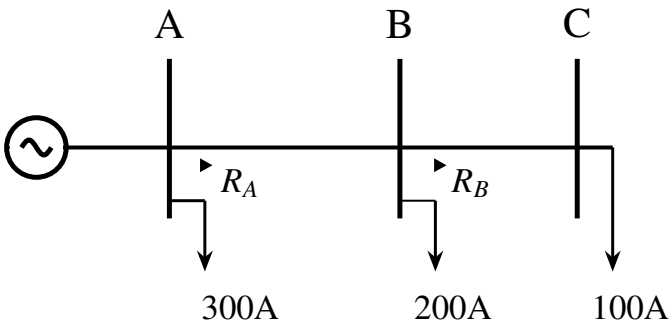
2014-EE-1-13

Golla Shriram - AI24BTech11010

53) The overcurrent relays for the line protection and loads connected at the buses are shown in the figure (2014-EE)

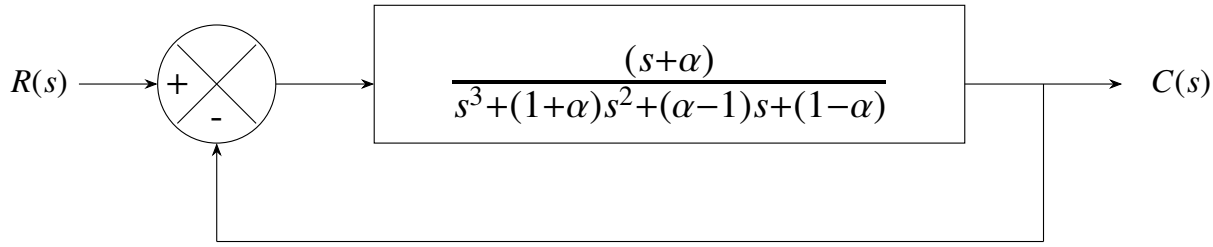


The relays are IDMT in nature having the characteristic

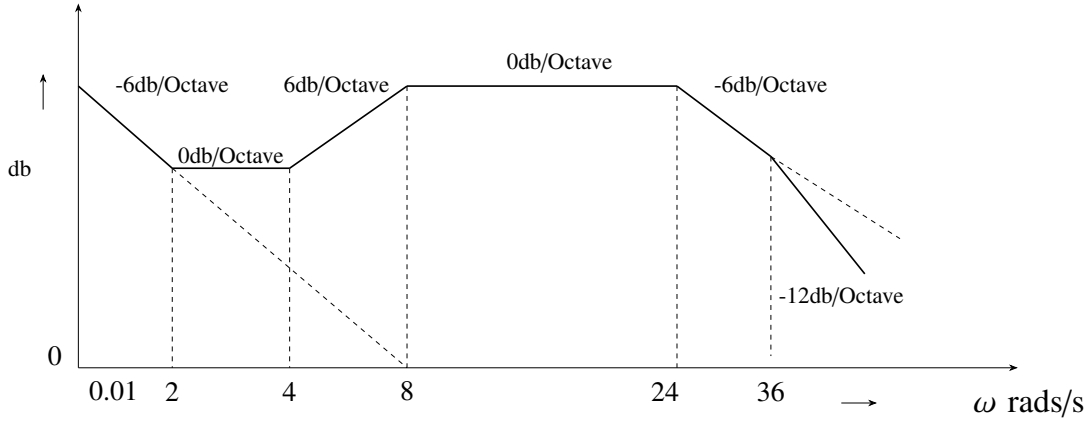
$$t_{op} = \frac{0.14 * TimeMultiplierSetting}{(PlugSettingMultiplier)^{0.02} - 1}$$

The maximum and minimum fault currents at bus B are 2000 A and 500 A respectively. Assuming the time multiplier setting and plug setting for relay RB to be 0.1 and 5A respectively, the operating time of RB (in seconds) is _____.

