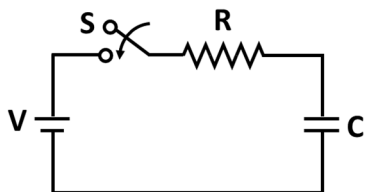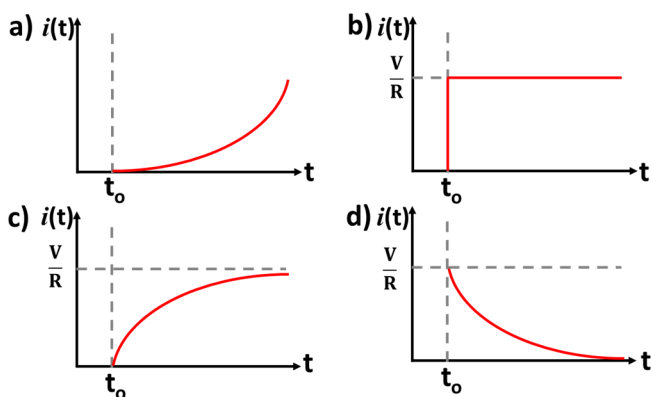1. Consider the following circuit which was open until time $t = t_o$, at time t_o the switch was closed. Which of the following best represents the current [$i(t)$] through the circuit?
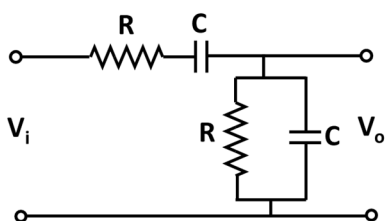

Options:

a)

b)

c)

d)

Ans: d
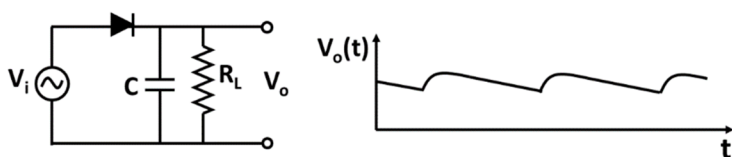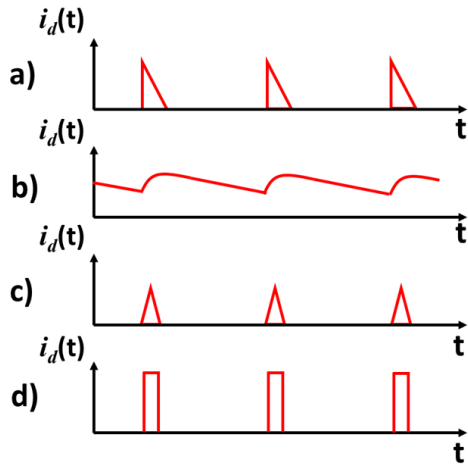
2. The RC circuit in the figure is a:

a) High-pass filter   b) Low-pass filter

c) Band-pass filter   d) Band-reject filter

Ans: c

3. Consider the half-wave rectifier circuit with a capacitor filter. Its output waveform is also shown in the figure. Which of the following waveforms approximately represents the current through the diode?
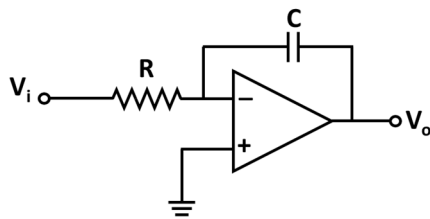
Ans: a

4. For the circuit shown below, the input (V_i) is a square wave. What will be the output (V_o)?

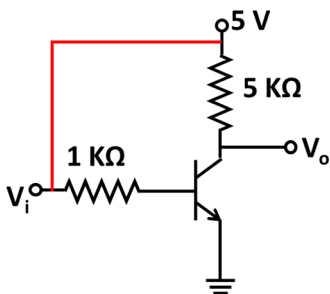Each symbol represents their usual meaning.

