Max. Marks: 70

PART – A

Answer all the questions.   **(1 X 10 = 10)**

1. In which region of characteristic transistor behaves as a closed switch?
2. Define input offset voltage of op-amp.
3. What is a transmission line?
4. Expand DSB-FC.
5. Write the symbol of TRIAC.
6. Expand EBC-DIC
7. What is racing condition in flip-flops.
8. What is the size of internal RAM of 8051 microcontroller?
9. Write C equivalent expression for $Y = (a^2 + b^2) / c$
10. Why the cells are in hexagon shape during cell-splitting?

PART – B

Answer any five of the following.   **(2 X 5 = 10)**

11. Differentiate between FET & BJT.
12. Mention any two disadvantages of direct coupled amplifier.
13. In a negative FB amplifier, a = 200, β = 0.06, calculate gain with feedback.
14. Write the Barkhausen criterian for sustained oscillation.
15. Draw the frequency sprectrum of AM wave.
16. Draw the VI characteristics of power diode under forward biased condition for 2 temperatures.
17. What are identifiers? Write the rules for declaring variables.
18. Compare Wifi and Bluetooth.

PART – C

Answer any five of the following.   **(3 X 5 = 15)**

19. Explain the needs for biasing.
20. Derive an expression for input impedance of negative feedback amplifier.
21. Draw the block-diagram of a communication system and explain the function of each block.
22. Draw the circuit of half-wave controlled rectifier using RC triggering method. Draw input-output waveforms.
23. Explain the construction and working of SCR with transistor equivalent circuit.
24. Draw the logic diagram of DFF, write its truth-table and timing diagram.
25. Explain the following units of 8051 microcontroller:
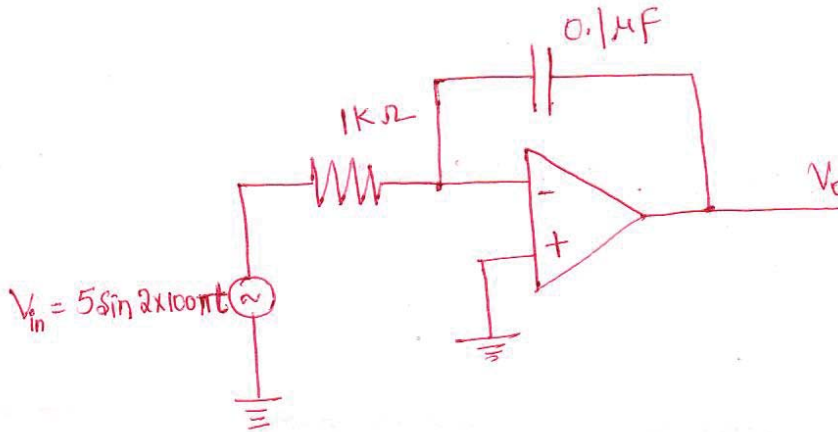   i.   Accumulator
    ii. ALU
    iii. Program Counter

26. What is RADAR? Mention any 2 applications.

PART - D

Answer any three of the following. (5X 3 = 15)

27. In a CE amplifier $R_1 = 30K\Omega$ $R_2=3.9K\Omega$, $R_C=1.5K\Omega$, $R_E =1K\Omega$, $R_L =10K\Omega$, $V_{CC} =10V$, $\beta=120$, $V_{IN} =10mV$. Given: $r_e= 52mV/I_E$. Find
    i. R_{IN}
    ii. A_V

28. Calculate the output of the following circuit.

29. Calculate the frequency of oscillation of a colpitt's oscillator given L = 30mH, $C_1 = 0.01$ μF , $C_2 = 0.22$μF. Also calculate feedback factor.

30. A carrier wave with frequency 22MHz and Amplitude 7V, is amplitude modulated by a 8KHz, 5.3V audio signal. Calculate
    i.   Percentage modulation
    ii.   Side-band frequencies
    iii. Amplitude of each sideband.
    iv.   Equation of AM wave.

31. Simplify using K-Map. $Y= \Sigma m(0,2,4,6,8,10,11,12,14,15) + \Sigma d(9, 13)$. Draw the logic circuit using NAND gate only for simplified expression.

PART –E

Answer any four of the following. (5X 4 = 20)

32. Explain the working of Class B push-pull amplifier.
33. Derive an expression for the voltage gain of Op-Amp inverting amplifier.
34. Derive power relations in AM. Write expressions for
    i.   Total power of an AM wave
    ii.   Total side-band power
    iii. Power of each sidebands with respect to carrier power.
35. Draw the logic diagram of SISO shift register and explain the working with truth table.
36. Write 8051 microcontroller instructions to perform the following:
    i.   To copy the number 51h to register R_0
    ii.   To copy the content of register R_2 to accumulator.
    iii. To add the contents of accumulator and RAM location 32h
    iv.   To exchange the contents of accumulator and register R_1
    v.   To increment the content of DPTR
37. Write a c-program to accept three integers and print the largest among them.

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