PAPER – II

ELECTRONICS

Note : Attempt all the questions. Each question carries *two* (2) marks.

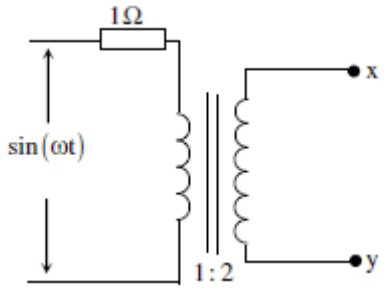
1. A MOS capacitor made using p type substrate is in the accumulation mode. The dominant charge in the channel is due to the presence of

1) holes
2) electrons
3) positively charged icons
4) negatively charged ions

2. Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance

1) in series with a current source
2) in parallel with a voltage source
3) in series with a voltage source
4) in parallel with a current source

3. Assuming an ideal transformer. The Thevenin's equivalent voltage and impedance as seen from the terminals x and y for the circuit in figure are

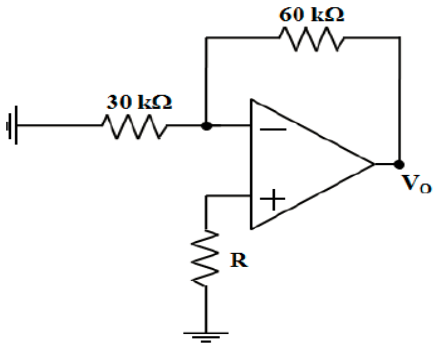


1) $2\sin(\omega t)$, 4Ω
2) $1\sin(\omega t)$, 1Ω
3) $1\sin(\omega t)$, 2Ω
4) $2\sin(\omega t)$, 0.5Ω

4. If $X(s)$, the Laplace transform of signal $x(t)$ is given by $X(s) = \dfrac{(s+2)}{(s+1)(s+3)^2}$, then the value of $x(t)$ as $t \to \infty$ is

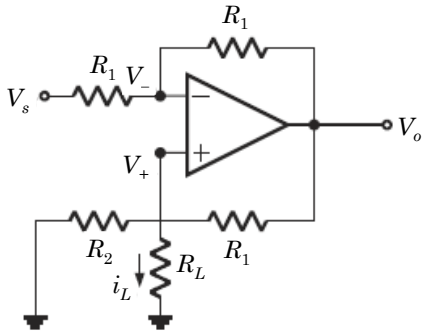
1) 0
2) ∞
3) 100
4) can't be determined

5. In the circuit given below, each input terminal of the opamp draws a bias current of 10 nA. The effect due to these input bias currents on the output voltage V_O will be zero, if the value of R chosen in kilo-ohm is



1) 20
2) 30
3) 60
4) 90

6. In the op amp circuit given below, the load current i_L is



1) $-\frac{V_s}{R_2}$
2) $\frac{V_s}{R_2}$
3) $-\frac{V_s}{R_L}$
4) $\frac{V_s}{R_1}$

7. A low – pass filter with a cut-off frequency of 30 Hz is cascaded with a high-pass filter with a cut-off frequency of 20 Hz. The resultant system of filters will function as

1) an all-pass filter
2) an all-stop filter
3) an band stop (band-reject) filter
4) a band-pass filter

8. In which '*T*' state, the 8085 microprocessor sends address to memory or I/O and activate 'ALE' signal?

1) *T*1

2) *T*2

3) *T*3

4) *T*4

9. How many bytes of bit addressable memory are present in 8051 based microcontrollers?

1) 8 bytes

2) 16 bytes

3) 32 bytes

4) 64 bytes

10. In which of the following priority interrupt controller 8259A, the interrupt requests are registered?

1) ISR

2) IRR

3) IMR

4) Priority resolver

11. How many I/O spaces on the I/O map are required for interfacing a DMA controller in an 8085 system?

1) 4

2) 8

3) 16

4) 64

12. ———————— is the process of using the same name for two or more functions.

1) Function Overloading

2) Operator Overloading

3) Default Function

4) Constructors

13. A magnetron is operated at a duty cycle of 0.001. It has a peak power output of 100 kilowatts. Its average power is

1) 10,000 watts

2) 100 watts

3) 1,000 watts

4) 1,000,000 watts

14. What is the carrier frequency in an AM wave when its highest frequency component is 850 Hz and the bandwidth of the signal is 50 Hz?

