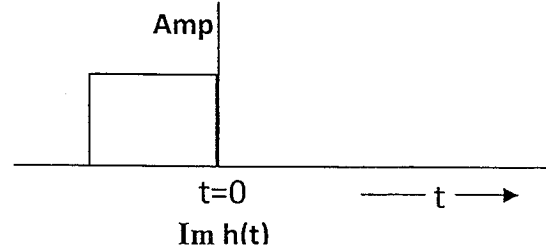
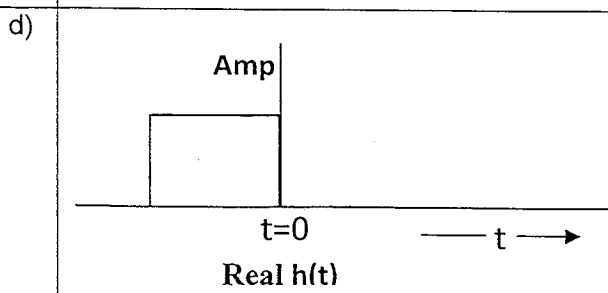
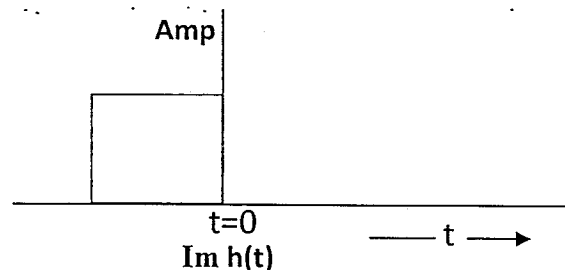
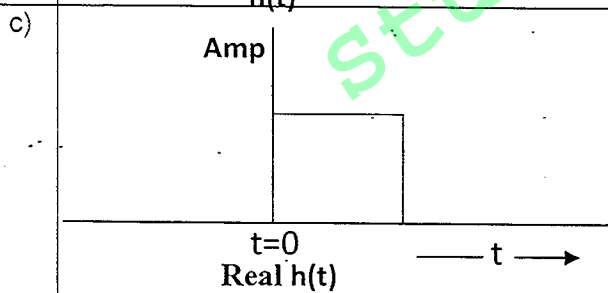
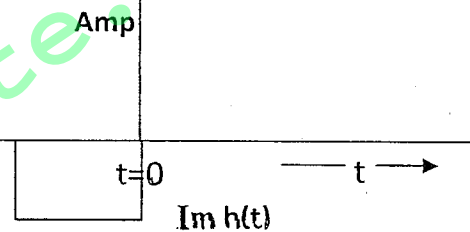
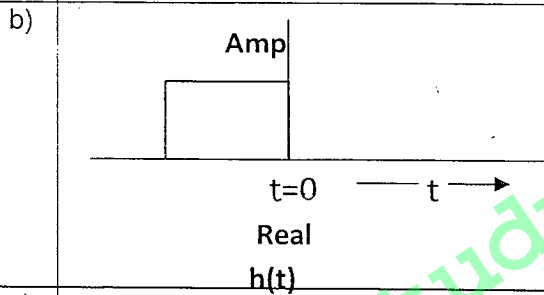
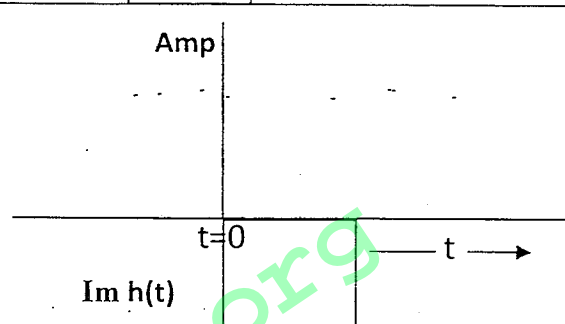
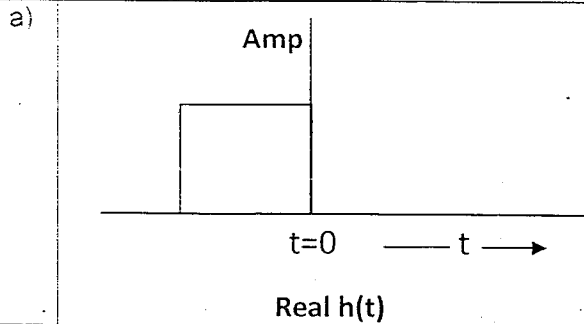
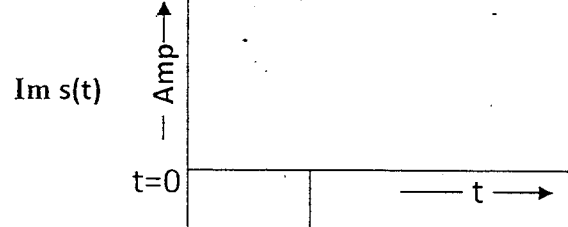
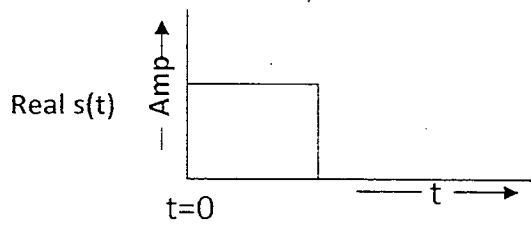


