Analog Communication - 1

Q1. Percentage modulation of an AM wave having the power content of 8kW at its carrier frequency and 2kW in each of its side band is

(A)60% (B)70% (C)100% (D)80%

(ISRO-2009)

Q2. A1kW carrier is amplitude modulated to a depth of 60%. The total power of modulated carrier is

(A)1kW (B)1.06kW (C)1.6kW (D)1.18kW. (ISRO-2009)

Q3.A audio frequency of 15kHz is frequency modulated with frequency deviation of 75kHz. The resulting bandwidth is

(A)180kHz (B)150kHz (C)210kHz (D)240kHz (ISRO-2009)

Q4. Total power of amplitude modulated signal is 600W and carrier power is 400W, the modulation index is

(A)0.75 (B)0.5 (C)0.25 (D)1 (ISRO-2010)

Q5. A angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation $s(t) = 10 \cos(\omega_c + 5\sin(3000\pi t) + 10\sin(2000\pi t))$. Frequency deviation Δf is .

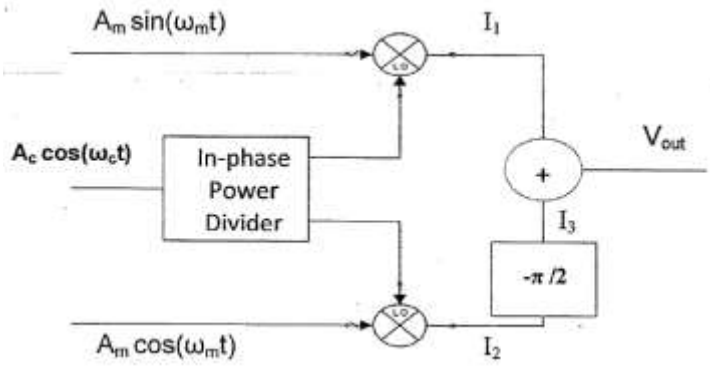
(A)12387.32Hz (B)17500Hz (C)20000Hz (D)15000Hz (ISRO-2010)

Q6. The Maximum transmission power efficiency of the DSB with carrier Amplitude modulation is:

(A)25% (B)33%
(C)50% (D)100% (ISRO-2011)

Q7.In this circuit V_{out} is

(A)Upper sideband ($\omega_L + \omega_m$)
(B)Lower sideband ($\omega_L - \omega_m$)
(C) Both upper and lower sideband ($\omega_L \pm \omega_m$)
(D)None of the above



(ISRO-2012)

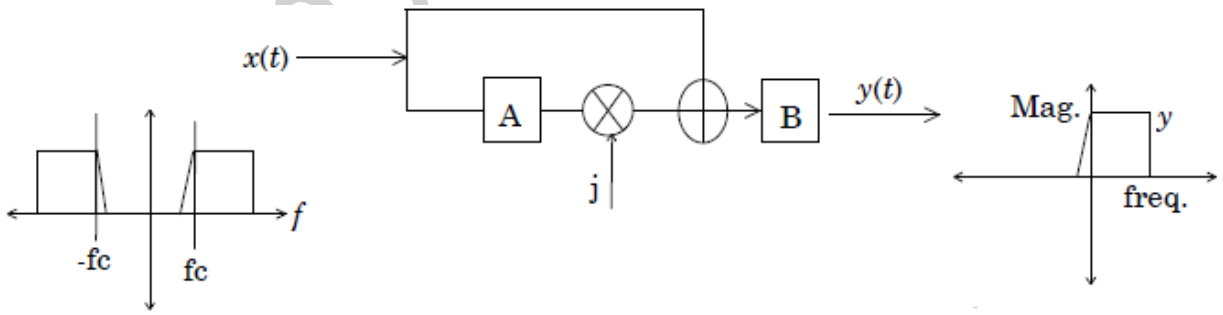
Q8. For frequency modulated signal represented by $s(t) = 10\sin(6 \times 10^8 t + 2\sin 100\pi t)$. The maximum frequency deviation in the carrier from its unmodulated frequency is

