Question Paper

Exam Date & Time: 15-Mar-2021 (09:00 AM - 12:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

FIRST SEMESTER B.TECH END SEMESTER EXAMINATIONS, MARCH 2021

BASIC ELECTRONICS [ECE 1051 - 2020 -PHY]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

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

1) Consider a sinusoidal voltage of 200 Sin (2π50t) volts applied to a bridge rectifier with turns ratio 10:1. If the load resistance is 1kΩ, diodes are ideal, calculate (4)

A)

i. Average load current.

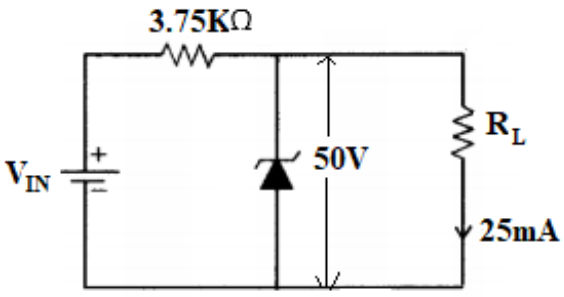
ii. RMS load current

iii. Efficiency & Ripple factor

iv. Frequency of the output signal

B) Draw a self-bias circuit using Silicon transistor having R_E = 200 Ω, R_1 = 10 kΩ, R_2 = 100kΩ, R_C = 2kΩ, β = 100 and V_{CC} = 12V. Find the Operating point (3)

C) For the circuit shown, find the limits for V_{IN} for which it can vary without any loss in regulation. Assume I_{ZMIN} = 5mA and I_{ZMAX} = 40mA. (3)



2) Draw the circuit using two OPAMPs to realize $V_0=2V_1-5V_2+V_3$ where V_1, V_2, V_3 are the input voltages (4)

A)

B) i) The inputs V_1=3mV and V_2=2mV is given to the non-inverting and inverting terminals of an OPAMP,respectively.The differential gain is 60dB and CMRR is 40dB.Calculate the output voltage. (3)

ii) Realise an integrator using OPAMP and give its output expression for an input V_i=10 sin 200t.

C) Explain, with necessary diagram ,the working of an RC coupled amplifier with feedback and draw its frequency response. (3)

3) Simplify f (A, B, C, D) =Σm (0,1,3,4,5,6,7,12,13,14,15) using K-map and implement usingAOI logic. (4)

A)

B) Obtain $(25.50)_{10}$- $(67.75)_{10}$using2's complement method. (3)

C) Draw the logic diagram ofa 3bit rippleup counter using negativeedge triggered JK flip-flops. Sketch the timing diagram. (3)

4) An audio frequencysignal 10sin(2π500t) volts is used to amplitude modulate a carrier of (4)

A) $50\sin(2\pi 10^5 t)$ volts.Determine the

i. Modulation index

ii. Bandwidth required for transmission

iii. Side band frequencies

Also Plot the frequency spectrum of AM wave

B) A 250 W, 100 kHz carrier is amplitude modulated to a depth of 75% by a modulating signalof 1 kHz frequency. Determine the total power transmitted in side band frequencies. (3)

C) Given a frequency modulated signalv(t)=10sin $(2\pi 10^8 t+5\sin(2\pi 15000t))$, Determine the (3)

i. Modulation index

ii. Modulating frequency

iii. Frequency deviation

5) Draw the block diagramofaDigital Communication systemand explain the function of each block. (4)

A)

B) Definesampling theorem.Consider an analog signal, (3)

x(t)=15cos(50 t)+10sin(100 t)+5cos(150 t).

Determine the minimum sampling rate required to reconstruct the signal.

C) Sketch the ASK,FSK and PSK waveforms for thegiven binarydata 101101. (3)

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