1 Determine the matched filter response  $h(t)$  for signal  $s(t)$  shown below :

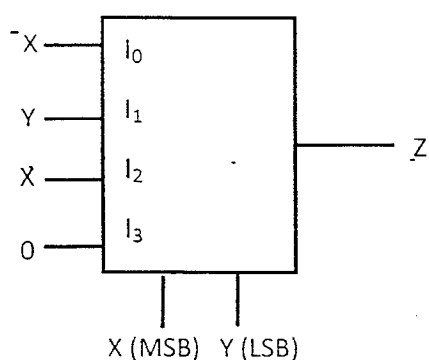


2	A signal source with 100m wavelength is connected to the input terminals of a 150m long transmission line terminated in its characteristic impedance. The phase difference between the voltages at two ends of the transmission line in steady-state condition is :			
	a) $2\pi$	b) $3\pi$		
	c) $4\pi$	d) $\pi$		
3	A charge $Q_2 = 8.854 \times 10^{-9}$ C is located in a vacuum at $P_2 (2,3,1)$ . The force on $Q_2$ due to a charge $Q_1 = 4\pi \times 10^{-3}$ C at $P_1 (2,2,1)$ is : (Note : All the coordinates are measured in Meters. $a_x, a_y$ and $a_z$ are unit vectors in X, Y and Z direction respectively.)			
	a) $a_y$ N	b) $-a_y$ N		
	c) $4a_x + 5a_y + 2a_z$ N	d) $-4a_x - 5a_y - 2a_z$ N		
4	A low pass filter as shown in following figure is built using an operational amplifier having unity gain bandwidth of 1MHz. What is the bandwidth of this circuit?			
	a) 1 KHz	b) 10 KHz		
	c) 100 KHz	d) 500 KHz		
5	What is the frequency and duty cycle of output Y, when CLK frequency is 1MHz @ 50% duty cycle?			
	a) 500 KHz @ 50% duty cycle	b) 500 KHz @ 25% duty cycle		
	c) 250 KHz @ 50% duty cycle	d) 250 KHz @ 25% duty cycle		

6 For an isotropic radiator, electric field intensity at a distance R is measured as 3V/m. What will be the electric field intensity at a distance 3R ?

- |                      |                      |
|----------------------|----------------------|
| a) 1 V/m             | b) $\frac{1}{3}$ V/m |
| c) $\frac{1}{9}$ V/m | d) 3V/m              |

7 The logic function implemented by following 4:1 MUX is

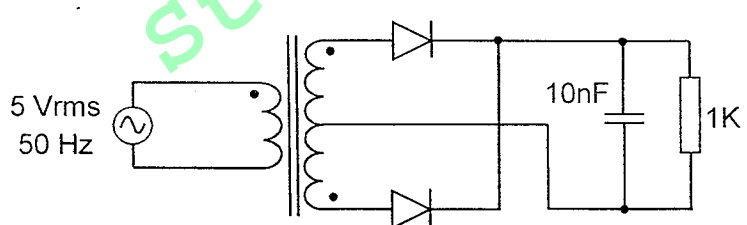


- |                           |                            |
|---------------------------|----------------------------|
| a) $Z = X \text{ and } Y$ | b) $Z = X \text{ or } Y$   |
| c) $Z = X \text{ xor } Y$ | d) $Z = X \text{ xnor } Y$ |

8 Characteristic impedance of a two-wire transmission line at 10KHz is  $200 - j50$  ohms. Line is terminated in its characteristic impedance, and a 28.28V p-p signal is measured at its input. Determine the real power supplied by the signal source to the line?

- |           |           |
|-----------|-----------|
| a) 0.5 W  | b) 0.485W |
| c) 0.47 W | d) 0.25 W |

9 Which is the correct waveform across capacitor in the following circuit?



- |    |    |
|----|----|
| a) | b) |
| c) | d) |

ELECTRONICS – 2013

SET -A

10	Input voltage applied to a circuit is 1V rms and the output is 1mV rms. Net gain of the circuit is:			
	a)	+ 30dB	b)	- 30dB
	c)	- 60dB	d)	+ 60dB
11	Two ideal quantizers A and B have following specifications : A: 5 bit Quantizer with input dynamic range of -1V to +1V with Q1 as quantization noise power B: 8 bit Quantizer with input dynamic range of -0.5V to +0.5V with Q2 as quantization noise power. Then Q1/Q2 will be			
	a).	16	b).	256
	c)	64	d)	128
12	The divergence of magnetic field intensity is			
	a)	Electric charge density	b)	Electric field intensity
	c)	Zero	d)	Conduction current density
13	A UART is configured to transmit 8 bit data, 1 start bit and 1 stop bit. The serial data output is observed on oscilloscope, which looks like a square wave with frequency of 9600 Hz. What is the baud rate and transmitted data?			
	a)	Baud rate = 9600, Data = 55h	b)	Baud rate = 19200, Data = 55h
	c)	Baud rate = 19200, Data = FFh	d)	Baud rate = 9600, Data = AAh
14	A transmission line having characteristic impedance of 50ohms has to deliver 10KW power at 100KHz to a load. Maximum permissible value of rms current anywhere along the line is 20A. What is the maximum VSWR that can be tolerated on this line?			
	a)	2	b)	1
	c)	3	d)	2.5
15	Routh Hurwitz criterion is used to determine			
	a)	Relative stability of the system	b)	Time response of the system
	c)	Absolute stability of the system	d)	Roots of the characteristic equation graphically
16	The decoding circuit shown in the figure is has been used to generate active low chip select signal of memory interfaced to 8 bit microprocessor with 16 bit address bus. What is address range and size of memory?			
	a)	D000h to EFFFh , size= 8K Bytes	b)	D000h to DFFFh, size= 4K Bytes
	c)	C000h to FFFFh, size= 16K Bytes	d)	E000h to EFFFh, size = 4K Bytes