(A)990Hz (B)100Hz
(C)50Hz (D)200Hz (ISRO-2013)\

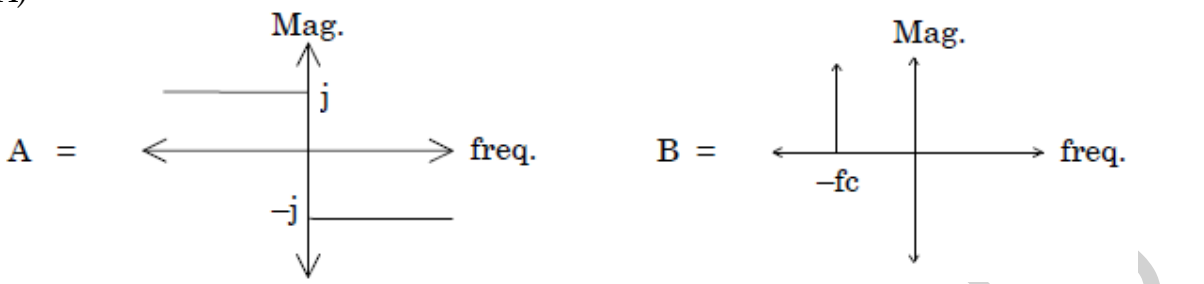
Q9. Which of the following modulation scheme is most bandwidth efficient?

(A)AM (B)FM
(C)PM (D)SSB-SC (ISRO-2014)\

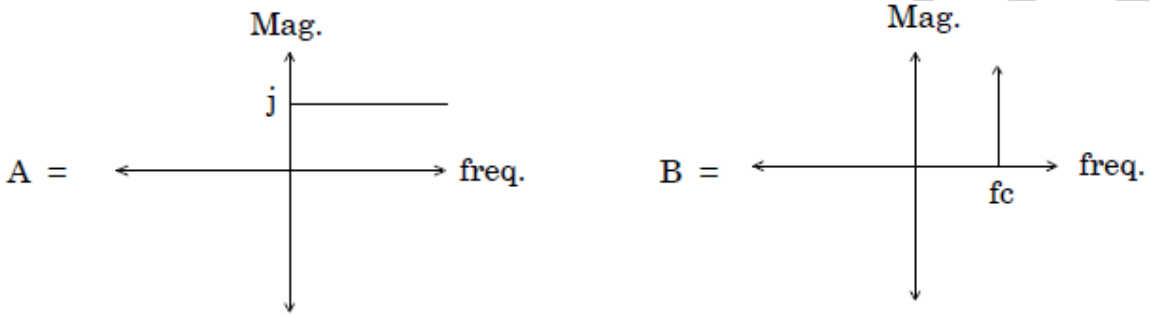
Q10. Consider the system with x(t) as input and y(t) as output. The frequency domain characteristics are shown in the figure. Which combination of A and B will give y as result



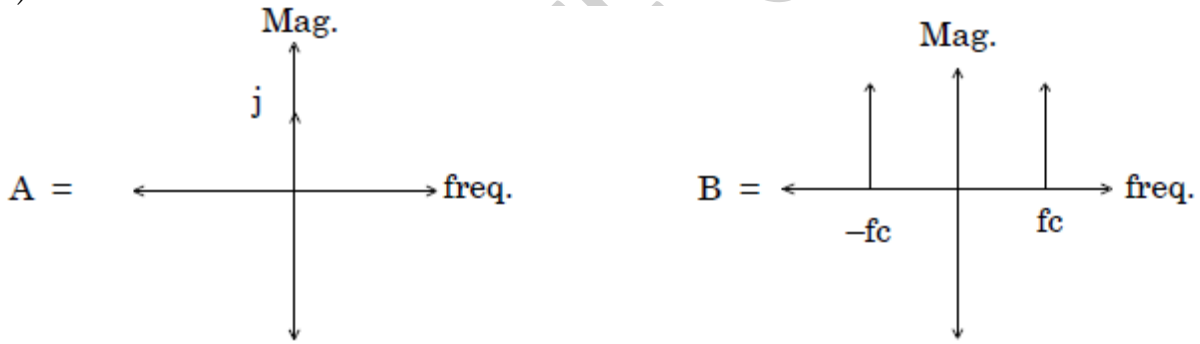
(A)



