

EE 2010

EE24BTECH11063 - Y.Harsha Vardhan Reddy

Q.1-Q.25 CARRY ONE MARK EACH

- 1) Power is transferred from system A to system B by an HVDC link as shown in the figure 1 . If the voltages V_{AB} and V_{CD} are as indicated in the figure, and $I > 0$, then:

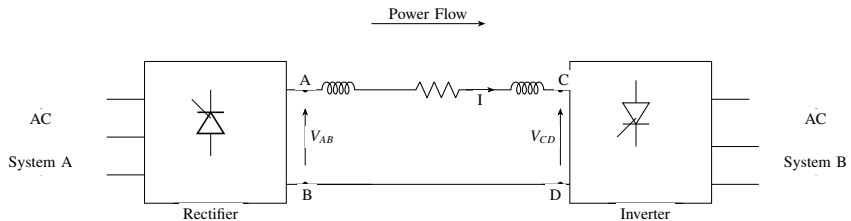


Fig. 1

- $V_{AB} < 0, V_{CD} < 0, V_{AB} > V_{CD}$
 - $V_{AB} > 0, V_{CD} > 0, V_{AB} < V_{CD}$
 - $V_{AB} > 0, V_{CD} > 0, V_{AB} > V_{CD}$
 - $V_{AB} > 0, V_{CD} < 0$
- 2) A balanced three-phase voltage is applied to a star-connected induction motor, the phase to neutral voltage being V . The stator resistance, rotor resistance referred to the stator, stator leakage reactance, rotor leakage reactance referred to the stator, and the magnetizing reactance are denoted by r_s, r'_r, x_s, x'_r and X_m , respectively. The magnitude of the starting current of the motor is given by:
- $\frac{V}{\sqrt{(r_s + r'_r)^2 + (x_s + x'_r)^2}}$
 - $\frac{V}{\sqrt{r_s^2 + (x_s + X_m)^2}}$
 - $\frac{V}{\sqrt{(r_s + r'_r)^2 + (X_m + x_s)^2}}$
 - $\frac{V}{\sqrt{r_s^2 + (X_m + x'_r)^2}}$
- 3) Consider a step voltage wave of magnitude 1 pu traveling along a lossless transmission line that terminates in a reactor. The voltage magnitude across the reactor at the instant the traveling wave reaches the reactor is:

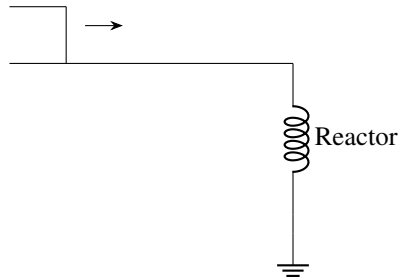


Fig. 3

- a) 1 pu b) 1 pu c) 2 pu d) 3 pu

4) Consider two buses connected by an impedance of $(0 + j5)\Omega$. The bus 1 voltage is $100\angle 30^\circ$ V and bus 2 voltage is $100\angle 0^\circ$ V. The real and reactive power supplied by bus 1, respectively, are:

- a) 1000 W, 268 VAR b) -1000 W, -134 VAR
c) 276.9 W, -56.7 VAR d) -276.9 W, 56.7 VAR

5) A three-phase, 33 kV oil circuit breaker is rated 1200 A, 2000 MVA, 3 s. The symmetrical breaking current is:

- a) 1200 A b) 3600 A c) 35 kA d) 104.8 kA

6) Consider a stator winding of an alternator with an internal high-resistance ground fault. The currents under the fault condition are as shown in the figure. The winding is protected using a differential current scheme with current transformers of ratio 400/5 A as shown in figure6. The current through the operating coil is:

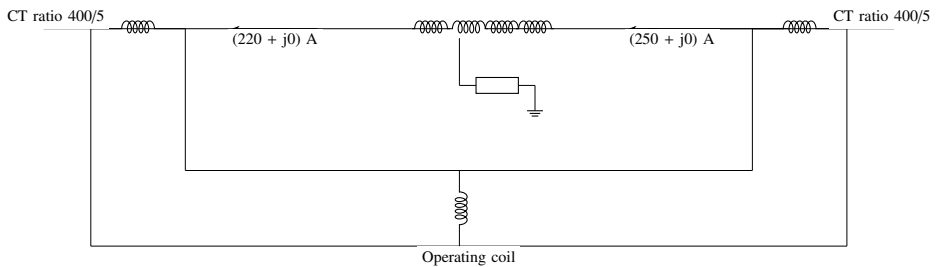


Fig. 6

a) 0.1875 A

b) 0.2 A

c) 0.375 A

d) 60 kA

7) The zero-sequence circuit of the three-phase transformer shown in the figure7 is

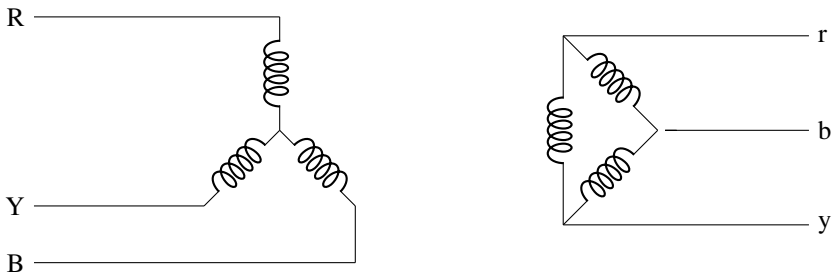
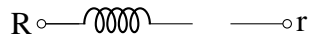


