG COMMUNICATION SYSTEMS
Subject Code : BTEC-401
Paper ID : [A1189]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1) Write briefly :

a) What is signal to noise ratio? Why is it important in communication systems?

b) Find the modulation index if a 10 V carrier is amplitude modulated by three different frequencies with amplitudes of 1V, 2V and 3V respectively.

c) Give two advantages of SSB operation compared with full carrier amplitude modulation.

d) An FM modulator has deviation sensitivity of 30 kHz/V and operates at a carrier frequency of 175 MHz. Find the output frequency for an instantaneous value of modulating signal equal to 150mV.

e) What is pre emphasis and de emphasis?

f) Is it possible to use class C amplifiers to amplify an AM signal? Explain your answer.

g) Why do some superheterodyne receivers use an RF stage while others do not?

h) List three types of analog pulse modulation. Which pulse modulation scheme is used as an intermediate step in creation of pulse code modulation?

i) Compare AM and FM (3 points).

j) What are high level and low level modulation systems?

SECTION - B

Q2) The carrier $c(t) = 100 \cos(2\pi f_c t)$ is frequency modulated by the signal $m(t) = 5\cos 20,000 \pi t$ where $f_c = 10^8$ Hz. The peak frequency deviation is 20 KHz. Determine the amplitude and frequency components of all signal components that have a power level of atleast 10% of the power of unmodulated carrier component. Table of Bessels's function :

m_f	n or order					
	J_0	J_1	J_2	J_3	J_4	J_5
0	1.00					
.25	.98	.12				
.5	.94	.24	.03			
1.0	.77	.44	.11	.02		
1.5	.51	.56	.23	.06	.01	
2.0	.22	.58	.35	.13	.03	
2.5	−.05	.50	.45	.22	.07	.02

Q3) An RC capacitive reactance modulator is used to vary the frequency of a 10 MHz oscillator by ± 100 kHz. An FET, whose transconductance varies linearly with gate voltage from 0 to .628 mS, is used in conjunction with a resistor whose value is one tenth of the capacitive reactance used. Calculate the inductance and capacitance of the oscillator tank circuit.

Q4) Briefly explain Delta modulation and PPM (Pulse position modulation).

Q5) What factors affect the choice of Intermediate frequency? How does dual conversion super heterodyne receiver remove the problem of image frequency?

Q6) Explain the functioning of balanced ring modulator with appropriate waveforms.

SECTION-C

Q7) Compare the three main systems of SSB generation by drawing up a table of outstanding characteristics of each system. Draw block diagram of each system mentioning the outputs of each block.

Q8) Explain in detail the operation of Foster Seeley Discriminator along with its mathematical analysis and phasor diagrams.

Q9) Write a note on SSB Product Demodulator and single sideband Envelope Detection Receiver.