a) sinusoidal wave   b) train of pulses
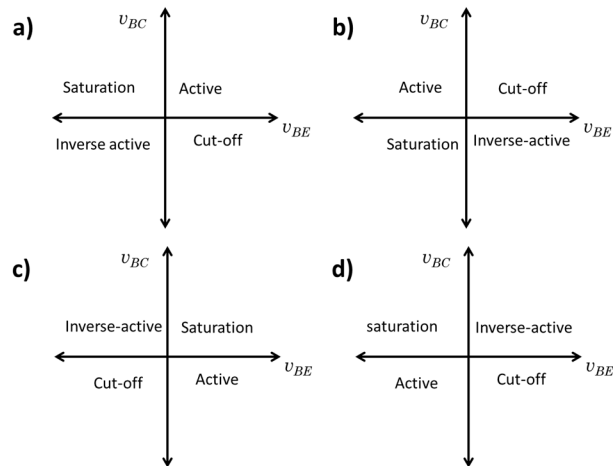
c) triangular wave   d) ramp.

Ans: c

5. Consider an npn silicon transistor in CE-configuration. If the input port of the circuit is connected to the supply as shown in figure, approximately what would be the output voltage (V_o)?

a) 0.2 V   b) 5 V   c) 1 V   d) 2.5 V

Ans: a

6. Which one is the correct set of biasing conditions for the four modes of operation of an **npn** BJT?

a)

v_{BC}

Saturation	Active
Inverse active	Cut-off

v_{BE}

b)

v_{BC}

Active	Cut-off
Saturation	Inverse-active

v_{BE}

c)

v_{BC}

Inverse-active	Saturation
Cut-off	Active

v_{BE}

d)

v_{BC}

saturation	Inverse-active
Active	Cut-off

v_{BE}

Ans: c

7. Consider the following circuit consisting of ideal diodes, the input waveforms V_1 and V_2 are shown. Which of the following waveforms nearly represents the output voltage?

5 V

10 KΩ

V_1

V_2

V_o

V_1

5 V

t

V_2

5 V

t

a) V_o

5 V

t

b) V_o

5 V

t

c) V_o

5 V

t

d) V_o

5 V

t
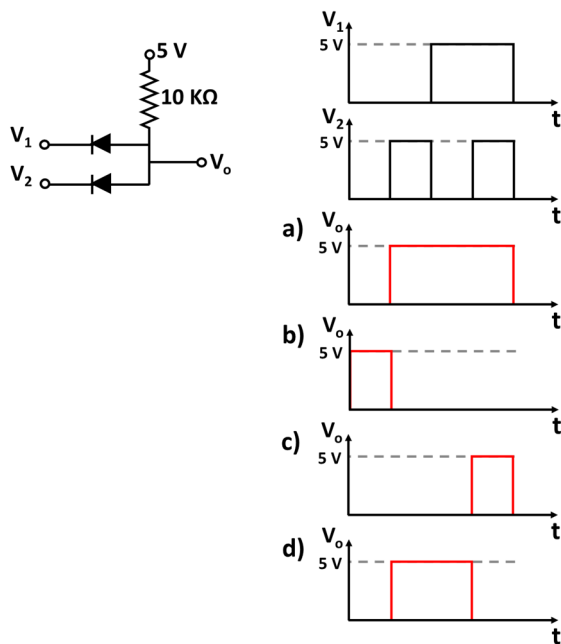
Ans. c

8. A 100 nF capacitor in parallel with 10 nF produces resultant capacitance of:

a) 9 nF   b) 100 nF   c) 110 nF   d) Cannot be determined

Ans: c

9. To measure current through a resistor in a circuit the multimeter is connected:

a) in series with resistor   b) in parallel with the resistor

c) either in series or in parallel   d) none of the above

Ans: a

10. In a RC circuit with R=1 kΩ and C = 4.7 μF , the time constant of the circuit is

(a) 3.75 ms   (b) 4.7ms   (c) 4.7 μs (d) 10.3 ms

Ans: b

11. An ideal Operational Amplifier has

(a) Infinite output impedance   (b) Zero input impedance
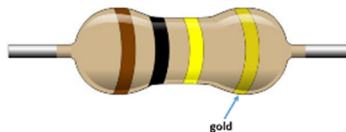
(c) Infinite bandwidth   (d) All of the above

Ans. c

12. Cathode ray oscilloscope (CRO) displays graph of waveforms based on ___A___ and the amplitude of waveforms represents the ___B____ value.

