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SE-8286

B. E. III (Sem. V) (E & C) Examination

May / June – 2011

Electronic Communication

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 5) (E & C)**

Name of the Subject :

☛ **Electronic Communication**

☛Subject Code No. : **8 2 8 6** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(1) Attempt all questions.
(2) Make suitable assumptions wherever necessary.
(3) Figures to the right indicate full marks.

1 (a) Answer the following questions : **16**

(i) The _____ communication uses medium such as wire, cable etc. (line/optical)

(ii) The transmission without modulation is called as _____ transmission. (radio/baseband)

(iii) Explain the importance of q-factor.

(iv) Explain the difference between series and paralled R-L-C circuit.

(v) Describe the term flicker noise and list several sources.

(vi) Explain the difference between simple AGC and delayed AGC.

(vii) Discuss different noise sources exhibits in a bipolar transistor.

(viii) The intermediate frequency IF is _____ then the frequency of input signal. (higher/lower)

(b) Draw neat schematic diagram of the basic communication system. **4**

2 (a) A coil has a series resistance of 5 Ω, a self capacitance of 7 PF and an inductance of 1 μH. Determine the effective inductance and effective Q-factor when the coil forms part of a series tuned circuit resonant at 25 MHz. 8

(b) Two resistors of 20 and 50 kΩ are at room temperature (290 K). For a bandwidth of 100 KHz calculate the thermal noise voltage generated by 8
(i) each resistor
(ii) the two resistors in series
(iii) the two resistors in parallel

OR

2 (a) Draw parallel tuned circuit and derive the equation for resonant frequency and 'Q' factor. 8

(b) The equivalent noise resistance for an amplifier is 300 Ω and the equivalent shot noise current is 5 μA. The amplifier is fed from a 150 Ω, 10 μA rms sinusoidal signal source. Calculate the individual noise voltage at the input and the input signal to noise ratio in decibels. The noise bandwidth is 10 MHz. 8

3 Attempt any **two** : 14
(i) Draw the block diagram of super heterodyne AM receiver and explain its operation in detail.
(ii) Determine the overall noise factor when
(a) an amplifier is connected to a lossy network and
(b) when a lossy network is connected to an amplifier
(iii) Draw the circuit diagram of low frequency transformer and derive the equation for reflected load.

4 (a) Explain following : (each carries **two** marks) 10
(i) Define Fourier Transform and Inverse Fourier Transform. Also mention the conditions for the existence of Fourier Transform.
(ii) Define Energy Spectral Density. Mention its properties.
(iii) Define the term Modulation and explain the time domain representation of AM signal.
(iv) What are the advantages of SSB transmission over DSB ? Why SSB transmission not suitable for broadcast ?
(v) What is angle modulation ? Explain the relationship between Frequency Modulation and Phase Modulation.

(b) Enlist various signal distortions occurs over a communication channel. Explain Distortions due to Multipath effects and Fading effects in detail. **5**

(c) Consider an Exponentially damped sinusoidal signal defined as : **5**

$$X(t) = e^{-t} \sin(2\Pi f_c t) \text{-----} > t > 0$$
$$0 \qquad \text{elsewhere}$$

Obtain Fourier Transform using frequency shifting property.

5 Attempt any **two** : **16**

(a) For single tone AM, derive the expression for total transmitted power Pt in terms of Carrier power Pc and modulation index m.
A transistor Class C amplifier has maximum permissible collector dissipation of 20 watts and collector efficiency of 75%. If it is collector modulator to depth of 90. Calculate
(i) Maximum carrier power and
(ii) Power in sidebands.

(b) Explain the operation of square law modulator which generated the AM wave. Prove with the help of derivation that it generates the AM at its output.

(c) Explain Balanced Modulator using FET with the derivation for DSB-SC.

6 Attempt any **two** : **14**

(a) Draw a block diagram of Wideband FM transmitter based on Armstrong method of FM generation. Explain its operation in detail.

(b) Explain the working principle FM detection. Draw the circuit diagram and expain the operation of Ratio detector. Why it is preferred over Foster Seeley detector ?

(c) Draw and explain Zero crosing detector as Frequency Demodulator.
