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:

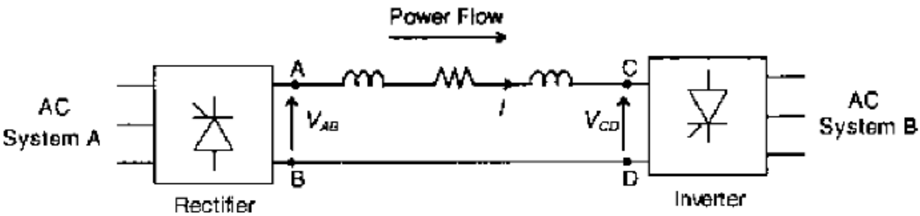


Fig. 1

a) $V_{AB} < 0, V_{CD} < 0, V_{AB} > V_{CD}$
b) $V_{AB} > 0, V_{CD} > 0, V_{AB} < V_{CD}$
c) $V_{AB} > 0, V_{CD} > 0, V_{AB} > V_{CD}$
d) $V_{AB} > 0, V_{CD} < 0$

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:

a) $\frac{V}{\sqrt{(r_s+r_r')^2+(x_s+x_r')^2}}$
b) $\frac{V}{\sqrt{r_s^2+(x_s+X_m)^2}}$
c) $\frac{V}{\sqrt{(r_s+r_r')^2+(X_m+x_s)^2}}$
d) $\frac{V}{\sqrt{r_s^2+(X_m+x_r')^2}}$

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:

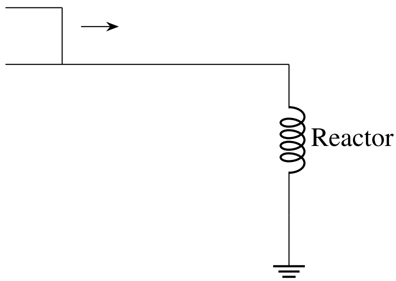


Fig. 3

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:

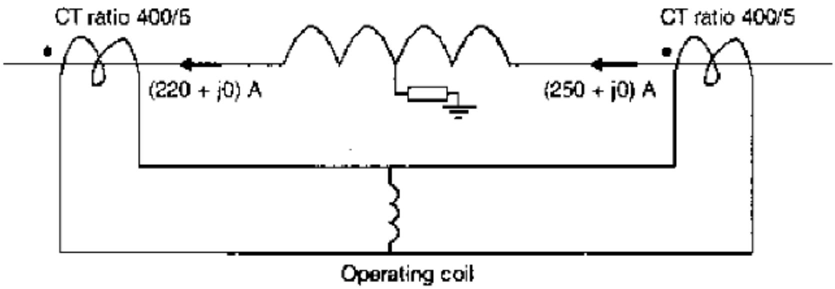


Fig. 6

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

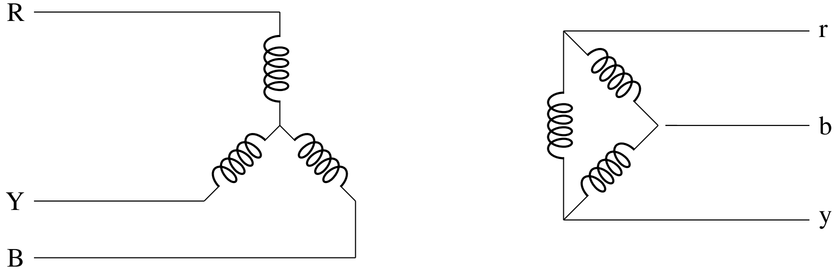
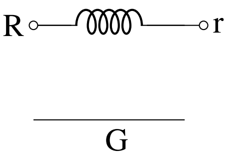
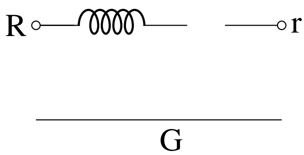


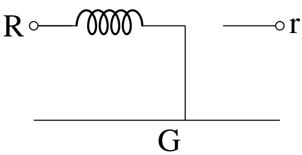
Fig. 7



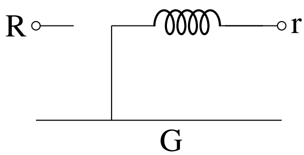
(a)