(a) A: current; B: peak to peak   (b) A: current; B: RMS

(c) A: voltage; B: average value   (d) A: voltage; B: peak to peak value

Ans. d

13. The resistance value of the resistor shown in figure is

gold

(a) 110 kΩ (b) 10 kΩ (c) 100 kΩ (d) 1000 kΩ

Ans. c

14. In a series RC circuit, the output voltage is taken across the resistor. The circuit acts as _____ filter.

(a) low pass   (b) high pass
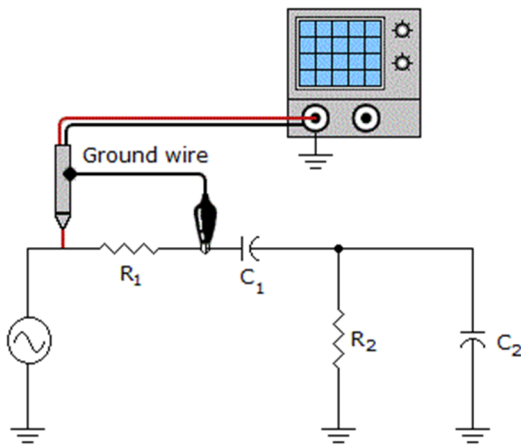(c) band pass   (d) band reject

Ans. b

15. The capacitance value of the capacitor shown in figure is

(a) 10 nF   (b) 100 nF   (c) 10000 nF   (d) 104 pF

Ans. b

16. Connecting the oscilloscope as shown in the given figure will _____.

(a) measure the voltage across the source   (b) measure the voltage across C_1, R_2, and C_2
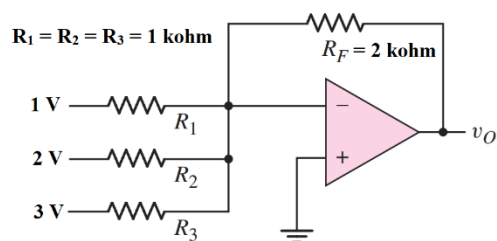(c) short R_1 (d) short C_1, R_2, and C_2
Ans. d

17. When checking a diode using a multimeter, the low resistance readings in both ways indicate
that it is
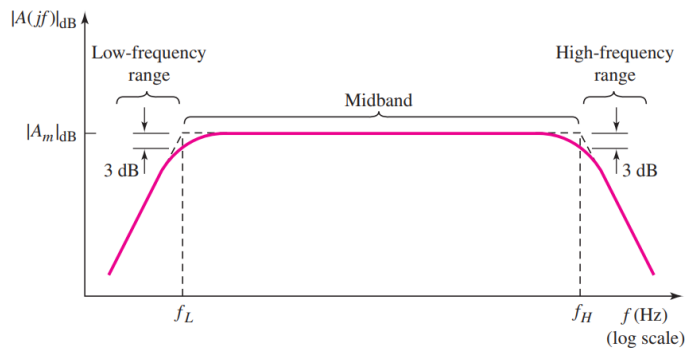(a) Zener diode   (b) photodiode   (c) faulty diode   (d) working just fine
Ans. c

18. The output of the circuit shown below is

(a) −6 V

(b) +6 V

(c) +12 V

(d) −12 V

Ans: d

19. Following figure shows the gain vs frequency response of a CE amplifier. Decrease in gain in the low frequency region is due to __A__ and the same in the high frequency region is due to __B__.