INDIAN SPACE RESEARCH ORGANISATION

Page 4 of 18

ELECTRONICS - 2013

SET -A

17	If the waveguide cross-section of a square waveguide with TE <sub>11</sub> propagation mode is gradually deformed into a circle, then the corresponding circular waveguide mode will be:			
	a)	TE <sub>11</sub>	b)	TE <sub>10</sub>
	c)	TE <sub>21</sub>	d)	TE <sub>12</sub>
18	What could be the output current rating of following shunt regulator?			
	a)	$0 < I_L < 100\text{mA}$	b)	$20\text{mA} < I_L < 100\text{mA}$
	c)	$0 < I_L < 50\text{mA}$	d)	$10\text{mA} < I_L < 100\text{mA}$
19	An FM-CW (Frequency Modulated – Continuous Wave) Radar is essentially			
	a)	Bistatic	b)	Monostatic
	c)	Can operate either as monostatic or as bistatic	d)	None of the above
20	The flux in a magnetic core is sinusoidally varying at 200 Hz. The maximum flux density is 2 Tesla and eddy current loss is 15 W. If the frequency is raised to 400 Hz and maximum flux density reduced to 1 Tesla, the eddy current loss will			
	a)	Reduce to half	b)	Get doubled
	c)	Reduce to one-fourth	d)	Remain same
21	The electric field intensity $E$ and magnetic field intensity $H$ are coupled and propagating in free space in $x$ and $y$ direction respectively, the Poynting vector is given by			
	a)	$EH\hat{x}$	b)	$EH\hat{y}$
	c)	$EH\hat{xy}$	d)	None of the above
22	If $x$ and $y$ are two random signals with zero mean Gaussian distribution having identical standard deviation, the phase angle between them is			
	a)	Zero mean Gaussian distributed	b)	Uniform between $-\pi$ and $\pi$
	c)	Uniform between $-\pi/2$ and $\pi/2$	d)	Non-zero mean Gaussian distributed
23	The current flowing through a capacitor in an AC circuit is :			
	a)	Non-existent	b)	Conduction current
	c)	Displacement current	d)	None of the above



INDIAN SPACE RESEARCH ORGANISATION

Page 5 of 18

ELECTRONICS – 2013

SET -A

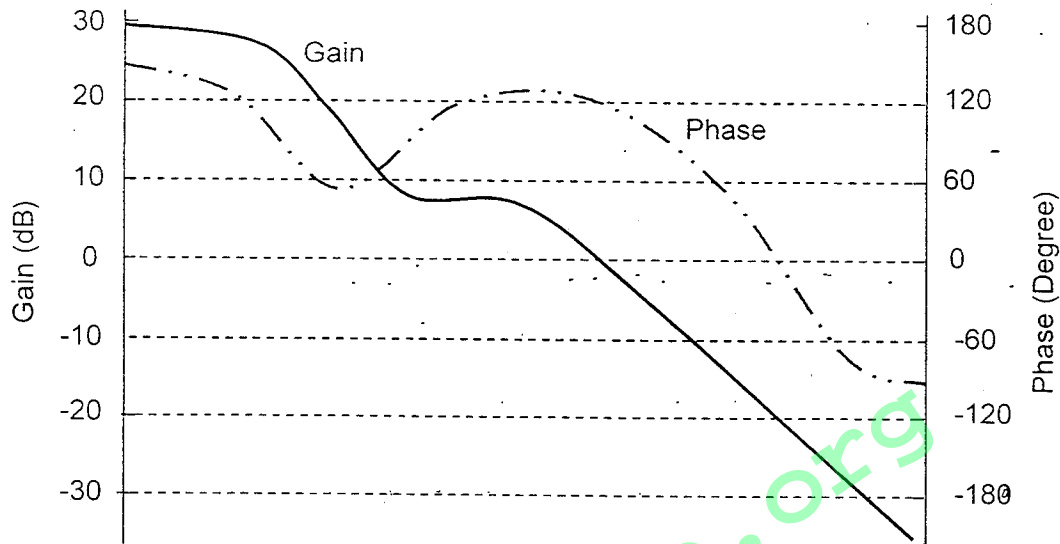
24	Which of the following is the Boolean function for Majority Voting, assuming A,B,C are inputs and Y is output?			
	a)	$Y = AB + AC + CB$	b)	$Y = A+B+C$
	c)	$Y = ABC$	d)	$Y = AB + BC$
25	For broadside antenna array, the largest possible spacing between the antenna elements without any grating lobes is			
	a)	$\lambda/2$	b)	$\lambda$
	c)	$2\lambda$	d)	None of the above
26	For the 8085 assembly language program given below, the content of the accumulator after the execution of the program is 3000 MVI A, 45H 3002 MOV B, A 3003 STC 3004 CMC 3005 RAR 3006 XRA B			
	a)	00H	b)	45H
	c)	67H	d)	E7H
27	Conduction angle of a Class AB amplifier is:			
	a)	$<180^\circ$	b)	Between $180^\circ$ and $360^\circ$
	c)	$360^\circ$	d)	$90^\circ$
28	For non dispersive medium			
	a)	Phase velocity > Group velocity	b)	Phase velocity < Group velocity
	c)	Phase velocity = Group velocity	d)	None of the above
29	Schottky clamping is resorted in TTL gates			
	a)	to reduce propagation delay	b)	to increase noise margins
	c)	to increase packing density	d)	to increase fan-out
30	At cut-off frequency, the phase velocity of a waveguide is			
	a)	Zero	b)	Infinite
	c)	Finite	d)	None of the above
31	A Zener diode, when used in voltage stabilization circuits, is biased in			
	a)	reverse bias region below the breakdown voltage	b)	reverse breakdown region
	c)	forward bias region	d)	forward bias constant current mode



