

KADI SARVA VISHWAVIDYALAYA
BE EC SEMESTER 5th EXAMINATION – NOVEMBER 2016

SUBJECT CODE: EC-504
DATE: 17/11/2016

SUBJECT NAME: Electronic Communication
TIME: 10.30 AM to 01.30 PM
TOTAL MARKS: 70

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. Attempt all questions.
4. Indicate **clearly**, the option you may attempted along with its respective question number
5. Use the last page of main supplementary for rough work.

SECTION - 1

- Q.1** (a) Define the following: [05]
- (1) Multiplexing
 - (2) Sensitivity
 - (3) Mutual Inductance
 - (4) Energy Signal
 - (5) Fourier Transform
- (b) Explain in brief: Classification of Electronic communication system. [05]
- (c) Derive Q- factor for Parallel circuit. Why the Parallel circuit is called a Rejecter circuit? [05]

OR

- (c) Calculate -3dB bandwidth for the series tuned circuit. [05]
- Q.2** (a) Explain the Unit Gate Function, Unit Triangle Function and Interpolation Function Sinc (x). [05]
- (b) Find the Fourier transform of $g(t) = \text{rect}(t / T)$ and draw its spectrum. [05]

OR

- (a) Verify Parseval's theorem for the signal $g(t) = e^{-at} u(t)$ (if $a > 0$). [05]
- (b) Describe the Time shifting and Time Scaling signal operation with figures. [05]
- Q.3** (a) What are the sources of noise? Explain any two Internal noises. [05]
- (b) Explain in detail working of Superhetrodyne receiver with the help of block diagram. [05]

OR

- (a) Define Noise Figure. Derive Friis's formula for 2-stage cascaded amplifiers. [05]
- (b) A mixer has a noise figure of 20 dB, and this is preceded by an amplifier that has a noise figure of 9 dB and an available power gain of 15 dB. Calculate the overall noise figure referred to the input. [05]

SECTION - 2

- Q.4 (a) Define the following terms:** [05]
- (1) Phase Modulation
 - (2) DSBSC
 - (3) Frequency synthesizer
 - (4) Deviation ratio
 - (5) PLL
- (b)** What do you mean by AGC? Draw the circuit diagram of delayed AGC and explain its operation. What are the advantages of delayed AGC? [05]
- (c)** What do you mean by Tracking? Explain with figures: 1) Padder Tracking 2) Trimmer Tracking 3) Three point Tracking [05]

OR

- (c)** For a broadcast superhetrodyne AM RX has an IF = 465 KHz and is tuned to 1000KHz, RF stage has one tuned circuit with a Q of 50. Find: (a) Find the Image frequency [05]
(b) Find the image rejection in decibels.
- Q.5 (a)** Derive the mathematical expression of Time domain & frequency domain representation of DSB-FC signal. [05]
- (b)** Write a short note on Amplitude demodulator circuits. [05]

OR

- (a)** Write a Short note on Phase-shift method for SSB generation. [05]
- (b)** A sinusoidal carrier has amplitude of 10 V and frequency 30KHz. It is amplitude modulated by a sinusoidal voltage of amplitude 3V and frequency 1KHz. Modulated voltage is developed across a $50\ \Omega$ resistance. Find:
(a) Modulating frequency and carrier frequency.
(b) Write the equation for modulated wave.
(c) Plot the modulated wave showing maxima and minima of waveform.
(d) Determine the modulation index.
(e) Draw the spectrum of modulated wave.

- Q.6 (a)** Write a short note on Foster-seeley Discriminator. [05]
- (b)** State Carson's rule. [05]
Derive Carson's rule for Narrowband FM and Wideband FM.

OR

- (a)** Explain why De-emphasis is used in FM reception. What is the function of Pre-emphasis in an FM transmitter? [05]
- (b)** Explain: Indirect method of FM generation method (Armstrong Method). [05]

*****ALL THE BEST*****

KADI SARVA VISHWAVIDYALAYA

B.E SEMESTER : 5th

EXAMINATION (November / 2015)

SUBJECT CODE : EC - 504

SUBJECT NAME : Electronic Communication

DATE: 26/11/2015

TIME: 10:30 am to 01:30 pm

TOTAL MARKS: 70

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

Section - 1

Q:1 Answer the following Question.

- (A) Draw & explain the basic elements of basic communication system. 05
(B) What is modulation? Explain need of modulation in detail. 05
(C) Calculate -3dB bandwidth for the series tuned circuit. 05

OR

- (C) Write a short note on Skin effect. Explain how this effect can be removed. 05

Q:2 Answer the following Question.