1) 80 Hz

2) 695 Hz

3) 625 Hz

4) 825 Hz

15. In statistical Time-Division Multiplexing (TDM), a block of data is usually many bytes while address is just

1) many bytes

2) few bytes

3) zero byte

4) infinity bytes

16. In an FM stereo multiplex transmission, the

1) sum signal modulates 19 kHz subcarrier

2) difference signal modulates the 19 kHz subcarrier

3) difference signal modulates the 38 kHz subcarrier

4) difference signal modulates the 67 kHz subcarrier

17. What type of fiber has the highest modal dispersion?

1) Step-index multimode

2) Graded index multimode

3) Step-index single mode

4) Graded index mode

18. The typical ratio of latching current to holding current in a 20A thyristor is

1) 5.0

2) 2.0

3) 1.0

4) 0.5

19. In a step-down chopper using pulse-width modulation with $T_{ON} = 3 \times 10^{-3}$s and $T_{OFF} = 3 \times 10^{-3}$s periods. The chopping frequency in Hz is

1) 333.33

2) 250

3) 500

4) 1000

20. Which one of the following instruments is an integrating instrument?

1) ammeter

2) voltmeter

3) wattmeter

4) watt-hour meter

21. For signal conditioning of a piezoelectric type transducer we require

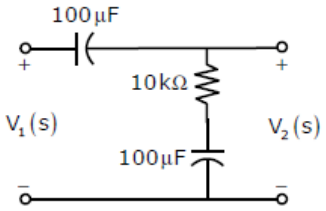
1) a charge amplifier

2) a differential amplifier

3) an instrumentation amplifier

4) a transconductance amplifier

22. The transfer function $\frac{V_2(s)}{V_1(s)}$ of the circuit shown below is



1) $\frac{0.5\ s+1}{s+1}$

2) $\frac{3s+6}{s+2}$

3) $\frac{s+2}{s+1}$

4) $\frac{s+1}{s+2}$

23. For a stable system

1) gain margin must be positive but phase margin can be positive or negative

2) phase margin must be positive but gain margin can be positive or negative

3) both gain margin and phase margin must be positive

4) one of them must be zero

24. In a type-1 second order system, the first undershoot occurs at a time

1) $t_p = \frac{\pi}{\omega_d}$

2) $t_p = \frac{2\pi}{\omega_d}$

3) $t_p = \frac{\pi}{2\,\omega_d}$

4) $t_p = \frac{\omega_d}{2\pi}$

25. Due to an increase in the forward path gain of a control system, the maximum overshoot is

1) reduced

2) increased

3) not affected

4) eliminated

26. Current through a PN junction diode in reverse biased condition is due to

1) minority carriers

2) majority carriers

3) both majority and minority carriers

4) can't be determined

27. In CMOS technology, shallow P-well or N-well regions can be formed using

1) low pressure chemical vapor deposition

2) low energy sputtering

3) low temperature dry oxidation

4) low energy ion-implantation

28. When a JFET is cut-off, the depletion layers are

1) far apart

2) close together

3) touching

4) conducting

29. In bipolar transistors, dc current gain is

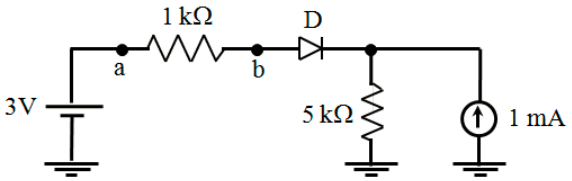
1) $\frac{I_C}{I_E}$

2) $\frac{I_C}{I_B}$

3) $\frac{I_E}{I_B}$

4) $\frac{I_E}{I_C}$

30. The diode D used in the circuit below is ideal. The voltage drop V_{ab} across the 1kΩ resistor in volt is



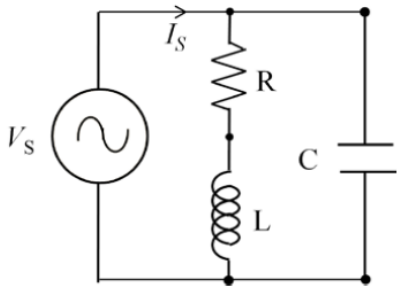
1) 0

2) 2

3) 3

4) 5

31. In the circuit shown below, $V_S = 101\angle 0\,\text{V}, R = 10\Omega$ and $\omega L = 100\Omega$. The current I_S is in phase with V_S. The magnitude of I_S in milliampere is



1) 1

2) 10

3) 100

4) 1000

32. The parameter that indicates how fast the output of an op amp can vary for the input variations is

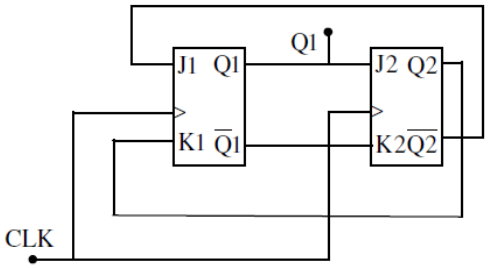
1) slew rate

2) unity gain bandwidth

3) open loop gain

4) offset voltage

33. The outputs of two flip-flops Q1, Q2 in the figure shown are initialized to 0, 0. The sequence generated at Q1 upon application of clock signal is



1) 01110……..

