Total No of Questions: [12] 　　　　**SEAT NO. :**

[Total No. of Pages : 3]

S.E. 2008 (Electronics and Telecommunication)
Communication Theory
(Semester - II)

Time: 3 Hours 　　　　　　　　　　　*Max. Marks : 100*

Instructions to the candidates:
　1) *Answers to the two sections should be written in separate answer books.*
　2) *Neat diagrams must be drawn wherever necessary.*
　3) *Figures to the right side indicate full marks.*
　4) *Use of Calculator is allowed.*
　5) *Assume Suitable data if necessary*

SECTION I

Q1　**A**　An AM transmitter radiates 1000 kHz, carrier with 50 kW of power. 　[8]
　　　　Carrier is modulated with 300 Hz, 800Hz and 2 kHz signals. What will be
　　　　the radiated power if each signal modulates at 80 % modulation? Draw the
　　　　spectrum of modulated signal. Calculate total modulation index and power
　　　　content of each spectral component

　　　B　What is carrier communication? Explain the types of the same.　[8]

OR

Q2　**A**　Derive following　[8]

　　　　　a. **Equation of AM**
　　　　　b. **Equation of total power transmitted in AM (DSBFC)**
　　　B　Explain nonlinear generation of DSBSC with suitable mathematical　[8]
　　　　equation and block diagram also draw the waveforms and spectrum of the
　　　　DSBSC signal for non sinusoidal signal

Q3　**A**　Explain Indirect method of FM generation　[8]

　　　B　A baseband signal m (t) is periodic Triangular waveform of period 10^{-3} and 　[8]
　　　　amplitude of 1V peak.

　　　　 i) Sketch FM and PM waveform if Wc is equal to $2\pi * 10^5$, Kf = 2000 π and
　　　　Kp = 10π.

　　　　 ii) Estimate bandwidth for FM and PM.

OR

| Q4 | A | Compare following | [8] |

           1.NBFM and WBFM

           2.FM and AM

| | B | An angle modulated signal with carrier frequency $W_c = 2\pi * 10^6$ is described by the equation | [8] |

$E_{FM}(t)=10 \cos (W_c t + 0.2 \sin 1000 \pi t)$

Find following

1. Power of modulated signal
2. Modulation index
3. Frequency deviation
4. Bandwidth of FM

| Q5 | A | Explain Simple and practical diode detector in detail | [10] |
| | B | Explain superhetrodyne receiver for FM | [8] |

OR

Q6	A	Explain distortions present in simple diode detector.	[8]
	B	What is AGC and explain the types of AGC	[6]
	C	In an AM radio receiver the loaded Q of the antenna circuit at the input to the mixer is 100.If the intermediate frequency is 455 kHz, calculate the image frequency and its rejection at 1 MHz.	[4]

SECTION II

| Q7 | A | Consider a receiving system consisting of an RF amplifier with a noise figure of F1 =8 dB and a gain of 20 dB followed by a mixer with a noise figure of F2= 10 dB and a conversion gain of 12 dB and finally IF amplifier with a noise figure of F3 = 7 dB and a gain of 40 dB. Find overall noise figure and noise temperature. | [8] |
| | B | Derive Friis formula for noise factor of an amplifier in cascade and calculate the equivalent Noise temperature of the same | [8] |

OR

| Q8 | A | Explain Internal sources of Noise | [8] |
| | B | Three resistors have values R1= 10KΩ ,R1= 14KΩ, R1= 24KΩ.It is known | [8] |

that the thermal noise voltage generated by R1 = 0.3μV .Calculate the Thermal voltage generated by 1) Series combination 2) parallel combination

Q9	**A**	**Describe performance of DSBFC-AM in presence of Noise for synchronous detection.**	**[8]**
	B	**Describe performance of FM in presence of Noise**	**[8]**

OR

Q10	**A**	**Explain Pre-emphasis and De emphasis in detail**	**[8]**
	B	**Describe performance of DSBSC-AM in presence of Noise**	**[8]**

Q11	**A**	**Explain PCM encoder and Decoder**	**[8]**
	B	**Explain types of Sampling with waveforms**	**[6]**
	C	**Compare DM and ADM**	**[4]**

OR

Q12	**A**	**State and Prove Sampling theorem with suitable waveforms and mathematical equations.**	**[8]**
	B	**Draw and explain Distortions in DM**	**[6]**
	C	**Explain block diagram of PCM encoder**	**[4]**