- (A) Define Noise Factor. Derive Friis's formula for 2-stage cascaded amplifiers. 05
(B) A mixer stage has a noise figure of 20dB, and this is preceded by an amplifier that has a noise figure of 9 dB and an available power gain of 15 dB. Calculate the overall noise figure referred to the input. 05

OR

- (A) Write a short note on 1. Johnson Noise 2. Avalanche Noise 05
(B) Define Noise Factor. Derive Friis's formula for 2-stage cascaded amplifiers in noise temperature. 05

Q:3 Answer the following Question.

- (A) List out the Properties of Fourier Transform. Prove any two in detail. 05
(B) Explain the Classification of signals. 05

OR

- (A) What is Fourier Transform? What does a Fourier Transform Do? Write the definition of Fourier Transform and Inverse Fourier Transform. 05
(B) What is the meaning of Fading? What are the different reasons for fading? 05

Section – 2

Q:4 Answer the following Question

- (A) Draw the block diagram of superhetrodyne FM receiver and explain its operation in detail with necessary waveforms. 05
(B) What do you mean by AGC? Draw the circuit diagram of delayed AGC and explain its operation. What are the advantages of delayed AGC? 05
(C) Write a short note on Adjacent Channel Selectivity. 05

OR

- (C) For a broadcast superhetrodyne AM RX having no RF amplifier, the Q factor is 100. Now if the intermediate frequency is 455 kHz, then determine the image frequency and its rejection ratio in dB at an incoming frequency of 1 MHz and 25 MHz. 05

Q:5 Answer the following Question

- (A) Obtain the mathematical expression for an AM wave, If the modulating signal is $e_m = E_m \sin(2\pi f_m t)$ & $e_c = E_c \sin(2\pi f_c t)$ in Time Domain & Frequency Domain. 05
(B) Find the power saving calculation in DSB-SC AM wave. Why DSB-FC & DSB-SC are band width efficient? 05

OR

- (A) Write a short note on 1) Square Law detector 05
 2) Envelope detector
(B) Write a Short note on Phase-shift method for SSB generation. 05

Q:6 Answer the following Question

- (A) Explain Carson's rule. Derive equation of FM bandwidth When 1) $\Delta f \ll f_m$ 2) $\Delta f \gg f_m$ 05
(B) Write down advantages and disadvantages of AM & FM. 05

OR

- (A) Explain why de-emphasis is used in FM reception. What is the function of pre-emphasis in an FM transmitter? 05
(B) An FM signal has a resting frequency of 105 MHz and highest frequency of 103.03 MHz when modulated by a signal of frequency 5 KHz.
Determine :
(1). Frequency Deviation (2). Carrier swing (3). Modulation Index
(4). % of Modulation 05

-----All the Best -----

KADI SARVA VISHWAVIDYALAYA
B.E. SEMESTER 5th EXAMINATION NOVEMBER – 2014

SUBJECT CODE: EC – 504
DATE: 20/11/2014

SUBJECT NAME: ELECTRONIC COMMUNICATION
TIME: 10:30 TO 1:30 **TOTAL MARKS: 70**

Instructions:

1. Answer each section in separate answer sheet.
 2. Use of scientific calculator is permitted.
 3. All questions are compulsory.
 4. Indicate **clearly**, the options you attempted along with its respective question number.
 5. Use the last page of main supplementary for rough work.

Section – 1

Que. 1 (A) Define Following.

- 1) Heterodyning 2) Noise Factor
3) Frequency Deviation 4) Modulation
5) AM Modulation Index

(B) Derive Friis's Formula for Noise Factor of cascaded amplifier.

(C) Derive the Q factor of series RLC tune circuit.

OR

(C) Write short note on Superhetrodyne Receiver.

(5)

Que. 2 Answer the following questions.

(A) Explain Independent Sideband Modulation with Frequency Spectrum. (5)

(B) A 350 W carrier is Amplitude Modulated to a depth of 100%. Calculate the total power for SSB technique. How much power saving is achieved for SSB as compared to AM, if the depth of modulation is changed to 75%.

OR

(A) What is Image Frequency and explain its significance.

(5)

(B) The RF Amplifier of a receiver has an input resistance of 800Ω , and equivalent shot noise resistance of 1800Ω , a gain of 20, and a load resistance of $100 \text{ k}\Omega$. Given that the bandwidth is 1.1 MHz and the temperature is 15°C . Calculate the equivalent noise voltage at the input of RF Amplifier. If the receiver is connected to an antenna with an impedance of 65Ω , calculate the noise figure.

Que. 3 Answer the following questions.

(A) Explain Envelope Detector and discuss the error occurring in detection. (5)
(B) Write short note on Tracking errors at Receiver. (5)

OR

(A) Explain Frequency Synthesizer PLL. (5)

(B) A 107.6 MHz carrier is frequency modulated by a 7 kHz sine wave. (5)
The resultant FM signal has a frequency deviation of 50kHz.

- 1) Determine the highest and lowest frequencies attained by the modulated signal.
 - 2) What is the modulation index of the FM wave?