(b)



(c)



(d)

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

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

a) 4 V   b) 5 V   c) 7.5 V   d) 12.12 V

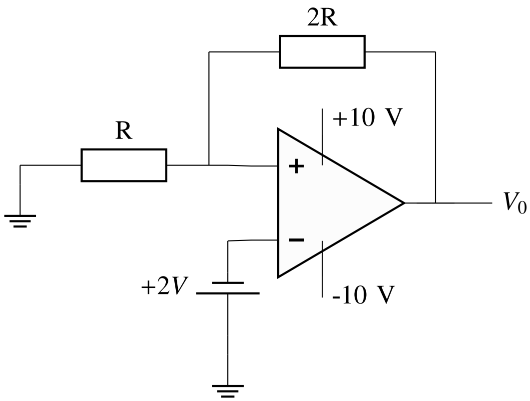


Fig. 8

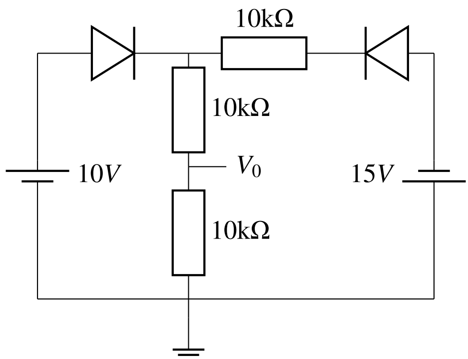


Fig. 9

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:

a) step-down chopper (buck converter)
b) half-wave rectifier
c) step-up chopper (boost converter)

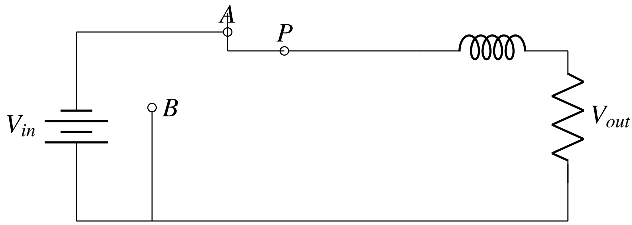


Fig. 10

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:

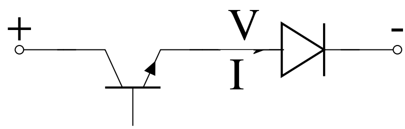
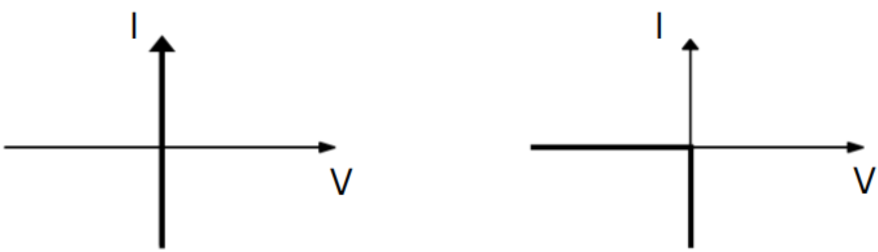
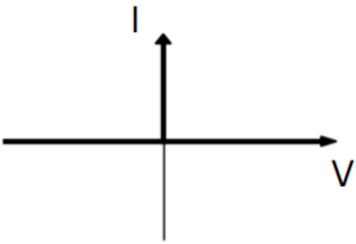


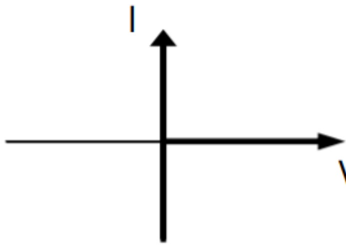
Fig. 11



(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?

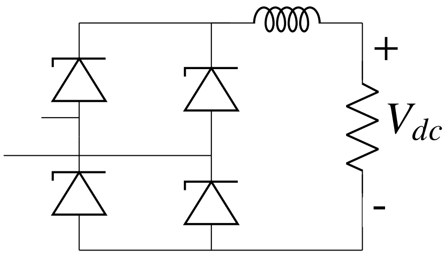


Fig. 12

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