RESPONSE SHEET FOR Online Assessment April - 2021

Department: Information Technology
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Regular/ Supply:

Subject Name: Analog and Digital Communication
Subject Code: IT-221

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Q.1.

DSB-FC	DSB-SC	SSB-SC
→ It is a double side band along with carrier AM.	→ It is a double side band without carrier AM.	→ It is only one side band AM, without carrier.
→ Band width = 2 fm	→ Band width = 2 fm	→ Band width = fm
→ Less no. of channels in a given frequency range.	→ Less number of channels in a given frequency range.	→ More number of channels in a given frequency range.
→ More power Consumption.	→ Moderate power consumption.	→ Least power consumption.
→ More redundant data.	→ Moderately redundant data	→ Least redundant data.
→ No need of synchronization	→ Tracking might be required.	→ Synchronization or tracking is essential.

Q. No.

Rough Wo
Required)

ii) Here, we have to calculate the modulation index of the AM wave.

given,

$m(t) = A \sin 45\pi t$

$c(t) = 4 \cos 800\pi t$

Let's calculate the value of A, as given in question.

My scholar no. = 68

As the scholar no. is even, so the value of $\boxed{A = 2}$.

So, as we know that, Modulation index $(m) = \frac{A_m}{A_c}$

And Here, $A_m = 2$ & $A_c = 4$.

$\therefore m = \frac{2}{4} = 0.5 \Rightarrow \boxed{m = 0.5}$

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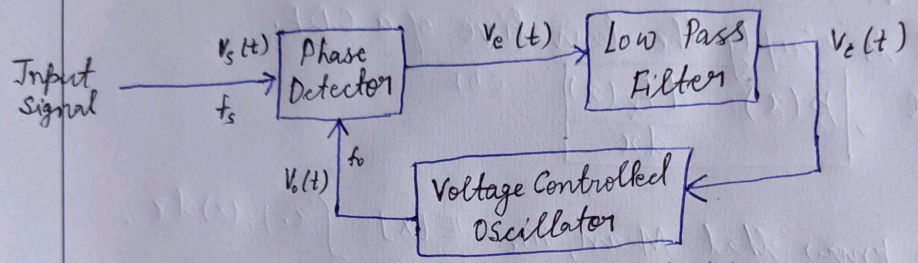
Q. No.

Rough Work (If Required)

2. → FM waves are detected using Phase-locked Loop (PLL).
It is a feedback control system with 3-basic components :-
i) Phase Detector, ii) Low Pass Filter & iii) Voltage Controlled oscillator.



Let's have a look at the working of PLL :-

→ If an input signal V_s of frequency f_s is applied to the PLL, the phase detector compares the phase and frequency of incoming signal to V_o of VCO

→ If the two signals differs in frequency and/or phase, an error V_e is generated.

→ The phase-detector is basically a multiplier and produces the sum and difference components at its output.

→ The high frequency component is removed by low pass filter and difference frequency component is then V_c to VCO.

→ The signal V_c shifts the VCO frequency in a direction to reduce the frequency difference between f_s and f_o.

→ And once the action starts we say that the signal is in capture range.

→ The Voltage Controlled oscillator continues to change frequency till output frequency is exactly the same as input signal frequency, And when its achieved the circuit is then all set to be locked and thus we are able to detect the FM waves.

Q. No. 3.

Rough Work (If Required)

i) The Central limit theorem states that whenever a random sample of size n is taken from any distribution with mean, variance, then the sample mean will be approx. normally distributed with mean & variance.

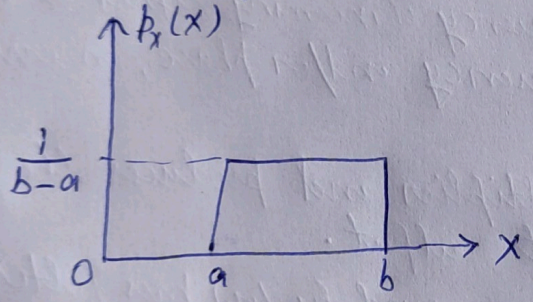
ii) A PDF is simply the derivative of a CDF.

i.e $f_x(x) = \frac{d(F_x(x))}{dx}$ ← CDF

PDF

iii) As we know that Mean, $m_x = E[x] = \int_{-\infty}^{\infty} x \cdot p_x(x)\, dx$.

Here, the given pulse is as :-



$\therefore m_x = E[x] = \int_a^b x \cdot \frac{1}{b-a}\, dx = \frac{1}{2(b-a)} [b^2 - a^2]$

$m_x = \frac{a+b}{2}$.

As stated in question,

a is smallest digit of my mob. no., i.e $a = 0$

b is largest digit of my mob. no., i.e $b = 9$

$\therefore \quad m_x = \frac{0+9}{2} = 4.5$

$\therefore \quad \boxed{m_x = 4.5}$

So, the mean of the rectangular pulse is 4.5.

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Q. No. 4.

Rough Work (If Required)

Noise may be defined as any unwanted form of energy tending to interfere with proper and easy reception and reproduction of wanted signal.

→ Depending upon whether noise is external or internal to the signal, there are two types of noise.

i) External noise: The noise which is generated externally to the system is known as external noise.
eg. Atmosphere Noise, extra-terrestrial noise, etc.

ii) Internal noise: The noise which is generated within the system is known as internal noise.
Some types of internal noise are :-
i) Thermal Noise.
ii) Flicker Noise.
iii) Shot Noise.

→ The thermal noise in electronic systems is usually modeled as a white ~~su~~ gaussian Noise process. It is usually assumed that it has zero mean $\mu_x = 0$, and is gaussian.

So, its power spectral density is given as, $\boxed{S_x(f) = \frac{N_0}{2} \text{ ; for all } f}$