54) For the given system, it is desired that the system be stable. The minimum value of α for this condition is _____. (2014-EE)



55) The Bode magnitude plot of the transfer function $G(s) = \frac{K(1+0.5s)(1+\alpha s)}{s\left(1+\frac{s}{8}\right)(1+bs)\left(1+\frac{s}{36}\right)}$ is shown below: Note that -6 dB/octave = - 20 dB/decade. The value of $\frac{a}{bK}$ _____. (2014-EE)

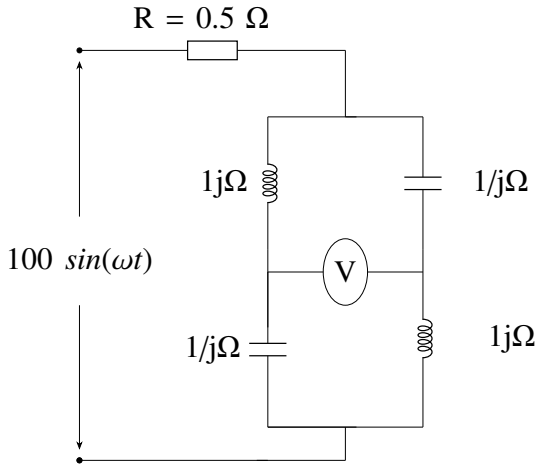


56) A system matrix is given as follows.

$$A = \begin{bmatrix} 0 & 1 & -1 \\ -6 & -11 & 6 \\ -6 & -11 & 5 \end{bmatrix}$$

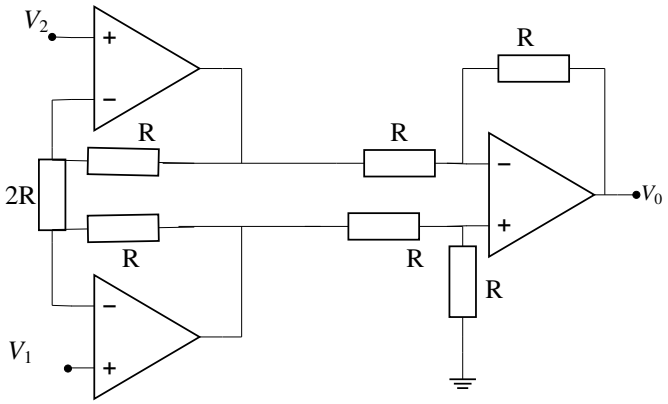
The absolute value of the ratio of the maximum eigenvalue to the minimum eigenvalue is _____. (2014-EE)

57) The reading of the voltmeter (rms) in volts, for the circuit shown in the figure is _____ (2014-EE)



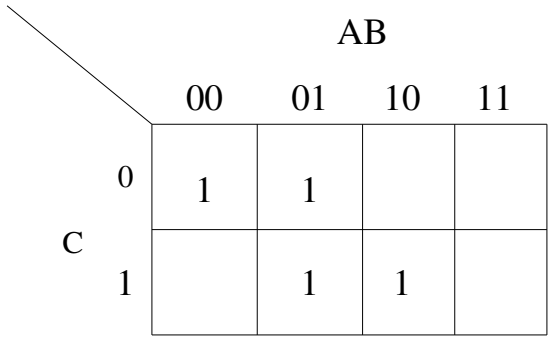
58) The dc current flowing in a circuit is measured by two ammeters, one PMMC and another electrodynamometer type, connected in series. The PMMC meter contains 100 turns in the coil, the flux density in the air gap is 0.2 Wb/m^2, and the area of the coil is 80 mm^2. The electrodynamometer ammeter has a change in mutual inductance with respect to deflection of 0.5 mH/deg. The spring constants of both the meters are equal. The value of current, at which the deflections of the two meters are same, is _____. (2014-EE)

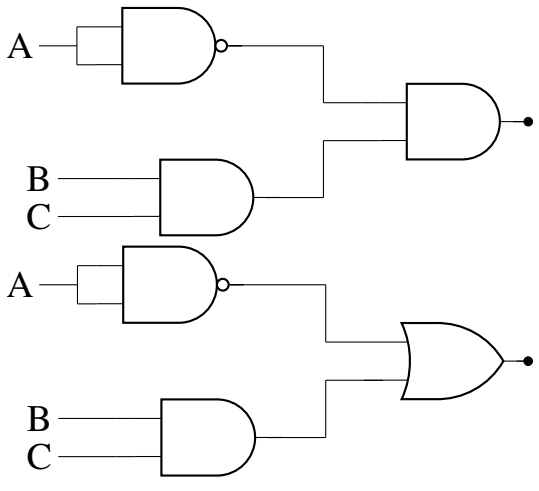
59) Given that the op-amps in the figure are ideal, the output voltage V_0 is