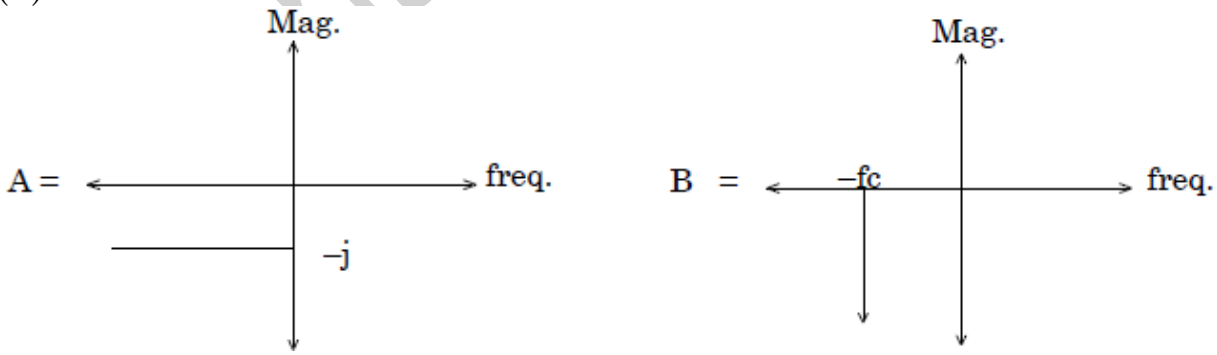
(B)



(C)



(D)



Q11. A DSB-SC signal is generated using the carrier cos ($\omega e\, t + \theta$) and modulating signal $x(t)$. The envelope of the DSB-SC signal is

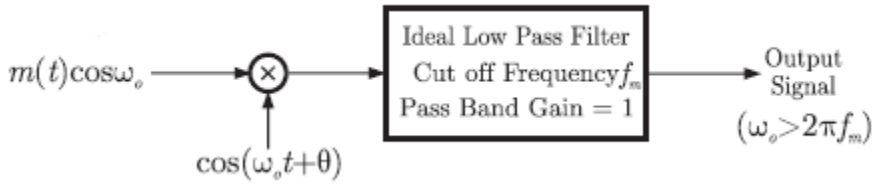
(A) $x(t)$ (B) $|x(t)|$
(C) only positive portion of $x(t)$ (D) $x(t)\cos\theta$ (GATE-EC-1996)

Q12. A modulated signal is given by $s(t)= e^{-at}\cos[(\omega_c + \Delta\omega)\,t]u(t)$ where ωc and $\Delta\omega$ are positive constants, and $\omega c >> \Delta\omega$. The complex envelope of $s(t)$ is given by
(A) $\exp(-at)\exp[(\omega_c + \Delta\omega)\,t]u(t)$
(B) $\exp(-at)\exp(j\,\Delta\omega\,t)u(t)$
(C) $\exp(j\,\Delta\omega\,t)u(t)$
(D) $\exp[j\,\omega_c + \Delta\omega)\,t]$ (GATE-EC-1998)

Q13. In an FM system, a carrier of 100 MHz is modulated by a sinusoidal signal of 5 KHz. The bandwidth by Carson's approximation is 1 MHz. If y(t) = (modulated waveform)^3, than by using Carson's approximation, the bandwidth of y(t) around 300 MHz and the and the spacing of spectral components are, respectively.
(A) 3 MHz, 5 KHz (B) 1 MHz, 15 KHz
(C) 3 MHz, 15 KHz (D) 1 MHz, 5 KHz (GATE-EC-2000)

Q14. The Hilbert transform of $\cos\omega_1 t + \sin\omega_2 t$ is
(A) $\sin\omega_1 t - \cos\omega_2 t$ (B) $\sin\omega_1 t + \cos\omega_2 t$
(C) $\cos\omega_1 t - \sin\omega_2 t$ (D) $\sin\omega_1 t + \sin\omega_2 t$ (GATE-EC-2000)

Q15. A message $m(t)$ bandlimited to the frequency fm has a power of Pm. The power of the output signal in the figure is



(A) $\frac{P_m\cos\theta}{2}$ (B) $\frac{P_m}{4}$
(C) $\frac{P_m\sin^2\theta}{4}$ (D) $\frac{P_m\cos^2\theta}{4}$ (GATE-EC-2000)

Q16. The amplitude modulated waveform $s(t) = Ac\,[1 + K_a m(t)]\cos wc\,t$ is fed to an ideal envelope detector. The maximum magnitude of $K_a m(t)$ is greater than 1.
Which of the following could be the detector output ?
(A) $Acm(t)$ (B) $A_c^2[1 + Kam(t)]^2$
(C) $[Ac\,(1 + Kam(t)]$ (D) $Ac\,[1 + Kam(t)]^2$ (GATE-EC-2000)