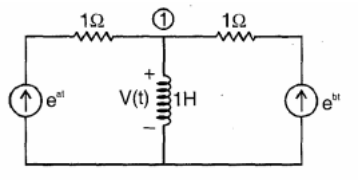
ONE MARK QUESTIONS

1. In the circuit of the figure, the voltage v(t) is



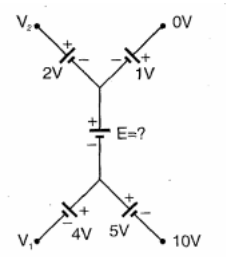
(a.) $e^{at}-e^{bt}$

(b.) $e^{at}+e^{bt}$

(c.) $a^{et}-b^{et}$

(d.) $a^{et}+be^{bt}$

2. In the circuit of the figure, the value of the voltage source E is



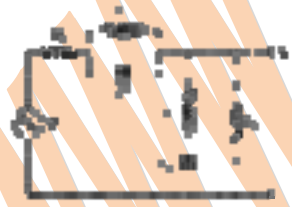
(a.) -16V

(b.) 4V

(c.) -6V

(d.) 16V

3. The circuit of the figure represents a



(a.) low pass filter

(b.) high pass filter

(c.) band pass filter

(d.) band reject filter

4. In the differential amplifier of the figure, if the source resistance of the current source I_{EE} is infinite, then the common-mode gain is

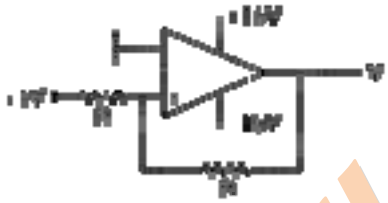
(a.) zero

(b.) infinite

(c.) indeterminate

(d.) $\frac{V_{in1}+V_{in2}}{2V_T}$

5. In the circuit of the figure, V_0 is



(a.) -1V

(b.) 2V

(c.) +1V

(d.) +15V

6. Introducing a resistor in the emitter of a common amplifier stabilizes the dc operating point against variations in

(a.) only the temperature

(b.) only the β of the transistor

(c.) both temperature and β

(d.) none of the above

7. The current gain of a bipolar transistor drops at high frequencies because of

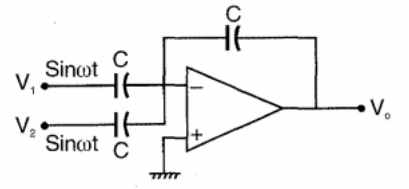
(a.) transistor capacitances

(b.) high current effects in the base

(c.) parasitic inductive elements

(d.) the Early effect

8. If the op-anp in the figure, is ideal, then v_0 is



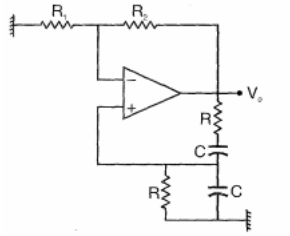
(a.) zero

(b.) $(V_1 - V_2)\sin \omega t$

(c.) $-(V_1 + V_2)\sin \omega t$

(d.) $(V_1 + V_2)\sin \omega t$

9. The configuration of the figure is a



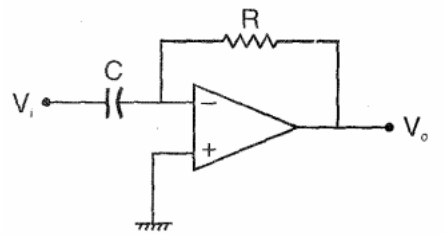
(a.) precision integrator

(b.) Hartley oscillator

(c.) Butterworth high pass filter

(d.) Wien-bridge oscillator

10. Assume that the op-amp of the figure is ideal. If v_i is a triangular wave, then v_0 will be



(a.) square wave

(b.) triangular wave

(c.) parabolic wave

(d.) sine wave

11. The most commonly used amplifier in sample and hold circuits is

(a.) a unity gain inverting amplifier

(b.) a unity gain non-inverting amplifier

(c.) an inverting amplifier with a gain of 10

(d.) an inverting amplifier with a gain of 100

12. An 8 bit successive approximate analog to digital converter has full scale reading of 2.55V and its conversion time for an analog input of 1V is 20µs. The conversion time for a 2V input will be