(a) A: coupling and bypass capacitors; B: stray capacitance and transistor capacitances
(b) A: stray capacitance and transistor capacitances; B: coupling and bypass capacitors
(c) A: coupling capacitors; B: bypass capacitors
(d) A: bypass capacitors; B: coupling capacitors
Ans: a

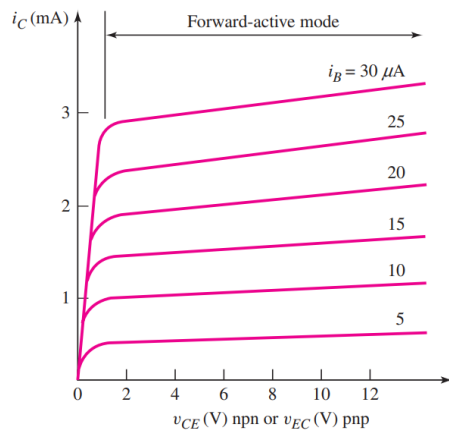20. For the following common emitter circuit estimate the V_{CE}.

Consider, $\beta = 200$ and $V_{BE(on)} = 0.7$ V.

(a) 10 V   (b) 4 V

(c) 0   (d) 6.5 V
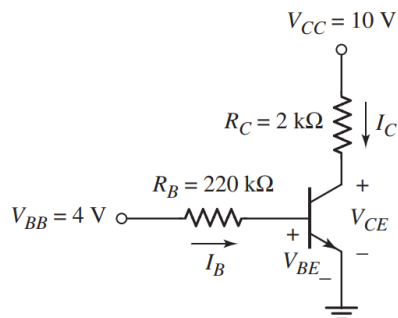
Ans: b

21. Following figure shows the output characteristics of a BJT operating in CE mode. The gradual increase in collector (i_c) in the active region is due to ____A____ and the current gain is $\approx$ __B__ .
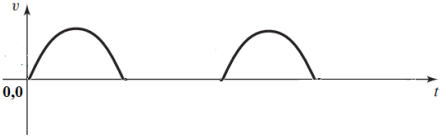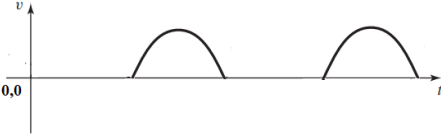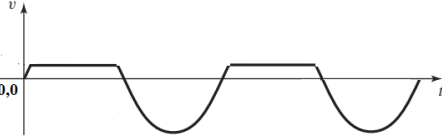

(a) A: Decrease in neutral base width; B: 100

(b) A: Increase in neutral base width; B: 200

(c) A: Heating of transistors; B: 10

(d) A: Early effect and self-heating; B: cannot be estimated

Ans. a

22. In the following circuit v_s is a sinusoidal signal. The diode is a regular diode ($V_\gamma \neq 0$). Identify the correct waveform of v_o .
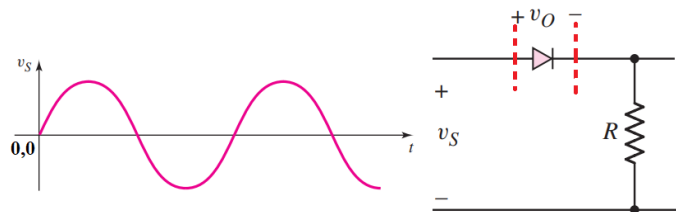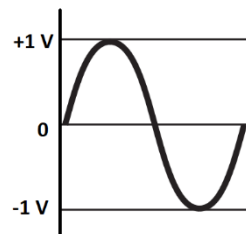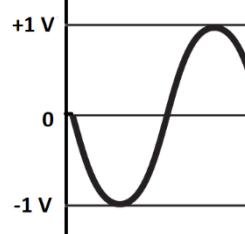

(a)

(b)

(c)

(d)

Ans. c
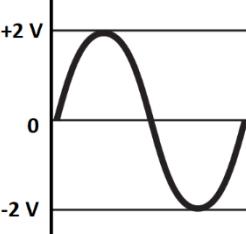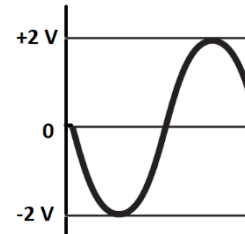
23. You are using a general purpose digital multimeter to measure the amplitude of a time varying signal. This multimeter can correctly measure RMS voltage if the voltage waveform is