Section – 2

- Que. 4** (A) Define Modulation Index for AM and derive total power. (5)
(B) Write short note on Pre-Emphasis and De-Emphasis. (5)
(C) Write short note on Foster Seeley Detector. (5)

OR

- (C) Explain Automatic Gain Control with necessary diagram. (5)

- Que. 5** Answer the following questions.

- (A) Explain Sensitivity and Selectivity of a Receiver. (5)

(B) A receiver tunes signal from 550 kHz to 1600 kHz with an IF of 455 kHz. Find the Frequency Tuning ranges and Capacitor Tuning ranges for the Oscillator section and for the RF section. (5)

OR

- (A) Describe Adjacent Channel Selectivity. (5)

(B) A Superhetrodyne Receiver having an RF amplifier tuned to 15 MHz and having an IF of 450 kHz. Calculate the Q_s of the RF and Mixer, both being same, If the receiver's Image Rejection is to be 120. (5)

- Que. 6 Answer the following questions.**

- (A) State and prove following properties of Fourier Transform. (5)
 1) Linearity 2) Frequency Shifting
 (B) Give Classification of Signals. (5)

OR

- (A) Write short note on Armstrong Method. (5)
(B) Define Frequency Modulation and derive mathematical expressions for that. (5)

KADI SARVA VISHWAVIDYALAYA
B.E. SEMESTER 5th (ATKT) EXAMINATION APRIL – 2015

SUBJECT CODE: EC-504
DATE: 23/04/2015

SUBJECT NAME: Electronic Communication
TIME: 10:30AM To 1:30PM **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

Section – 1

Que. 1 (All Compulsory)

- (A) Explain Armstrong method of FM generation with neat diagram. (5)
(B) Draw block diagram of super heterodyne receiver and explain function of each block. (5)
(C) With related to Amplitude modulation discuss following parameters (5)
(i) Modulation index (ii) Modulation depth (iii) Bandwidth requirement
(iv) Power distribution in sidebands and carrier
- OR**
- (C) What are the advantages of SSB modulation? Explain the SSB and derive the total power in SSB. (5)

Que. 2 Answer the following questions.

- (A) For a receiver with IF and RF frequency of 455 KHz & 950 KHz respectively determine:
(i) local oscillator frequency
(ii) image frequency
(iii) Image frequency rejection ratio. Take Q=70.
(B) What do you understand by image frequency and its rejection? (5)
- OR**
- (A) An FM wave is given by $e(t) = 20\sin(6 \times 10^8 t + 7\sin 1250 t)$. (5)
Determine (i) The carrier frequency (ii) Modulating frequency
(iii) The modulation index (iv) The maximum deviation.
(B) Discuss basic principle of FM detection and Explain foster seeley discriminator with neat diagram. (5)

Que. 3 Answer the following questions.

- (A) Explain phase locked loop. (5)
(B) Explain the demodulation process of an SSB-SC signal with relevant mathematical expressions
- OR**
- (A) Write short note on Pre-emphasis and De- emphasis. (5)
(B) List and discuss the factors influencing the choice of intermediate frequency for a radio receiver. (5)

Section – 2

Que. 4 (All Compulsory)

- (A) Write short note on series and parallel tuned circuits. (5)
(B) Write short note on signal energy and energy spectral density and signal power and power spectral density. (5)
(C) Discuss Noise factor. Derive expression for noise factor of amplifier connected in cascade. (5)

OR

- (C) Write a short note on Skin Effect. How to reduce Skin Effect? (5)

Que. 5 Answer the following questions.

- (A) The RF amplifier of a receiver has an input resistance of $800\ \Omega$, and equivalent shot noise resistance of $1800\ \Omega$, a gain of 20, and a load resistance of $100\ k\Omega$. Given that the bandwidth is 1.1 MHz and the temperature 15^0C , calculate the equivalent noise voltage at the input to this RF amplifier. If this receiver is connected to an antenna with an impedance of $65\ \Omega$, calculate the noise figure.
(B) Derive an expression for 3-dB bandwidth of a series RLC circuit. (5)

OR

- (A) A parallel tuned circuit, having a Q of 20, is resonated to 300 MHz with a 20 Pico farad capacitor. If this circuit is maintained at 19^0C , what noise voltage will a wideband voltmeter measure when placed across it?
(B) Define the following terms related with radio receivers:
(1) Selectivity (2) Fidelity (3) sensitivity (4) Double spotting (5) AGC (5)

Que. 6 Answer the following questions.

- (A) State and prove any three properties of Fourier transform. (5)
(B) State the Parseval's theorem. Prove it for the signal :
$$g(t) = e^{-at} u(t) \quad (a > 0).$$
 (5)

OR

- (A) Find Fourier transform of following: (5)
(i) $\text{rect}(t/\tau)$
(ii) $e^{-5|t|}$
(B) List different types of noise related to communication. Explain Any two of them. (5)

----ALL THE BEST----