INDIAN SPACE RESEARCH ORGANISATION

Page 6 of 18

32 The closed loop frequency response of a dc-dc converter is shown in following figure. What are the gain and phase margins?



a)	20dB, 80°	b)	26dB, 80°
c)	20dB, 120°	d)	26dB, 120°
33	If for a silicon npn transistor, the base-to-emitter voltage ( $V_{BE}$ ) is 0.7V and the collector-to-base voltage ( $V_{CB}$ ) is 0.2 V, then the transistor is operating in the		
a)	normal active mode	b)	saturation mode
c)	inverse active mode	d)	cutoff mode
34	3 port Circulator is		
a)	Reciprocal, matched	b)	Non reciprocal, unmatched
c)	Non reciprocal, matched	d)	Reciprocal, unmatched
35	An 8 bit ripple counter and an 8 bit synchronous counter are made using flip flops having a propagation delay of 10 ns each. If the worst case delay in the ripple counter and the synchronous counter be $R$ and $S$ respectively, then		
a)	$R = 10 \text{ ns}, S = 80 \text{ ns}$	b)	$R = 40 \text{ ns}, S = 10 \text{ ns}$
c)	$R = 10 \text{ ns}, S = 10 \text{ ns}$	d)	$R = 80 \text{ ns}, S = 10 \text{ ns}$
36	Gain of an RC low pass filter having a time constant ' $\tau$ ' and frequency ' $\omega$ ' is:		
a)	$\sqrt{1 + (\omega\tau)^2}$	b)	$1/\sqrt{1 + (\omega\tau)^2}$
c)	$\omega\tau/\sqrt{1 + (\omega\tau)^2}$	d)	$\omega\tau/\sqrt{1 - (\omega\tau)^2}$

ELECTRONICS - 2013

SET -A

37	For a directional coupler, the quantities $I$ (isolation in dB), $D$ (directivity in dB), $C$ (coupling in dB) are related by			
	a)	$I=C/D$	b)	$I = D - C$
	c)	$I = D + C$	d)	$I= D/C$
38	The two numbers represented in signed 2's complement form are $P = 11101101$ and $Q = 11100110$ . If $Q$ is subtracted from $P$ , the value obtained in signed 2's complement is			
	a)	1000001111	b)	00000111
	c)	11111001	d)	111111001
39	Depletion type MOSFET operates in :			
	a)	Depletion Model only	b)	Enhancement Mode only
	c)	Both depletion and enhancement mode	d)	None of the above
40	Electric Field and Magnetic Field are perpendicular to each other in :			
	a)	Klystron	b)	Magnetron
	c)	TWTA	d)	All of the above
41	A linear regulator is attempted using discrete components as shown below. What is the output voltage?			
	a)	9.3 V	b)	7.5 V
	c)	0 V	d)	2.5 V
42	If range of a radar is to be doubled, the peak transmit power of the radar has to be :			
	a)	Increased by a factor of 2	b)	Increased by a factor of 4
	c)	Decreased by a factor of 4	d)	Increased by a factor of 16
43	The electric field measured in the far field of an antenna at a distance of 50m is 1V/m. The average power densities at a distance of 500m from the antenna is			
	a)	$26.6\mu\text{W}/\text{m}^2$	b)	$0.1\mu\text{W}/\text{m}^2$
	c)	$10\mu\text{W}/\text{m}^2$	d)	$13.3\mu\text{W}/\text{m}^2$