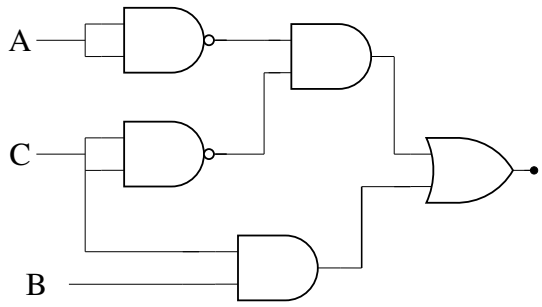
a) $(V_1 - V_2)$
b) $(V_1 - V_2)/2$
c) $2(V_1 - V_2)$
d) $(V_1 + V_2)$

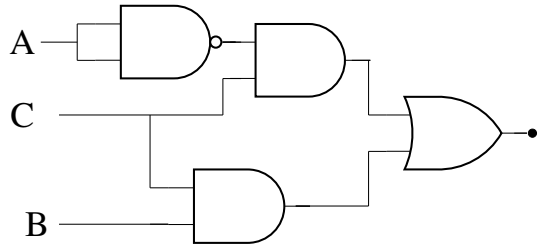
60) Which of the following logic circuits is a realization of the function F whose Karnaugh map is shown in figure (2014-EE)



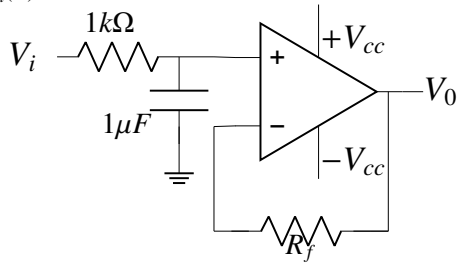
a)


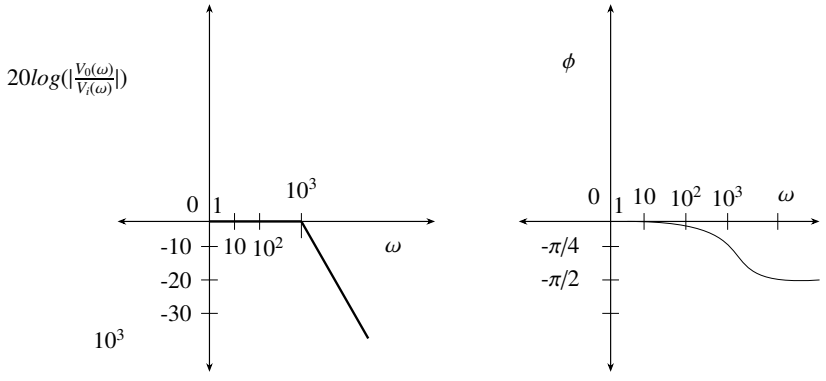
b)

c)


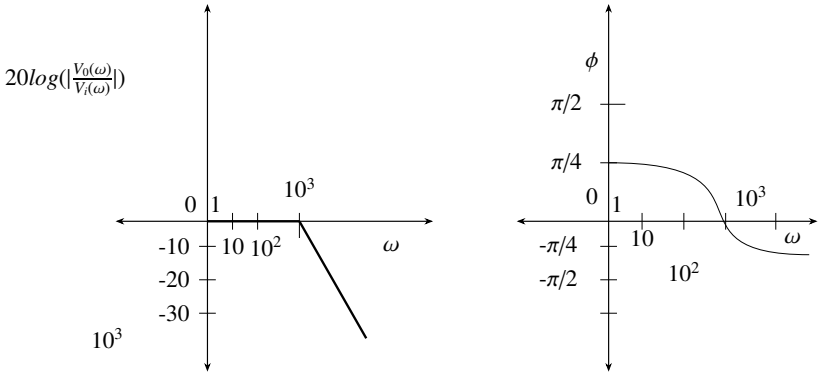
d)


61) In the figure shown, assume the op-amp to be ideal. Which of the alternatives gives the correct Bode plots for the transfer function $\frac{V_0(\omega)}{V_i(\omega)}$ (2014-EE)