(a) square only   (b) sinusoidal only

(c) triangular only   (d) either sinusoidal or square

Ans. b

24. A sinusoidal signal (v_i) as shown in the following figure is applied to the op-amp circuit. If R_1 = 1 kΩ and R_2 = 1 kΩ, the output (v_0) will look like
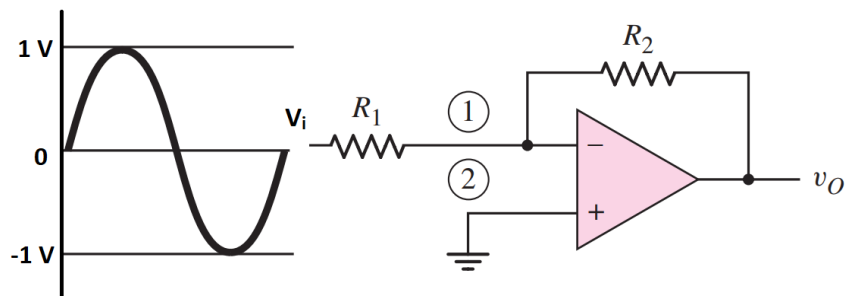
(a)

(b)

(c)

(d)

Ans. b

25. When the capacitor C_E is not connected across the resistor R_{E2} in the following amplifier circuit, what happens?

(a) gain decreases   (b) gain increases

(c) input resistance decreases   (d) none of the above

Circuit diagram: $V^+ = +5\ V$, R_C, $R_S = 0.5\ k\Omega$, C_C, v_s, $R_B = 100\ k\Omega$, R_{E1}, v_O, R_{E2}, C_E, $V^- = -5\ V$
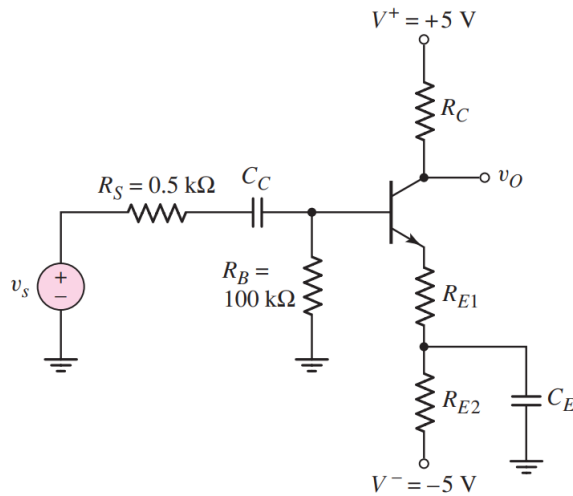
Ans. a

26. The secondary specification of a center-tapped transformer is 12-0-12 V. Then the peak-to-peak voltage between the two extreme terminals of the secondary is

(a) 12 V   (b) 16.97 V   (c) 24 V   (d) 33.9 V

Ans. d

27. A 4 V DC voltage source is connected to a voltage regulator using a Zener diode with Vz = 6 V. The load voltage is

(a) 0 V   (b) 4 V   (c) 6 V   (d) depends on the load resistance value

Ans. 4

28. The input voltage to a half-wave rectifier without a filter is v_i = 18.84 sin 314.2t. The dc component at the output is

(a) 4.25 V   (b) 6 V   (c) 9.42 V   (d) 13.3 V

Ans. b

29. The rms value of a 12 V dc signal is

(a) 0   (b) 8.48 V   (c) 12 V   (d) 16.97 V

Ans. c

30. In a R-C circuit with R = 1 kΩ and C = 4.7 µF, the time constant τ is equal to

(a) 4.7 mS   (b) 3.76 mS   (c) 4.7 µS   (d) 10.34 mS

Ans. a

31. The biasing resistors of a CE amplifier with $f_o \approx$ 500 kHz, 3-dB bandwidth = 1 MHz and voltage gain A_v = -10 are changed to obtain a gain value of A_v = -100. Then the following statement is approximately correct for the new amplifier:

