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# ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2008 ANALOG COMMUNICATION SEMESTER - 4

Time: 3 Hours ] [Full Marks: 70

#### GROUP - A

## (Multiple Choice Type Questions)

Cho	ose th	ne correct alternatives for a	ny ten of the	e following:	$10 \times 1 = 10$
i)	If X	$(\omega)$ is the Fourier transform	of x(t), the	n the Fourier transform	of x(t)e jω <sub>o</sub> t
	a)	$X(\omega-\omega_0)$	<b>b</b> )	$X(\omega_0 - \omega)$	
	c)	$X(\omega + \omega_0)$	d)	X (ω <sub>0</sub> ).	
ii)	For	envelop detection in AM th	e value of R	C should be	
	a)	1/W< <rc<<1 fc<="" td=""><td><b>b</b>)</td><td>1/W&gt;&gt;RC&gt;&gt;1/fc</td><td></td></rc<<1>	<b>b</b> )	1/W>>RC>>1/fc	
	c)	1/W<<1/RC<<1/fc	ď)	W< <rc<<fc.< td=""><td></td></rc<<fc.<>	
iii)	The	capacity C of AWGN chanr	iel is given l	b <b>y</b>	
	a)	Blog <sub>10</sub> (1+S/N)b/s	<b>b</b> )	Blog <sub>2</sub> (1+S/N)b/s	
	<b>c</b> )	Blog <sub>10</sub> (1+N/S)b/s	d)	$B\log_2(1+N/S)b/s$ .	
iv)	Acc	ording to Carson's rule the	bandwidth	of FM signal is expresse	d as
	a)	$B=2\Delta f+f_m$	b)	$B=\Delta f+f_m$	
	c)	$B=\Delta f+2 f_m$	d)	$B=\Delta f+f_m/2.$	
<b>v</b> )	Var	actor diode is used for			
	a)	FM generation	b)	AM generation	
	c)	PM generation	d)	All of these.	

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vi)	IF fr	equency for a superheterodyne o	omme	rcially available AM receiver is	100
<u>.</u>	a)	460 kHz	<b>b</b> )	500 kHz	
	c)	455 kHz	d)	355 kHz.	
vii)	The	bandwidth required for transmis	sion o	f SSB SC signal is	
	a)	more than AM signal	b)	less than DSB-SC signal	
	c)	more than VSB signal	d)	none of these.	
viii)	A sią	gnum function is			
	a)	zero for t greater than zero	<b>b</b> )	zero for t less than zero	
	c)	unity for t greater than zero	d)	2u (t)-1.	
ix)	A pr	e-emphasis circuit provides extr	a noise	e immunity to	
	a)	boost the bass frequencies			
	b)	amplify the higher audio freque	encies		٠
	<b>c)</b>	pre-amplify the whole audio ba	nd		
	d)	convert the PM to FM.			
x)	PWM	I may be generated			
	a)	by differentiating PPM	. ,		
	<b>b</b> )	with a monostable multivibrate	r		
	<b>c</b> )	by integrating the signal			-
	d)	with a free running multivibrate	or.		
xi)	The	main advantage of TDM over FDI	M is th	at it	
	a)	needs less power			
	<b>b</b> )	needs less bandwidth			
	<b>c</b> )	needs simple circuit			
	d)	gives better signal to noise ratio	).	**************************************	



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xii)	Flat-	top sampling leads to			्रम् <sub>र</sub> हुन्।
	a)	an aperture effect	<b>b</b> )	aliasing effect	
	c)	loss of signal	d)	none of these.	
			GROUP - B		
		(Short A	nswer Type (	Questions )	
		Answer a	my three of th	e following.	$3 \times 5 = 15$
A m	odulat	ing signal given by $v_m$	=2 sin (2π × 56	00 t) amplitude modulate	es a carrier given
by v	v <sub>c</sub> =10	$\sin (2\pi \times 10^6 t)$ . Determ	me	•	

- 2.
  - modulation index i)
  - H) frequencies present in the modulated signal
  - total transmitter power. tti)
- State and prove Parseval's theorem. 1 + 2
  - b) Verify Parseval's theorem for the signal  $g(t)=e^{-at}u(t)$ ; a>0. 2
- Explain the working principle of PLL for FM demodulation. 5
- 5. a) What do you mean by distortionless transmission? 2
  - **b**) Obtain the conditions for distortionless transmission of signals through a system. 3
- Distinguish between 'auto-correlation' and 'cross-correlation' functions. a)
  - What is a 'balanced modulator'? Explain the main advantages and disadvantages b) of such circuits. 5.

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### **GROUP - C**

## (Long Answer Type Questions)

		Answer any three of the following questions. $3 \times 15 = 45$
7.	a)	Explain with suitable block diagram the generation of FM signal using Armstrong
		method.
•	<b>b</b> )	What is Narrowband FM and Wideband FM? 2
	c)	Explain with proper expression
		i) modulation index for FM
		ii) bandwidth required for transmission of FM. 4
	d)	The maximum deviation allowed in an FM broadcast system is 75 kHz. If the
	- 8	modulating signal is a single tone sinusoid of 10 kHz, find the bandwidth of the
		FM signal. What will be the change in the bandwidth, if the modulating frequency
		is doubled? Determine the bandwidth when modulating signal amplitude is also
		doubled.
3.	a)	Define DSB-SC and SSB-SC.
	b)	With neat block diagram explain the principle of SSB-SC generation by phase
		shift method. What is VSB-SC modulation? 4 + 3
	c)	Briefly explain QAM. 4
9.	a)	What do you mean by 'switching modulator' ? How can ring modulation be acted
		as switching modulator?
	<b>b</b> )	Show that an AM system using synchronous detection does not suffer from
		threshold effect.
	c)	Compare FDM with a quadrature carrier multiplexing.

10.	a) .	Discuss the methods for modulation and demodulation of PAM signal.
	<b>b</b> )	Compare PAM with PWM system of signal/data transmission.
	c)	Explain the terms ' sensitivity', 'selectivity' and 'fidelity' of a receiver.
11.	a)	In a multipath transmission system, the input and output are related by:
		y (t) = x (t) + ax (t - $\tau$ ), where a and $\tau$ are constants. Determine the transfer
		function of the equalizer to compensate the channel induced distortion.
	<b>b</b> )	Determine the performance of an FM system in the presence of additive Gaussian
		noise. Discuss briefly the improvement offered in noise performance by pre-
		emphasis and de-emphasis concepts.
12.	Write	e short notes on any three of the following: $3 \times 5$
•	i)	Superheterodyne receiver
	n)	Entropy
	iii)	Stereophonic FM broadcasting
	iv)	Source coding
	v)	Convolution theorem.

END