(a.) 10 µs

(b.) 20 µs

(c.) 40 µs

(d.) 50 µs

13. The number of comparators in a 4bit flash ADC is

(a.) 4

(b.) 5

(c.) 15

(d.) 16

14. For the logic circuit shown in the figure, the required input condition (A, B, C) to make the output (X) = 1 is

(a.) 1, 0, 1

(b.) 0, 0, 1

(c.) 1, 1, 1

(d.) 0, 1, 1

15. Given that

$$L[f(t)]=\frac{s+2}{s^2+1}, L[g(t)]=\frac{s^2+1}{(s+3)(s+2)},$$

$h(t)\int_0^t f(\tau)g(t-\tau)d\tau.L[h(t)]$ is

(a.) $\frac{s^2+1}{s+3}$

(b.) $\frac{1}{s+3}$

(c.) $\frac{s^2+1}{(s+3)(s+2)}+\frac{s+2}{s^2+1}$

(d.) None of the above

16. The Fourier Transform of the signal x (t) = e^{-3t^2} is of the following form, where A and B are constants:

(a.) $Ae^{-B|f|}$

(b.) Ae^{-Bf^2}

(c.) $A+B|f|^2$

(d.) Ae^{-Bf}

17. A system with an input x(t) and output y(t) is described by the relation: y(t)= tx(t). This system is

(a.) linear and time-invariant

(b.) linear and time varying

(c.) non-linear and time-invariant

(d.) non-linear and time-varying

18. The amplitude modulated wave form $s(t)=_C\left[1+K_a m(t)\right]\cos\omega_C t$ is fed to an ideal envelope detector. The maximum magnitude of $K_0 m(t)$ is greater than 1. Which of the following could be the detector output?

(a.) $A_c m(t)$

(b.) $A_c^2\left[1+K_a m(t)\right]^2$

(c.) $\left[A_c\left[1+K_a m(t)\right]\right]$

(d.) $A_c\left[1+K_a m(t)\right]^2$

19. The frequency range for satellite communication is

(a.) 1 KHz to 100 KHz

(b.) 100 KHz to 10KHz

(c.) 10 MHz to 30 MHz

(d.) 1 GHz to 30 GHz

20. If the diameter of a $\frac{\lambda}{2}$ dipole antenna is increased from $\frac{\lambda}{100}$ to $\frac{\lambda}{50}$, then its

(a.) Bandwidth increases

(b.) Bandwidth decreases

(c.) Gain increases

(d.) Gain decreases

21. The magnitudes of the open-circuit and short-circuit input impedances of a transmission line are 100Ω and 25Ω respectively. The characteristic impedance of the line is,

(a.) 25Ω

(b.) 50Ω

(c.) 75Ω

(d.) 100Ω

22. A TEM wave is incident normally upon a perfect conductor. The E and H fields at the boundary will be, respectively,

(a.) minimum and minimum

(b.) maximum and maximum

(c.) minimum and maximum

(d.) maximum and minimum

23. The number of hardware interrupts (which require an external signal to interrupt) present in an 8085 microprocessor are

(a.) 1

(b.) 4

(c.) 5

(d.) 13

24. In the 8085 microprocessor, the RST6 instruction transfers the program execution to the following location:

(a.) 30 H

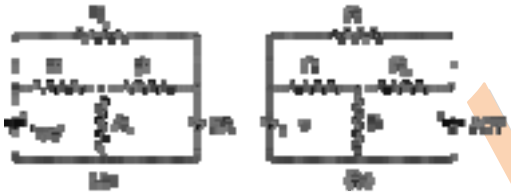
(b.) 24 H

(c.) 48 H

(d.) 60 H

TWO MARKS QUESTIONS

25. Use the data of the figure (a). The current i in the circuit of the figure (b)



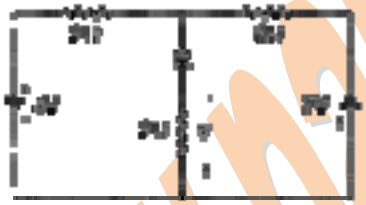
(a.) -2A

(b.) 2A

(c.) -4A

(d.) +4A

26. For the circuit in the figure, the voltage v_0 is



(a.) 2V

(b.) 1V

(c.) -1V

(d.) None of the above

27. A linear time invariant system has an impulse response e^{2t}, fort> 0. If initial conditions are 0 and the input is e^{3t}, the output for t > 0 is