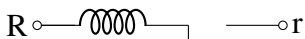
Fig. 7



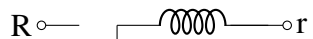
(a)



(b)



(c)



(d)

8) Given that the op-amp is ideal, the output voltage V_0 is

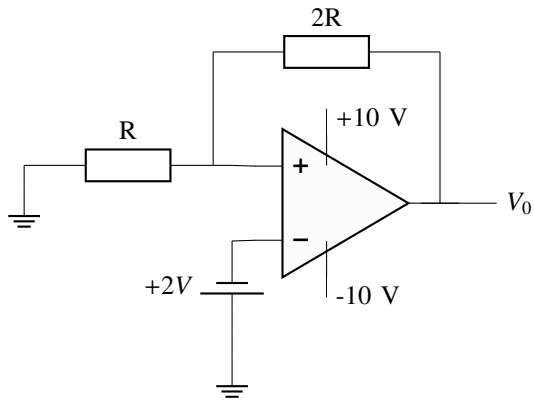


Fig. 8

- a) 4 V b) 6 V c) 7.5 V d) 12.12 V

9) Assuming that the diodes in the given circuit shown in figure9 are ideal, the voltage V_0 is

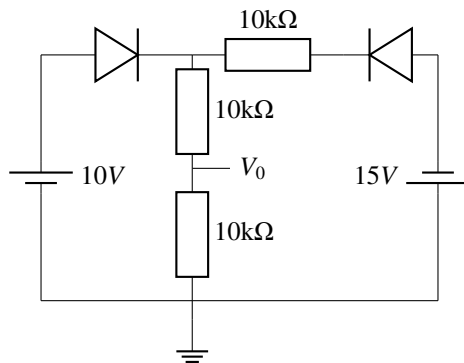


Fig. 9

a) 4 V

b) 5 V

c) 7.5 V

d) 12.12 V

- 10) The power electronic converter shown in the figure10 has a single-pole double-throw switch. The pole P of the switch is connected alternately to throws A and B. The converter shown is a:

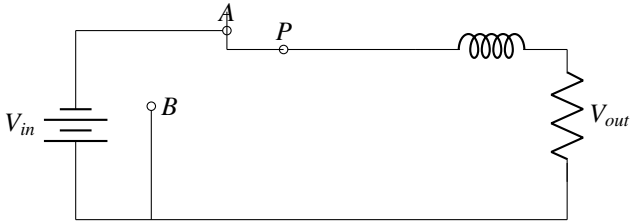


Fig. 10

- a) step-down chopper (buck converter)
 b) half-wave rectifier
 c) step-up chopper (boost converter)
 d) full-wave rectifier
- 11) Figure11 shows a composite switch consisting of a power transistor (BJT) in series with a diode. Assuming that the transistor switch and the diode are ideal, the I-V characteristic of the composite switch is:

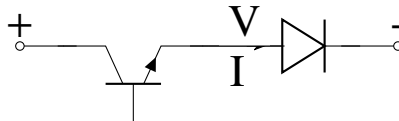
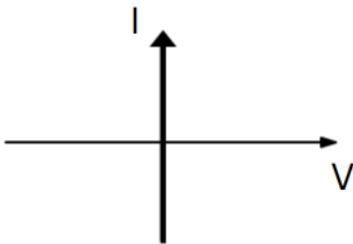
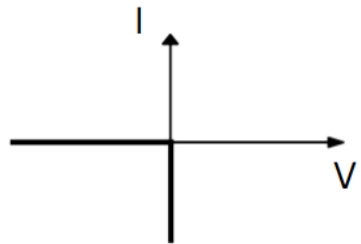


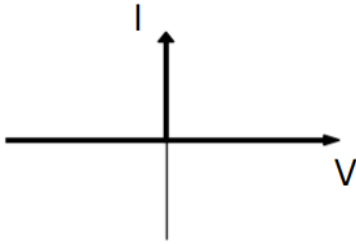
Fig. 11



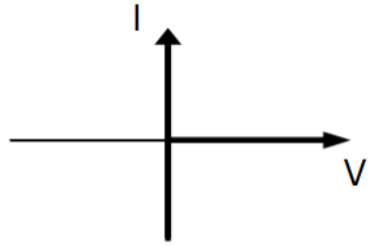
(a)



(b)



(c)



(d)

- 12) The fully controlled thyristor converter in the figure12 is fed from a single-phase source. When the firing angle is 0° , the dc output voltage of the converter is 300 V. What will be the output voltage for a firing angle of 60° , assuming continuous conduction?

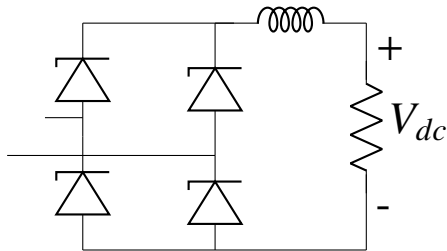


Fig. 12

- a) 150 V b) 210 V c) 300 V d) 100π V
- 13) At $t = 0$, the function $f(t) = \frac{\sin t}{t}$ has:
- a) a minimum
 b) a discontinuity
 c) a point of inflection
 d) a maximum