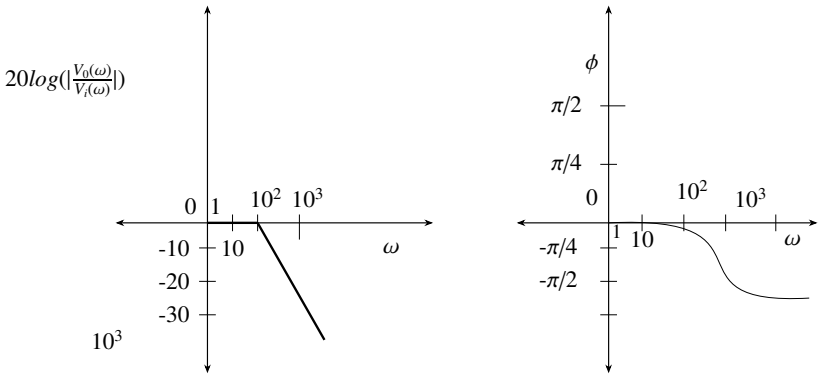


a)


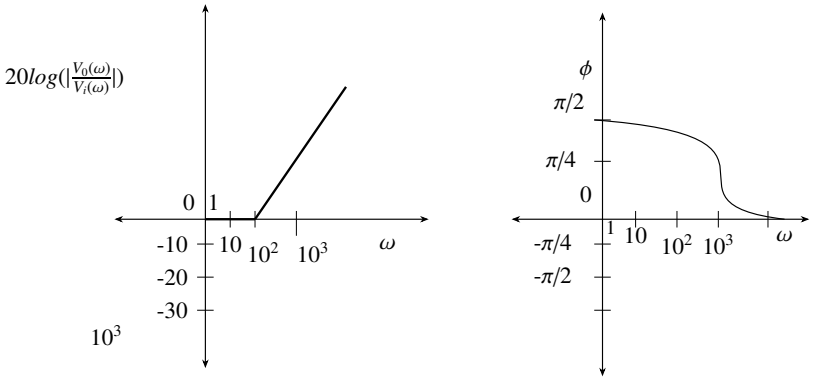
b)



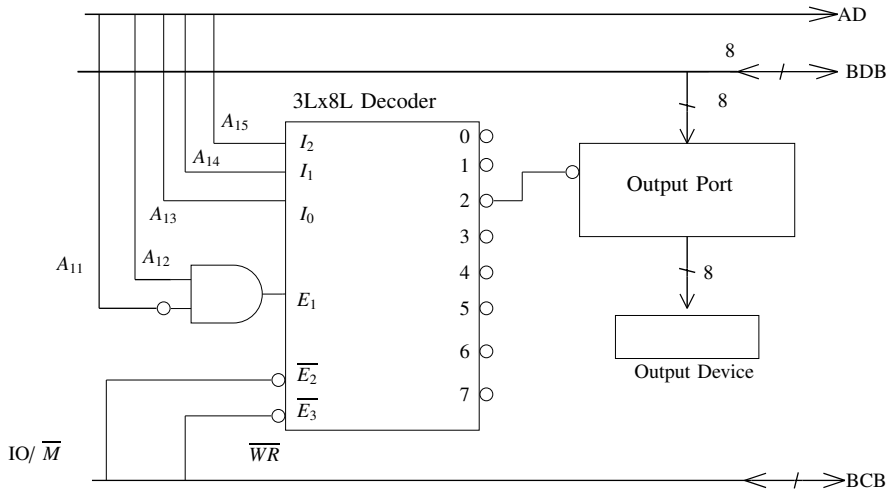
c)



d)



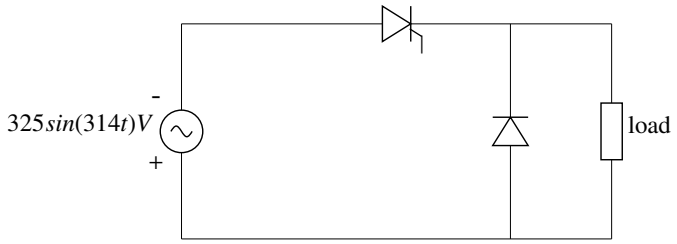
62) An output device is interfaced with 8-bit microprocessor 8085A. The interfacing circuit is shown in figure