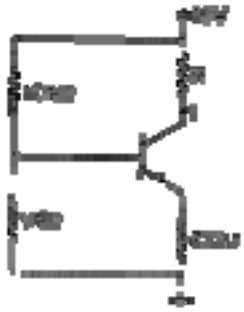
(a.) $e^{3t} - e^{2t}$

(b.) e^{5t}

(c.) $e^{3t} + e^{2i}$

(d.) None of the above

28. In the circuit of the figure, assume that the transistor is in the active region. It has a large β and its base-emitter voltage is 0.7V. The value of I_C is



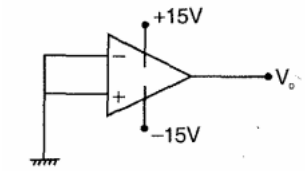
(a.) Indeterminate since R_C is not given

(b.) 1mA

(c.) 5mA

(d.) 10mA

29. If the op-amp in the figure has an input offset voltage of 5mV and an open-loop voltage gain of 10,000, then v_0 will be



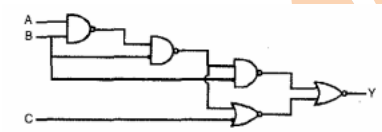
(a.) 0 V

(b.) 5mV

(c.) +15V or -15V

(d.) +50 V or -50 V

30. For the logic circuit shown in the figure, the simplified Boolean expression for the output Y is



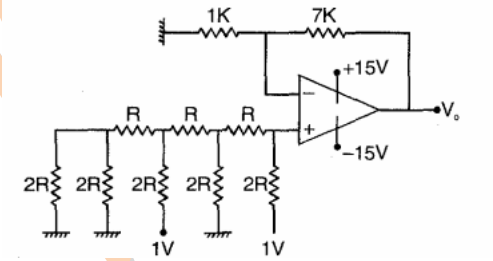
(a.) A+B+C

(b.) A

(c.) B

(d.) C

31. For the 4 bit DAC shown in the figure, the output voltage v_0 is



(a.) 10V

(b.) 5V

(c.) 4V

(d.) 8V

32. A sequential circuit using D Flip-Flop and logic gates is shown in the figure, where X and Y are the inputs and Z is the output. The circuit is

(a.) S-R Flip-Flop with inputs X = R and Y = S

(b.) S-R Flip-Flop with inputs X = S and Y = R

(c.) J-K Flip-Flop with inputs X = J and Y = K

(d.) J-K Flip-Flop with inputs X = K and Y = J

33. In the figure, the J and K inputs of all the four Flip-Flips are made high The frequency of the signal at output Y is

(a.) 0.833 KHz

(b.) 1.0 KHz

(c.) 0.91 KHz

(d.) 0.77 KHz

34. One period (0, T) each of two periodic waveforms W_1 and W_2 are shown in the figure. The magnitudes of the nth Fourier series coefficients of W_1 and W_2, for , $n \geq 1$ odd, are respectively proportional to

(a.) $|n^{-3}|$ and $|n^{-2}|$

(b.) $|n^{-2}|$ and $|n^{-3}|$

(c.) $|n^{-1}|$ and $|n^{-2}|$

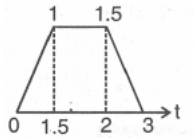
(d.) $|n^{-4}|$ and $|n^{-2}|$

35. Let u(t) be the step function. Which of the waveforms in the figure corresponds to the convolution of u(t)-u(t-1) with u(t)-u(t-2)?

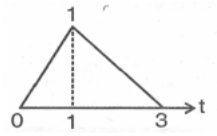
(a.)

(b.)

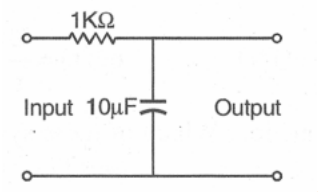
(c.)



(d.)