(a) A_v is 17 dB at 1 MHz   (b) A_v is 37 dB at 1 MHz

(c) A_v is 37 dB at 50 kHz   (d) A_v is 37 dB at 100 kHz

Ans. c

32. In an electronic circuit, current can be directly measured by a

(a) multi-meter   (b) function generator   (c) volt meter   (d) CRO

Ans. a

33. A sinusoidal voltage source is connected to a RL circuit. Then at very high frequency, phase of the resistor voltage with respect to the input voltage

(a) lags by 90º   (b) leads by 90º   (c) 0   (d) none of these

Ans. a

34. The high frequency operation of a CE amplifier is limited because of

(a) biasing resistors   (b) the input and output coupling capacitors

(c) Miller effect   (d) emitter bypass capacitor

Ans. c

35. DC biasing is used in a CE amplifier to

(a) set the transistor gain   (b) set the transistor in active regime

(c) both a and b   (d) none of a and b

Ans. c

36. The function of the input and output coupling capacitors in C_E amplifier are to

(a) limit the lower cut-off frequency (b) enhance the higher cut-off frequency

(c) improve the small signal gain   (d) provide dc isolation between the amplifier and signal source

Ans. d

37. In the given circuit, what is the peak value of the output wave (v_o), if the input (v_i) fed is 20 V (peak-to-peak) sine wave?
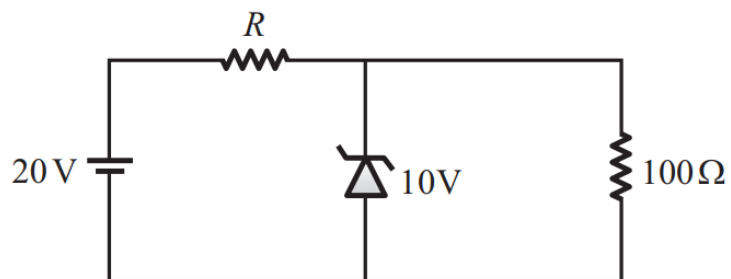
(a) 10 V   (b) 9 V   (c) 5 V   (d) 4.7
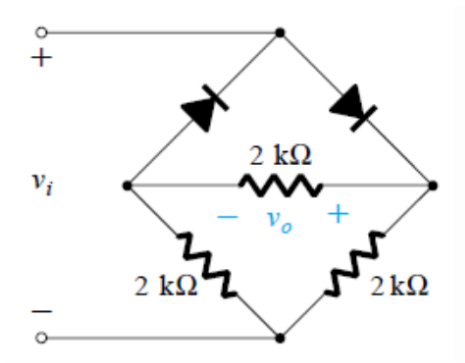
Ans. c

38. Figure shows an electronic voltage regulator. The Zener diode requires a minimum current of 25 mA for satisfactory operations. The value of R (in ohms) required for satisfactory voltage regulation of the circuit is _____
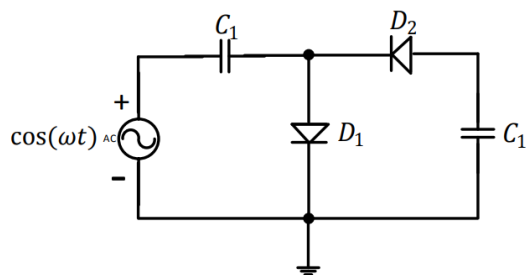
(a) 70   (b) 80 Ω   (c) 100 Ω   (d) 400 Ω

Ans. b

39. The diodes and capacitors in the circuit shown are ideal. The voltage v(t) across the diode D_1 is

(a) $\cos(\omega t) - 1$ (b) $\sin(\omega t)$

(c) $1 - \cos(\omega t)$ (d) $1 - \sin(\omega t)$

Ans. a

40. In a series RC circuit, 12 V(rms) is measured across the resistor and 15 V(rms) is measured across the capacitor. The rms source voltage is

(a) 27 V   (b) 19.2 V   (c) 1.9 V   (d) 3 V

Ans. b