Duration: 3 Hrs 15 mins   **Max.Marks**: 70

PART – A

Answer all the questions: **10 × 1 = 10m**

1. Write the symbol of $n-$ channel JFET.
2. Why is input current zero in the case of an ideal Op-Amp?
3. Sidebands are important in the transmission of AM signal. Why?
4. Mention the use of a limiter in an FM receiver.
5. Draw the circuit symbol of SCR.
6. Give one example for non-weighted code.
7. Expand ASCII.
8. How much is the RAM of microcontroller 8051?
9. Find the value of $a++$ when $a=6$.
10. What is Bluetooth?

PART – B

Answer any *Five* of thefollowing questions: **5 × 2 = 10m**

11. Derive $\mu = r_d \times g_m$. Symbols have their usual meaning.

12. Mention the steps involved in drawing AC equivalent circuit of an amplifier.

13. An amplifier has $Z_0 = 5\,k\Omega$ has a voltage gain $A=100$ and $\beta = 0.02$. Find the output impedance of feedback amplifier.

14. Explain the Barkhausen criterion for sustained oscillations.

15. What is the modulation index of an FM signal whose carrier swing is $50\,KHz$ and the modulating signal frequency is $8\,KHz$?

16. Briefly explain the need of drift layer in a power diode.

17. What is an addressing mode? Name any one addressing mode.

18. Write any two applications of satellite communication.

PART – C

Answer any *Five* of the following questions: **5 × 3 = 15m**

19. What is voltage divider bias? Mention any two advantages.
20. Derive an expression for the voltage gain of voltage series negative feedback amplifier.
21. What is fading? Distinguish between optical horizon and radio horizon.
22. Explain in brief the construction of Triac.
23. Determine anode current I_A of SCR when $I_G = 0$. Given $\left(\alpha_1 + \alpha_2 \right) = 0.97$ and $\left(I_{C01} + I_{C02} \right) = 1\,mA$.

24. Convert $Y = A + B\overline{C}$ into its canonical SOP form.
25. Write the format of simple C program.
26. Draw the simplified block diagram of RADAR Communication System.

PART – D

Answer any *Three* of the following questions: **3 × 5 = 15m**

27. A three-stage amplifier has a first stage voltage gain of 10, second stage voltage gain of 50 and third stage voltage gain of 400. If the input voltage given at the first stage of the amplifier is $10\,\mu V$, calculate the output voltage at the each stage. Also, find the total voltage gain in dB.

28. Calculate the output voltage given $V_1 = 0.2\,V$ and $V_2 = 0.5\,V$.
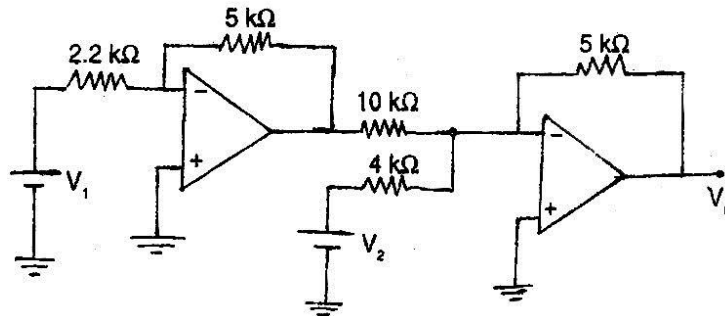
29. The following tank circuit is used in the Colpitt's oscillator, it oscillates at $1\,MHz$. Calculate the value of C_2.
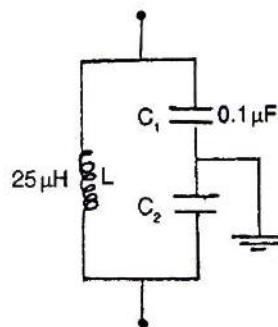
30. A modulating signals $10\sin\left(2\pi\times10^3\right)t$ is used to amplitude modulate a carrier signal $20\sin\left(2\pi\times10^6\right)t$. Write the equation for AM wave. Find:

    (a) Modulation index
    (b) Frequency of the sideband components
    (c) Amplitude of sidebands.

31. Simplify the Boolean expression using $K-map$
    $Y\left(A,\ B,\ C,\ D\right) = \sum m\left(2,\ 4,\ 5,\ 9,\ 13,\ 14\right) + \sum d\left(0,\ 6,\ 7,\ 8,\ 10\right)$. Draw the NAND gate equivalent circuit to realize the simplified equation.

PART – E

Answer any *Four* of the following questions: $4 \times 5 = 20m$

32. With a circuit diagram and waveforms explain the working of single stage CE amplifier.
33. Obtain an expression for the output of a logarithmic amplifier using Op-Amp.
34. Derive an expression for instantaneous voltage of AM waves.
35. With a circuit diagram explain the working of Serial In Serial Out (SISO) shift register.
36. Write an assembly language program to subtract D3H from E2H using 8051 microcontroller and save the result into register R5. Verify the contents of R5 after executing the program.
37. Write a C program to accept two numbers and compute their sum and average.