36. In the figure, the steady state output voltage corresponding to the input voltage 3+4 sin 100tV is



(a.) $3+\frac{4}{\sqrt{2}}\sin\left(100t-\frac{\pi}{4}\right)V$

(b.) $3+4\sqrt{2}\sin\left(100t-\frac{\pi}{4}\right)V$

(c.) $\frac{3}{2}+\frac{4}{\sqrt{2}}\sin\left(100t+\frac{\pi}{4}\right)V$

(d.) $3+4\sin\left(100t+\frac{\pi}{4}\right)V$

37. A system described by the transfer function

$$H(s)=\frac{1}{s^3+\alpha s^2+ks+3}$$

The constraints on α and k are,

(a.) $\alpha > 0$, $\alpha k < 3$

(b.) $\alpha > 0$, $\alpha k > 3$

(c.) $\alpha < 0$, $\alpha k > 3$

(d.) $\alpha > 0, \alpha k < 3$

38. In a digital communication system employing Frequency Shift Keying (FSK), the 0 and 1 bit are represented by sine waves of 10 KHz and 25 KHz respectively. These waveforms will be orthogonal for a bit interval of

(a.) 45µsec

(b.) 200 µsec

(c.) 50 µsec

(d.) 250 µsec

39. A message m(t) band limited to the frequency f_m has a power of P_m. The power of the output signal in the figure is

(a.) $\frac{P_m \cos\theta}{2}$

(b.) $\frac{P_m}{4}$

(c.) $\frac{P_m \sin^2\theta}{4}$

(d.) $\frac{P_m \cos^2\theta}{4}$

40. The Hilbert transform of $\cos\omega_1 t + \sin\omega_2 t$ is

(a.) $\sin\omega_1 t - \cos\omega_2 t$

(b.) $\sin\omega_1 t + \cos\omega_2 t$

(c.) $\cos\omega_1 t - \sin\omega_2 t$

(d.) $\cos\omega_1 t + \sin\omega_2 t$

41. In a FM system, a carrier of 100 MHz is modulated by a sinusoidal signal of 5KHz. The bandwidth by Carson's approximation is 1 MHz. If y(t) = (modulated waveform)^3, then by using Carson's approximation, the bandwidth of y(t) around 300 MHz and the and the spacing of spectral components are, respectively.

(a.) 3 MHz, 5KHz

(b.) 1 MHz, 15KHz

(c.) 3 MHz, 15 KHz

(d.) 1 MHz, 5 KHz

42. For an 8 feet (2.4m) parabolic dish antenna operating at 4 GHz, the minimum distance required for far field measurement is closest to

(a.) 7.5 cm

(b.) 15 cm

(c.) 15 m

(d.) 150 m

43. A system has a phase response given by $\phi(\omega)$, where ω is the angular frequency. The phase delay and group delay at $\omega = \omega_0$ are respectively given by

(a.) $-\frac{\phi(\omega_0)}{\omega_0}, -\left.\frac{d\phi(\omega)}{d\omega}\right|_{\omega=\omega_0}$

(b.) $\phi(\omega_0), -\left.\frac{d^2\phi(\omega_0)}{d\omega^2}\right|_{\omega=\omega_0}$

(c.) $\frac{\omega_0}{\phi(\omega_0)}, -\left.\frac{d\phi(\omega)}{d\omega}\right|_{\omega=\omega_0}$

(d.) $\omega_0\phi(\omega_0), \int_{-\infty}^{\omega_0}\phi(\lambda)dy$

44. A uniform plane wave in air impinges at 45^0 angle on a lossless dielectric material with dielectric constant ε_r. The transmitted wave propagates in a 30° direction with respect to the normal. The value of ε_r is

(a.) 1.5

(b.) $\sqrt{1.5}$

(c.) 2

(d.) $\sqrt{2}$

45. A rectangular waveguide has dimensions 1cm × 0.5cm. Its cut-off frequency is

(a.) 5 GHz

(b.) 10 GHz

(c.) 15 GHz

(d.) 12 GHz

46. Two coaxial cables 1 and 2 are filled with different dielectric constants ε_{r1} and ε_{r2} respectively. The ratio of the wavelengths in the two cables (λ_1/λ_2) is

(a.) $\sqrt{\varepsilon_{r1}/\varepsilon_{r2}}$

(b.) $\sqrt{\varepsilon_{r2}/\varepsilon_{r1}}$

(c.) $\varepsilon_{r1}/\varepsilon_{r2}$

(d.) $\varepsilon_{r2}/\varepsilon_{r1}$

47. The contents of Register (B) and Accumulator (A) of 8085 microprocessor are 49H and 3AH respectively. The contents of A and the status of carry flag (CY) and sign flag (S) after executing SUB B instructions are

(a.) A = F1, CY = 1, S = 1
(b.) A = 0F, CY = 1, S = 1
(c.) A = F0, CY = 0, S = 0
(d.) A = 1F, CY = 1, S = 1