2) 01010……..

3) 00110…….

4) 01100…….

34. The SOP (sum of products) form of a Boolean function is $\Sigma(0,1,3,7,11)$, where inputs are *A*, *B*, *C*, *D* (*A* is MSB, and *D* is LSB). The equivalent minimized expression of the function is

1) $(\overline{B}+C)(\overline{A}+C)(\overline{A}+\overline{B})(\overline{C}+D)$

2) $(\overline{B}+C)(\overline{A}+C)(\overline{A}+\overline{C})(\overline{C}+D)$

3) $(\overline{B}+C)(\overline{A}+C)(\overline{A}+\overline{C})(\overline{C}+\overline{D})$

4) $(\overline{B}+C)(A+\overline{B})(\overline{A}+\overline{B})(\overline{C}+D)$

35. Which of the following types of ADC requires S/H?

1) Successive approximation type

2) Integration type

3) Flash

4) Sigma-Delta

36. The present output Q_n of an edge triggered JK flip-flop is logic 0. If $J=1$, then Q_n+1

1) Cannot be determined

2) Will be logic 0

3) Will be logic 1

4) Will rave around

37. What will be the output of the following code segment?

```
main( ) {
char s[10] ;
strcpy(s, "abc");
printf("%d %d", strlen(s), sizeof(s));
}
```

1) 3 10

2) 3 3

3) 10 3

4) 10 10

38. Set precision requires the ———————— header file.

1) stdlib.h

2) iomanip.h

3) console.h

4) conio.h

39. A wave is incident normally on a good conductor. If the frequency of a plane electromagnetic wave increases four times, the skin depth, will

1) increase by a factor of 2

2) decrease by a factor of 4

3) remain the same

4) decrease by a factor of 2

40. Poynting vector gives

1) direction of polarization

2) rate of energy flow

3) intensity of electric field

4) intensity of magnetic field

41. What is the typical wavelength of light emitted from epitaxially grown LEDs?

1) 840 nm

2) 490 nm

3) 480 nm

4) 940 nm

42. Chromatic dispersion can be eliminated by

1) using a monochromatic light source

2) using a very small numerical aperture fiber

3) using a graded-index fiber

4) using a very sensitive photo detector

43. In a regulated power supply, two similar 15 V Zeners are connected in series. The input voltage is 45 V DC. If each Zener has a maximum current rating of 300 mA, what should be the value of the series resistance?

1) 10 Ω

2) 20 Ω

3) 40 Ω

4) 50 Ω

44. Which one of the following regulators has the highest efficiency?

1) Shunt regulator

2) Series regulator

3) Switching regulator

4) DC-DC converter

45. The slip of an induction motor normally does not depend on

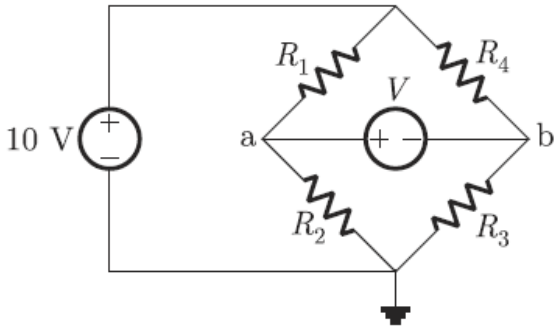
1) rotor speed

2) synchronous speed

3) shaft torque

4) core-loss component

46. If $R_1 = R_2 = R_4 = R$ and $R_3 = 1.1\,R$ in the bridge circuit shown in the figure, then the reading in the ideal voltmeter connected between a and b is,



1) 0.238 V
2) 0.138 V
3) −0.238 V
4) 1 V

47. Liquid flow rate is measured using

1) Pirani gauge
2) Pyrometer
3) Orifice plate
4) Bourdon tube

48. The input impedance of CRO is equivalent to a $1\,M\Omega$ resistance in parallel with a 45 pF capacitance. It is used with a compensated 10-1 attenuation probe. The effective input capacitance at the probe tip is

1) 4.5 pF
2) 5 pF
3) 45 pF
4) 450 pF

49. In a block diagram representation of a system, three blocks with gains 5, 8 and 4 are connected in cascade. The total gain of the arrangement is

1) 8
2) 17
3) 160
4) 52

50. Inverse Laplace transform of $\frac{1}{(s + a)}$ is

1) e^{-at}
2) e^{+at}
3) $1 - e^{-at}$
4) $1 + e^{-at}$

ROUGH WORK

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