INDIAN SPACE RESEARCH ORGANISATION

Page 8 of 18



ELECTRONICS – 2013

SET -A

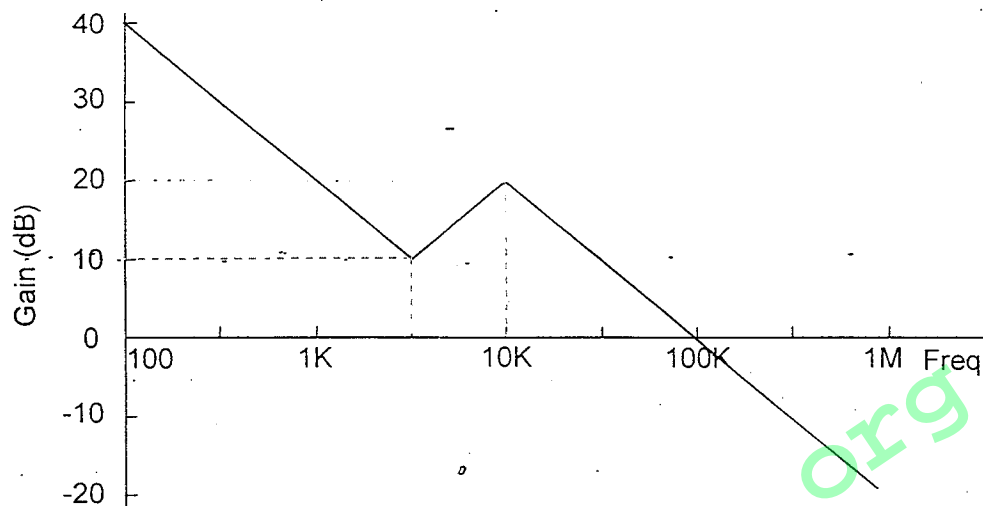
44	If a counter having 10 Flip Flops is initially at 0, what count will it hold after 2060 pulses ?	
	a) 000 000 1100	b) 000 001 1100
	c) 000 001 1000	d) 000 000 1110
45	For a frequency modulated signal represented by $s(t)=10\sin(6 \times 10^8 t + 2\sin 100\pi t)$ . The maximum frequency deviation in the carrier from its unmodulated frequency is:	
	a) 990Hz	b) 100Hz
	c) 50Hz	d) 200Hz
46	For which of the following conditions, the circuit shown below will function as precision full wave rectifier?	
	a) $R_1 = R_2 = R$	b) $R_1 = R_3 = R$
	c) $R_2 = 2R_1$	d) $R_1 = R_2 = R_3$
47	In a monostatic radar, if the antenna aperture is doubled, then the radar range will	
	a) Reduce by a factor of 2	b) Increase by a factor of 2
	c) Reduce by a factor of $\sqrt{2}$	d) Increase by a factor of $\sqrt{2}$
48	The disadvantage of single stub matching is that	
	a) Every load needs a new stub position	b) Only shunt stub should be used
	c) Only resistive load can be matched	d) Useful only in two wire transmission line
49	A certain antenna with an efficiency of 95% has maximum radiation intensity of 0.5 W/sr. The directivity of the antenna fed by input power of 0.4 W	
	a) 16.53	b) 12.2
	c) 10.36	d) 11.31
50	A memory system of size 16 K bytes is required to be designed using memory chips which have 12 address lines and 4 data lines each. Then number of such chips required to design the memory system is	
	a) 2	b) 4
	c) 8	d) 16



INDIAN SPACE RESEARCH ORGANISATION

Page 9 of 18

51 In the asymptotic bode plot of a transfer function of a closed loop system shown below, the number of poles and zeros are,

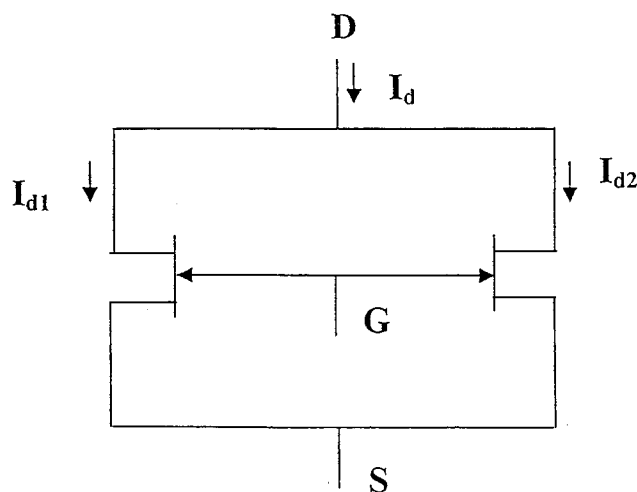


- |    |                |    |                |
|----|----------------|----|----------------|
| a) | 3 pole, 2 zero | b) | 2 pole, 2 zero |
| c) | 2 pole, 1 zero | d) | 3 pole, 1 zero |

52 Plane Wave travelling in free space has an average Poynting vector of  $3W/m^2$ . Average energy density ( $nJ/m^3$ ) of the wave is:

- |    |    |    |   |
|----|----|----|---|
| a) | 10 | b) | 5 |
| c) | 1  | d) | 3 |

53 For two identical n-channel JFET's connected in parallel as shown in fig. below, the pinch-off voltage of equivalent JFET is :



ELECTRONICS – 2013

SET -A

	a)	Doubled	b)	Becomes half
	c)	Remains same	d)	None of the above
54	The velocity at which a sinusoidal signal of $10^9$ rad/s travels down a loss-less transmission line for which $L=0.4 \mu\text{H/m}$ and $C=40 \text{ pF/m}$ is			
	a)	$2.36 \times 10^8$ m/s	b)	$2.5 \times 10^8$ m/s
	c)	$5 \times 10^9$ m/s	d)	$4.5 \times 10^9$ m/s
55	The Maxwell's equation $\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$ is obtained from :			
	a)	Ampere's Law	b)	Faraday's Law
	c)	Lenz's Law	d)	Both b and c
56	A lossless line having characteristic impedance $Z_0$ is terminated with a load impedance of $jZ_0$ . VSWR of the line will be :			
	a)	1	b)	10
	c)	Infinite	d)	None of the above
57	A signal $1 + \cos(2\pi ft) + \cos(6\pi ft)$ where $f=1\text{MHz}$ is sampled at $3\text{MHz}$ and Fourier Transform is carried out. How many lines will be seen in Fourier Transform?			
	a)	5	b)	1
	c)	3	d)	2
58	The array factor of an array antenna depends on			
	a)	Number of radiating elements	b)	Spacing between the elements
	c)	Phase of the applied signal	d)	All of the above
59	Which of the following parameter is improved by introducing pipelining in digital design?			
	a)	Area (Gate count)	b)	Maximum clock frequency
	c)	Power dissipation	d)	Noise
60	A transmission line having characteristic impedance ' $Z_0$ ' of varying length in series with a load impedance ' $Z_L$ ' appears in a Smith Chart on:			
	a)	Constant Resistance Circle	b)	Constant VSWR Circle
	c)	Constant Reactance Circle	d)	All of the above
61	Impedance characteristics on a Smith Chart repeat after a distance of:			
	a)	$\lambda$	b)	$\lambda/4$
	c)	$\lambda/2$	d)	None of the above



INDIAN SPACE RESEARCH ORGANISATION

Page 11 of 18

ELECTRONICS - 2013.

