BTS-IV-04.19-0355 Reg. No. | | | | | | | | |

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B.Tech. Degree IV Semester Examination April 2019

EE/EC 405 ANALOG COMMUNICATION

(*2006 Scheme*)

Time: 3 Hours Maximum Marks: 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) Mention the elements of a communication system. Describe their functionality.

(b) Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of
   (i) 100 percent
   (ii) 50 percent

(c) Derive the formula for the instantaneous value of an FM voltage and define the modulation index.

(d) With the aid of a vector diagram, explain what happens when a carrier is modulated by a single noise frequency.

(e) Name the different noises which may be created within a receiver or amplifier. Discuss their effect on the performance of the receiver.

(f) Define Thermal Agitation noise. An amplifier operating over the frequency range from 15 to 25 MHz has a 15 kΩ input resistor. What is the rms noise voltage at the input of this amplifier if the ambient temperature is 25°C ? (Boltzmann's constant $k = 1.38 \times 10^{23}$ J/K).

(g) Write a short note on Simple Telephone Communication.

(h) Briefly discuss about Centralized SPC.

PART B

(4 × 15 = 60)

II. (a) Describe the generation of VSB wave using analog multiplier and frequency discrimination methods. (7)

(b) An SSB transmission contains 10 KW. This transmission is to be replaced by a standard amplitude modulated signal with the same power content. Determine the power content of the carrier and each of the sidebands when the percent modulation is 80%. (8)

OR

III. (a) Briefly explain the working of double super heterodyne receiver. (5)

(b) An audio signal given as 15 sin $4(1500\pi t)$ amplitude modulates a carrier given as 60 sin $6(100{,}000\,\pi t)$, determine the following: (10)

   (i) Sketch the audio and carrier signal.
   (ii) Construct the modulated wave.
   (iii) Determine the modulation index.
   (iv) What are the frequencies of audio signal and carrier?
   (v) Sketch the spectrum of resulting AM signal.

(P.T.O.)

IV. (a) Explain the working of Foster-Seeley Discriminator with neat sketch. (7)

(b) Using a relevant block diagram and frequency spectrum diagram, explain the operation of the stereo multiplex FM transmission system. (8)

OR

V. (a) Compare FM and PM systems. (7)

(b) When the modulating frequency of an FM system is 600 Hz, modulating voltage 3.2 V and modulation index 60, calculate the maximum deviation. When the modulating frequency is reduced to 250 Hz and the modulating voltage is raised to 4.8 V, what will be the modulation index? (8)

VI. (a) A parallel tuned circuit is made to resonate at a frequency of 100 MHz. The parallel tuned circuit uses a coil having quality factor Q of 10 and capacitance of 10 μ F. The temperature of the circuit is maintained at 17° C. Determine the output voltage across the circuit measured by a wide band voltmeter. (7)

(b) With suitable circuits, explain how and why, the Ratio Detector is derived from the Phase Discriminator. (8)

OR

VII. (a) Write short note on: (6)

(i) Pre-emphasis

(ii) De-emphasis

(iii) Threshold effect

(b) The noise output of a resistor is amplified by a noiseless amplifier having a gain of 60 and bandwidth of 20 KHz. A meter connected to the output of amplifier read 1MVrms. (9)

(i) The bandwidth of the amplifier is reduced to 5 KHz, its gain remaining constant. What does the meter read now?

(ii) If the resistor is operated at 80° C, what is its resistance?

VIII. (a) State and explain sampling theorem. (7)

(b) Discuss signal distortion in PAM, PWM and PPM (8)

OR

IX. (a) Discuss Grade of Service and Blocking Probability. (8)

(b) What is uniform and non uniform quantization companding? Explain. (7)

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