Question Paper

Exam Date & Time: 28-Dec-2018 (08:30 AM - 11:30 AM)



FIRST SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, DEC 2018

Basic Electronics [ECE 1051 - 2018 -PHY]

A

Marks: 50

Duration: 180 mins.

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)

A)

For the biasing circuit shown in Figure Q1A with silicon ⁽⁴⁾

transistor,
$$R_B = 470 k\Omega$$
, $R_C = 2.7 k\Omega$, $V_{BE} = 0.7 V$, $V_{CC} = 16 V$

and $\beta = 90$. Determine I_B, I_C, V_{CE}, V_E and V_B.



Figure Q1A

- ^{B)} Draw the input and output V-I characteristics of an npn (3) transistor in CE Configuration. If $V_{CE} = 0.2V$ and $V_{BE}=0.7V$, identify the region of operation of the transistor.
- ^{C)} Draw the circuit of Zener voltage regulator. Given $V_i =$ ⁽³⁾ 20V, $R_S = 220\Omega$, $V_Z = 10V$, $P_{zmax} = 400$ mW, determine V_L , I_L , I_Z , and I_R for the Zener voltage regulator if $R_L = 470\Omega$.
- ²⁾ (i) Define the terms Differential gain, CMRR, Slew Rate and ⁽⁴⁾ (i) Define the terms Differential gain, CMRR, Slew Rate and ⁽⁴⁾ (i) Input resistance with respect to OPAMP. (ii) Design a circuit using OPAMP to obtain output $V_0 = -$ (0.1V_a + V_b + 10V_c) where, V_a, V_b and V_c are the input signals. Draw the circuit diagram. (Select R_F = 1k Ω)

B) Draw the circuit diagrams of Integrator and Differentiator (3) using OPAMP. Derive the expressions for the output voltage of these circuits. C) Perform $(75)_8 - (67)_{10}$ using 1's complement method. (3) 3) A logical function is defined by $f(A,B,C,D) = \Sigma m(0,2,4,6,8,13)^{(4)}$ $+ \Sigma d$ (5,7,10,11,12). Simplify the expression using K-Map A) and implement using NAND gates only. Test the received code word 1011101 for error if data B) (3) stream 1101 was encoded using (7,4) Hamming code over noisy channel. C) Realize a 3-bit down counter using positive edge triggered (3) JK flip flops. Draw the timing diagram for the same. 4) (4) Define Amplitude modulation. Sketch AM signal in time domain for a sinusoidal modulating signal. An AM wave is A) expressed by the following equation: $V_{AM}(t) = 6.5 (1 + 0.5 \text{ Sin } 5027t) \text{ Cos } (10053 \times 10^{3} \text{ t}).$ Sketch the spectrum of this AM Signal. B) (3) Write the equation for Frequency Modulated signal in time domain for a sinusoidal modulating signal. Determine the bandwidth of FM signal required to transmit 10 kHz, 2V peak amplitude signal with frequency sensitivity 3 kHz/V using Carson's rule. C) (3) When the modulation percentage is 75, an AM transmitter produces 10kW of power. Determine the carrier power. What would be the percentage power saving if the carrier and one of the sidebands were suppressed before transmitting the signal? 5) (4)Draw the block diagram of Digital Communication system and explain the function of each block. A) B) (3) Highlight the various functions involved in the data communication system. C) Explain the following terms with reference to electronic (3) communication systems. i) CDMA iii) VLR ii) FSK

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