Total No. of Questions – [8]

Total No. of Printed Pages 3

G.R. No.	

paper code: U228-133 (RE-FS)

May 2019/ENDSEM REEXAM

S. Y. B. TECH. (E & TC) (SEMESTER -II)

COURSE NAME: Communication Engineering-I

COURSE CODE: ETUA22173

(PATTERN 2017)

Time: [**2 Hours**]

[Max. Marks: **50**]

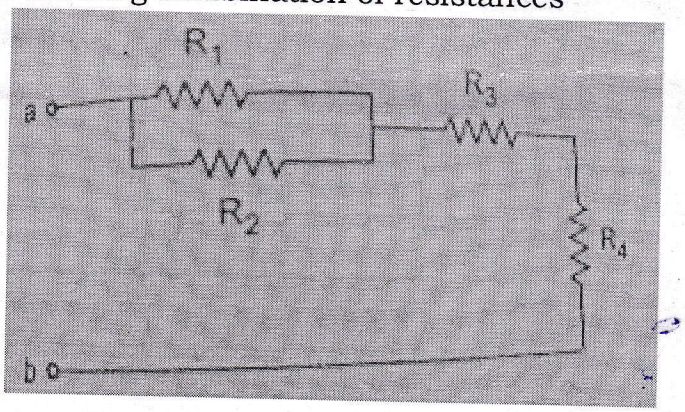
(*) Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) Three amplifiers have following characteristics [6]
F1=4dB, G1=20dB, F2=6dB,, G2=35dB, F3=9dB, G3=48dB
The amplifiers are connected in Tandem, Calculate overall noise figure and equivalent noise temperature.
Assume T=290 deg K.

OR

b) Four resistors have values R1= 15KΩ, R2= 20 KΩ , R3=25 KΩ, [6]
R4=35 KΩ. It is shown that the thermal noise voltage generated by R2= 0.5 μV. Calculate thermal noise voltage generated by following combination of resistances



Q2 a Calculate the power saving in percentage when the carrier and one side band is suppressed in AM wave when m = 50% and m= 100% [6]

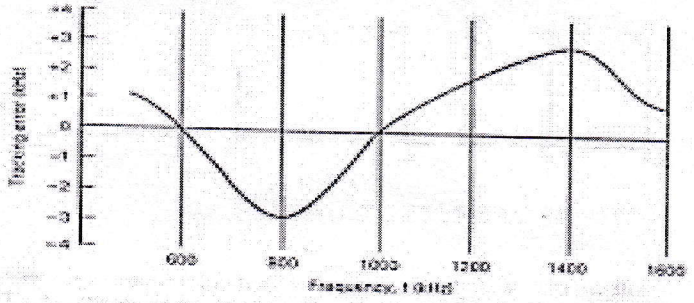
OR

b For the given baseband signal m(t) = cos (1000t),sketch the spectrum of m(t) and DSBSC signal m1(t)= m(t).cos(10000t) [6]

Q3 a A dual conversion super heterodyne receiver must cover the range from 220 to 224 MHz The first IF is 10.7 MHz; the second is 1.5 MHz higher than the first IF Find (*a*)first the local oscillator tuning range, (*b*) second local oscillator tuning range, and (*c*) the first IF image frequency range. d) Second IF image frequency range (Assume a local oscillator frequency higher than the input by the IF.) [6]

OR

b For the tracking curve shown with IF =455 kHz and maximum modulating signal frequency of 5kHz ,determine minimum IF bandwidth.(x axis of fig. is frequency in kHz and Y axis is tracking error at different frequencies with maximu tracking error of +3 at 1400 kHz and minimum is -3 at 800 kHz)) [6]

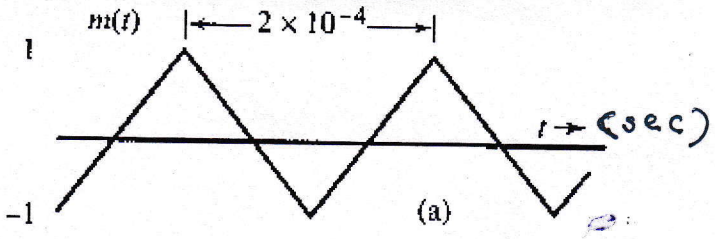


Q4 a) With block diagram and equations explain PLL method of FM detection [4]

OR

b) Draw block diagram and waveforms at the output of each block of FM receiver [4]

Q5. a) Sketch FM and PM waves for the modulating signal shown below. $k_f = 2\pi \times 10^5$ and $k_p = 10\pi$. Carrier frequency is 100MHz [6]



b) An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation [4]

$x(t) = 10 \cos(\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$.

Find: i. The frequency deviation ii. Deviation ratio β

c) Explain mathematically relation between FM and PM. How can [4]

we generate FM from PM and vice a versa

OR

Q.6 a) Draw the block diagram for design of Armstrong FM transmitter [6]
With final carrier frequency 91.2 MHz, and overall frequency deviation of 75kHz. Initial carrier frequency for NBFM is 200kHz and Initial frequency deviation is 25 Hz.
(Frequency doublers and triplers are available, output final Deviation may be more than the given)

b) Signal m (t) = sin 2000πt, k_f=200000 π rad/V and kp= 10 π. [4]
i. Estimate bandwidth of FM and PM

c) An angle modulated signal with carrier frequency [4]
$\omega_c = 2\pi \times 10^6$ is described by the equation
$x(t) = 10 \cos(\omega_c t + 0.1 \sin 2000 \pi t)$.
Find: i. The frequency deviation ii. Estimate the bandwidth

Q.7 a) Derive mathematically the expression for flat top sampling. [6]
Explain Aperture effect,

b). Find Nyquist rate and Nyquist interval for [4]
i. m(t)= sin (500 πt)/πt.
ii. ii. m (t)= cos (4000 πt). cos(1000 πt)

c) A band-limited signal *m* (*t*) with maximum frequency of 3 kHz is sampled at rate of 33⅓ % higher than the Nyquist rate. The maximum allowable error in the sample amplitude (*i.e.*, the maximum quantization error) is 0.5% of the peak Amplitude *mp*. Assume binary encoding. Find the minimum bandwidth of the channel to transmit the encoded binary signal [4]

OR

Q8. a) Derive mathematically the expression for natural sampling. [6]

b) A signal x(t)= cos 200 πt + 0.25 cos 700 πt is sampled at a rate of 400 samples per second. Sampled waveform is then passed through an ideal low pass filter with cutoff frequency 200Hz. Sketch the spectrum of sampled and reconstructed signal. [4]

c) Derive the expression for quantization noise power [4]