SET -A

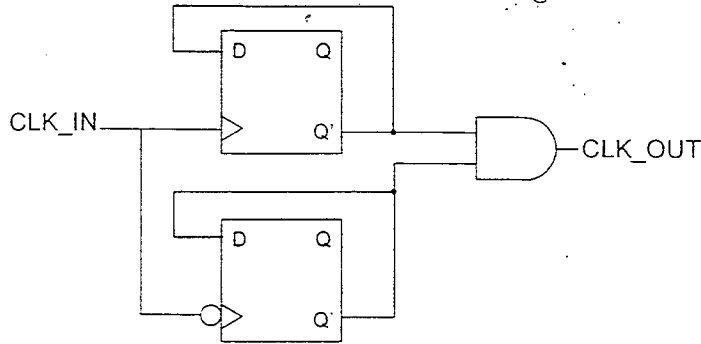
62	If $\tau$ is the time constant and $\omega$ is the applied frequency, a low pass RC filter acts as a pure integrator when:			
	a)	$\omega\tau=0$	b)	$\omega\tau \gg 1$
	c)	$\omega\tau = 1$	d)	$\omega\tau \ll 1$
63	10 $\mu$ F capacitor is connected across secondary winding of a high frequency transformer having primary to secondary turns ratio 5:2. What is the value of capacitance seen across primary?			
	a)	4 $\mu$ F	b)	62.5 $\mu$ F
	c)	25 $\mu$ F	d)	1.6 $\mu$ F
64	What will be the output of the following circuit, if point-P is stuck at 1?			
	a)	$A+B+C$	b)	$A'B'C'$
	c)	$(ABC)'$	d)	0
65	For the current mirror circuit shown below, if the emitter area of Q2 is thrice of Q1, the current I is:			
	a)	0.328mA	b)	2.955mA
	c)	0.105mA	d)	0.012mA
66	Output of an Op-amp is 1V peak, and slew rate is 5V/ $\mu$ s. The maximum frequency of input sinusoidal signal that can be reproduced is:			
	a)	398Hz	b)	796Hz
	c)	796KHz	d)	398KHz



INDIAN SPACE RESEARCH ORGANISATION

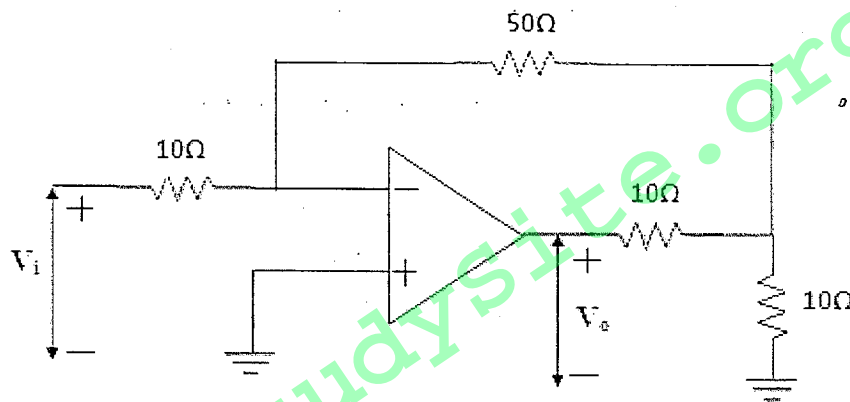
Page 12 of 18

67 What is the division factor of the following clock divider circuit?



- |    |     |    |     |
|----|-----|----|-----|
| a) | 2   | b) | 3   |
| c) | 1.5 | d) | 2.5 |