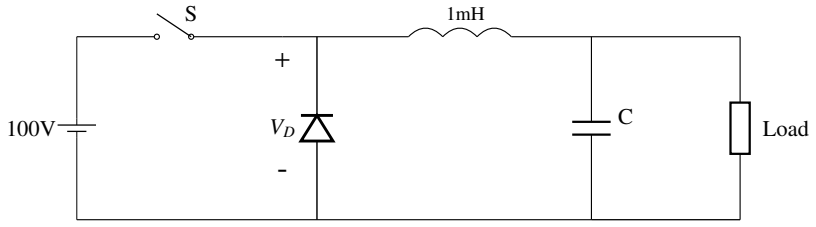
The interfacing circuit makes use of 3 Line to 8 Line decoder having 3 enable lines E_1, $\overline{E_2}$, $\overline{E_3}$. The address of the device is (2014-EE)

a) 50_H b) 5000_H c) $A0_H$ d) $A000_H$

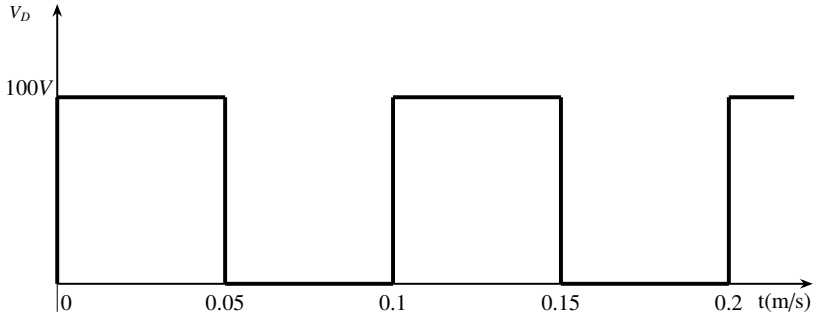
63) The figure shows the circuit diagram of a rectifier. The load consists of a resistance 10 Ω and an inductance 0.05 H connected in series. Assuming ideal thyristor and ideal diode, the thyristor firing angle (in degree) needed to obtain an average load voltage of 70 V is _____ (2014-EE)



64) Figure (i) shows the circuit diagram of a chopper. The switch S in circuit in figure (i) is switched such that the voltage v_D across the diode has the wave shape as shown in figure (ii). The capacitance C is large so that the voltage across it is constant. If switch S and the diode are ideal, the peak to peak ripple(in A) in the inductor current is _____ (2014-EE)

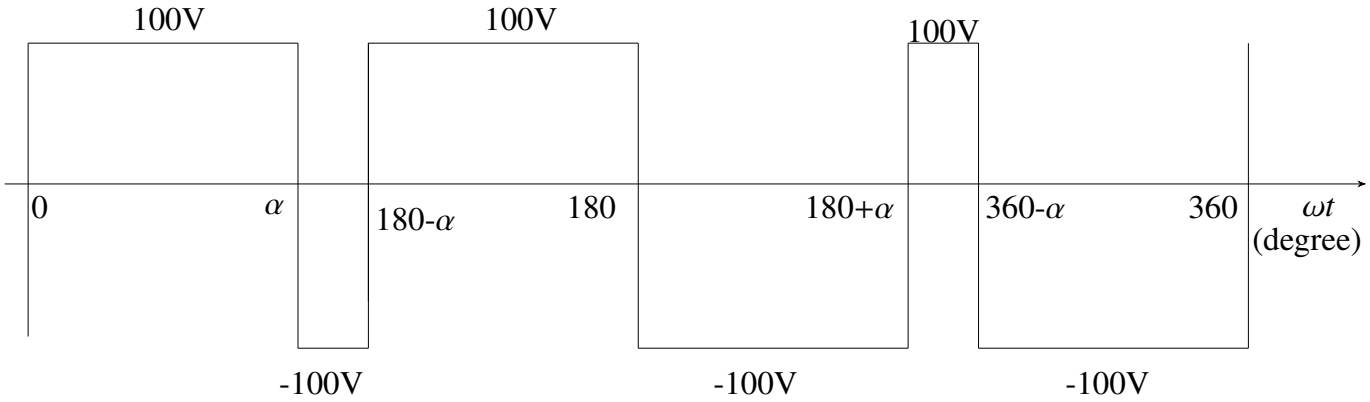


Figure(i)



Figure(ii)

65) The figure shows one period of the output voltage of an inverter. α should be chosen such that $60° < \alpha < 90°$. If the rms value of fundamental component is 50 V, then α in degree is _____ (2014-EE)



END OF THE QUESTION PAPER