B15

050/21

Total Number of Questions : 32

Time : 3.00 Hours

Max. Marks : 200

1. What is meant by forward energy gap in semiconductor and what is the forbidden band gap energy of silicon ? **(2 Marks)**

2. Define CMRR of an operational amplifier. **(2 Marks)**

3. Implement NOT gate using NAND gate. **(2 Marks)**

4. Define modulation index of amplitude modulation. **(2 Marks)**

5. What is a watchdog timer in a microcontroller ? **(2 Marks)**

6. What is sampling theorem ? What is the minimum sampling frequency for the proper reconstruction of an analog signal of 1 kHz ? **(4 Marks)**

7. The collector current of a CE transistor is given as 10 mA and base current is given as 50 μA. Define and find β value of the transistor. **(4 Marks)**

8. What is race-around condition in J-K flip flop ? **(4 Marks)**

9. Why CAN bus is selected as an industrial bus in embedded systems ? **(4 Marks)**

10. A system is represented by the equation, $y(t) = t\,x(t)$. Check whether the system is linear or not ? **(4 Marks)**

11. What is meant by base width modulation ? **(5 Marks)**

12. Find the transfer function for the given system with output y(t) and input x(t) : **(5 Marks)**

$$\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y(t) = 5\frac{dx}{dt} + x(t)$$

13. Why optic fiber is preferred over copper cables ? **(5 Marks)**

14. What is the difference between Harvard architecture and Von Neumann architecture in microprocessors ? **(5 Marks)**

15. Convert the given decimal number to equivalent binary value : 127_{10} **(5 Marks)**

16. Draw the inverting amplifier using an op amp. Write the equation for the gain of the amplifier. **(5 Marks)**

17. Illustrate BPSK signaling scheme for the binary data : **(5 Marks)**
    1 1 0 1 0 1

18. Illustrate total internal reflection in optic fiber with Snell's law. **(7 Marks)**

P.T.O.

19. Draw and explain the circuit of an astable multivibrator using transistors. (7 Marks)

20. Explain the concept of a cell in cellular communication. What is frequency reuse ? (7 Marks)

21. What is geostationary satellite ? What are conditions for geostationary ? Explain with applications. (7 Marks)

22. Design a Full-Adder using gates. (7 Marks)

23. Draw and explain superheterodyne receiver system. (10 Marks)

24. Write a C program to find the factorial of a number. (10 Marks)

25. Draw and explain a bridge rectifier. Write the expression for ripple factor. (10 Marks)

26. Explain principle of operation of Switched Mode Power Supply (SMPS) with B/D. (10 Marks)

27. What is meant by doping ? Draw and explain the energy band diagram for n-type and p-type semiconductors. (10 Marks)

28. Explain the delta modulation with necessary diagrams. (10 Marks)

29. Design and draw the circuit for a 4-bit ring counter using D flip flop. (10 Marks)

30. Design a 555 IC based system to generate a waveform with 75% duty cycle. (10 Marks)

31. Draw and explain a RC coupled CE amplifier. (10 Marks)

32. Maxwell's equations – state and write equations. (10 Marks)