68 For the circuit given below, the voltage  $V_o$  across the op-amp output is:

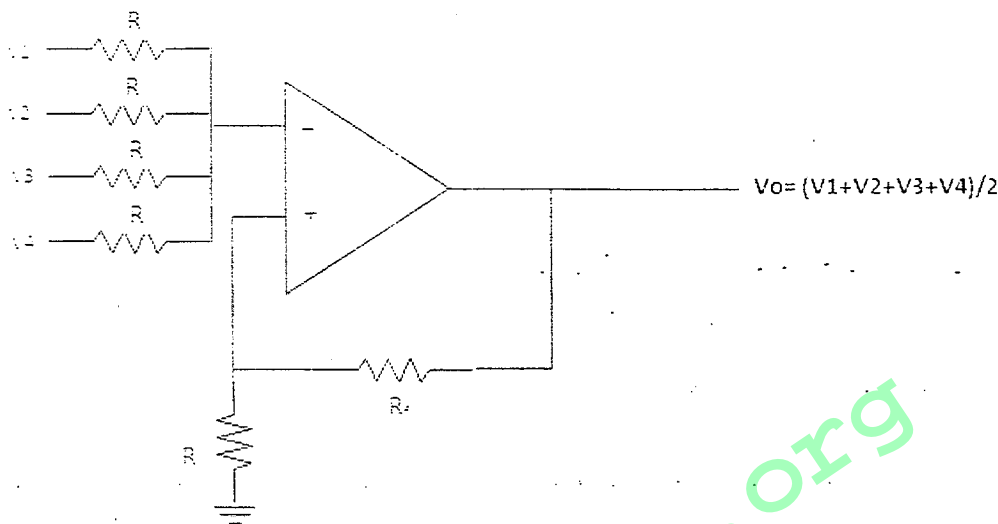


- |    |          |    |         |
|----|----------|----|---------|
| a) | $-9V_i$  | b) | $-3V_i$ |
| c) | $-11V_i$ | d) | $9V_i$  |

69 The rms value of current  $i(t) = I_1 \sin \omega t + I_2 \sin 2\omega t$  is:

- |    |                            |    |                             |
|----|----------------------------|----|-----------------------------|
| a) | $(I_1^2 + I_2^2)^{1/2}$    | b) | $(I_1^2/2 + I_2^2/2)^{1/2}$ |
| c) | $(I_1^2/2 + 2I_2^2)^{1/2}$ | d) | $(I_1^2 + 4I_2^2)^{1/2}$    |

70 Given the output for the following non-inverting summing amplifier, the relation between  $R_f$  and  $R$  in the circuit is?



- |    |          |    |           |
|----|----------|----|-----------|
| a) | $R_f=R$  | b) | $R_f=4R$  |
| c) | $R_f=2R$ | d) | $R_f=R/2$ |

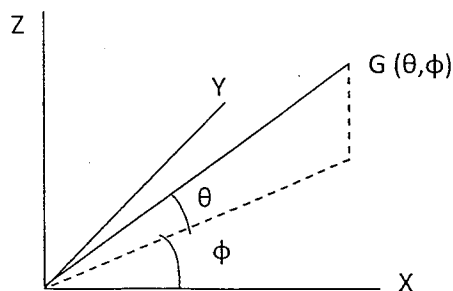
71 A pulse signal having 100 kHz frequency and 70 nsec rise time is to be measured on an oscilloscope. The minimum required bandwidth of the oscilloscope is,

- |    |         |    |          |
|----|---------|----|----------|
| a) | 500 kHz | b) | 14.3 MHz |
| c) | 5 MHz   | d) | 200 kHz  |

72 Multiple collectors are used in Traveling Wave Tube (TWT) to :

- |    |                                          |    |                                    |
|----|------------------------------------------|----|------------------------------------|
| a) | To distribute the dissipated heat evenly | b) | To increase the overall efficiency |
| c) | To increase the gain of the TWT          | d) | To shape the electron beam         |

73 A lossless antenna has directional gain  $G(\theta, \phi)$ , then  $\int_{\phi=-\pi/2}^{\phi=\pi/2} \int_{\theta=-\pi/2}^{\theta=\pi/2} G(\theta, \phi) d\theta d\phi$  is :



ELECTRONICS - 2013

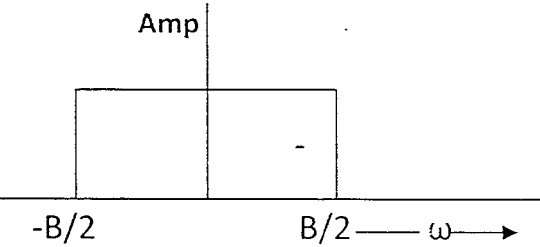
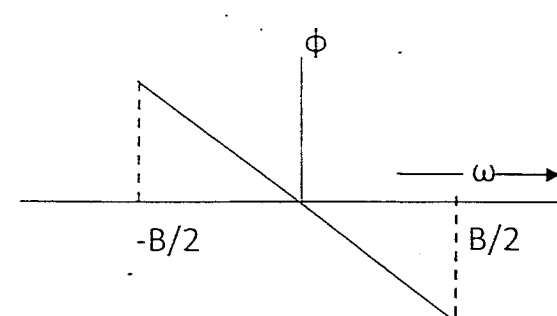
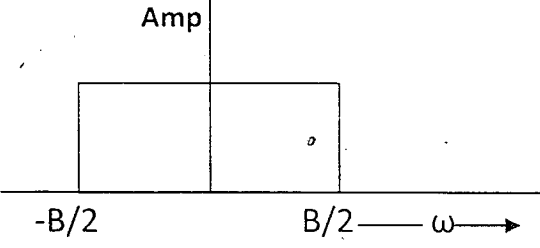
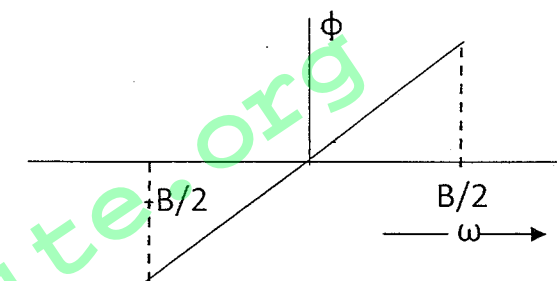
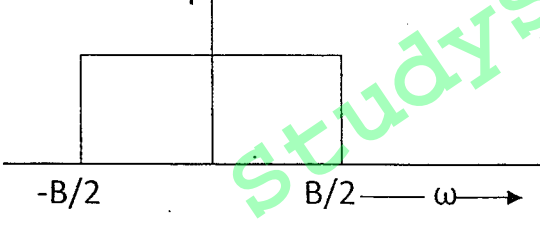
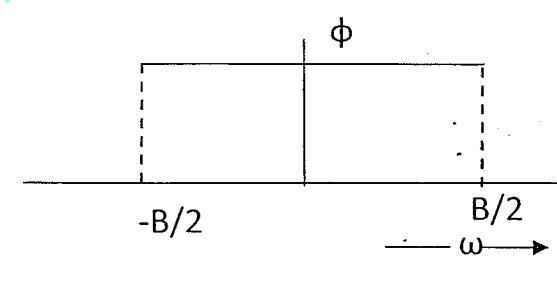
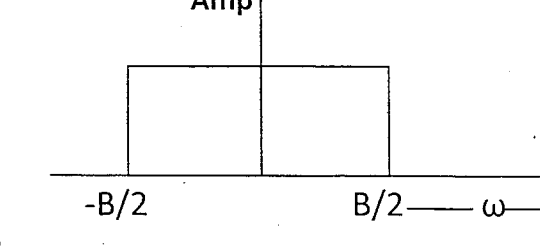
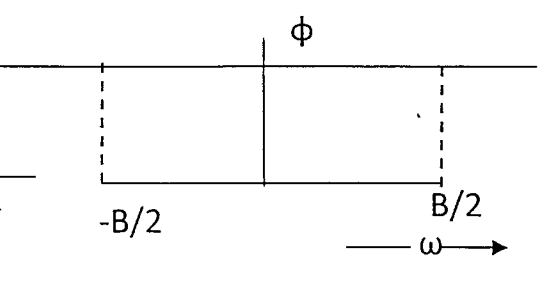
SET -A

	a)	$4\pi$	b)	$2\pi$
	c)	$\leq 4\pi$	d)	$\leq 2\pi$
74	$\sqrt[3]{\cos x - j\sin x}$ is equal to			
	a)	$(\cos x)^{1/3} - j(\sin x)^{1/3}$	b)	$\sqrt[3]{\cos^2 x - j\sin^2 x}$
	c)	$\cos \frac{x}{3} - j\sin \frac{x}{3}$	d)	$\sin \frac{x}{3} - j\cos \frac{x}{3}$
75	If $f(t)$ is 1 MHz sinusoid with 1 Vp-p and sampling frequency $f_s$ is 25KHz, the output will be :			
<p style="text-align: center;"><math>f_s</math>, Sampling Frequency</p>				
	a)	0V	b)	DC value anywhere between -1V and +1V
	c)	DC value anywhere between -0.5V and +0.5V	d)	1Vp-p 1MHz sinusoid



INDIAN SPACE RESEARCH ORGANISATION

Page 15 of 18

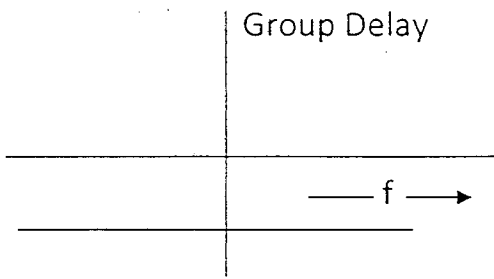
76	For a practical low pass filter , the ideal amplitude and phase response will be :	
a)		
b)		
c)		
d)		






ELECTRONICS - 2013 SET -A

77	A 10dB attenuator is put at the input of a low noise amplifier having 3dB noise figure. Now the noise figure of the cascaded amplifier will be		
	a) 3dB	b) 12dB	
	c) 7dB	d) None of the above	
78	A 33.33% duty cycle rectangular wave is fed to the input of an Spectrum Analyzer. What will be observed?		
	a) 2 <sup>nd</sup> , 5 <sup>th</sup> , 8 <sup>th</sup> ..... harmonics missing	b) 3 <sup>rd</sup> , 6 <sup>th</sup> , 9 <sup>th</sup> ..... harmonics missing	
	c) 1 <sup>st</sup> , 4 <sup>th</sup> , 7 <sup>th</sup> ..... harmonics missing	d) All the harmonic present	
79	Phase function of a filter is $(f) = kf^2, k > 0$ . The group delay of the filter has the shape		
a)	<p>The graph shows a coordinate system with a vertical axis labeled 'Group Delay' and a horizontal axis labeled 'f'. A straight line with a negative slope passes through the origin, indicating that the group delay decreases linearly as frequency increases.</p>		
b)	<p>The graph shows a coordinate system with a vertical axis labeled 'Group Delay' and a horizontal axis labeled 'f'. A straight line with a positive slope passes through the origin, indicating that the group delay increases linearly as frequency increases.</p>		
c)	<p>The graph shows a coordinate system with a vertical axis labeled 'Group Delay' and a horizontal axis labeled 'f'. A horizontal line is drawn across the graph, indicating that the group delay is constant and independent of frequency.</p>		

	d)	
80	1V p-p sinusoid is digitized by a 4 bit A-to-D converter with input dynamic range of 2V p-p. The signal to noise ratio of the digitized signal is :	
	a)	384
	b)	96
	c)	48
	d)	24

End of questions

	INDIAN SPACE RESEARCH ORGANISATION	Page 18 of 18
-------------------------------------------------------------------------------------	------------------------------------	---------------