2012-EE-1-13

EE24BTECH11006 - Arnav Mahishi

1) Two independent random variables X and Y are uniformly distributed in the interval $[-1, 1]$. The probability that $\max[X, Y]$ is less than $\frac{1}{2}$ is

   a) $\frac{3}{4}$ b) $\frac{9}{16}$ c) $\frac{1}{4}$ d) $\frac{2}{3}$

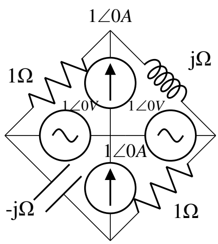
2) If $x = \sqrt{-1}$, then the value of x^x is

   a) $e^{\frac{-\pi}{2}}$ b) $e^{\frac{\pi}{2}}$ c) x d) 1

3) Given $f(z) = \frac{1}{z+1} - \frac{2}{z+3}$. If C is a counterclockwise path in the $z - plane$ such that $|z + 1| = 1$, the value of $\frac{1}{2\pi j} \oint_c f(z)\, dz$ is

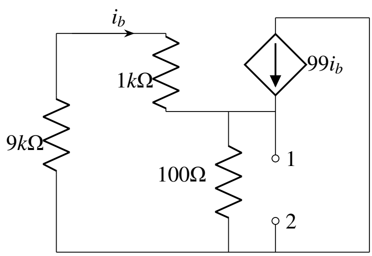
   a) -2 b) -1 c) 1 d) 2

4) In the circuit shown below, the current through the inductor is



   a) $\frac{2}{1+j}A$ b) $\frac{-1}{1+j}A$ c) $\frac{1}{1+j}$ d) $0A$

5) The impedence looking into nodes 1 and 2 in the given circuit is



a) 50Ω b) 100Ω c) $5k\Omega$ d) $10.1k\Omega$

6) A system with transfer function $G(s) = \frac{(s^2+9)(s+2)}{(s+1)(s+3)(s+4)}$ is excited by $\sin \omega t$. The steady-state output of the system is zero at

a) $\omega = 1\frac{rad}{s}$ b) $\omega = 2\frac{rad}{s}$ c) $\omega = 3\frac{rad}{s}$ d) $\omega = 4\frac{rad}{s}$

7) In the sum of products function $f(X,Y,Z) = \sum(2,3,4,5)$, the prime implicants are

a) $\overline{X}Y, X\overline{Y}$ b) $\overline{X}Y, X\overline{Y}\overline{Z}, X\overline{Y}Z$ c) $\overline{X}Y\overline{Z}, \overline{X}YZ, X\overline{Y}$ d) $\overline{X}Y\overline{Z}, \overline{X}YZ, X\overline{Y}Z$

8) If $x[n] = \left(\frac{1}{3}\right)^{|n|} - \left(\frac{1}{2}\right)^{n} u[n]$, the region of convergence (ROC) of its Z-transform in the Z-plane will be

a) $\frac{1}{3} < |z| < 3$ b) $\frac{1}{3} < |z| < \frac{1}{2}$ c) $\frac{1}{2} < |z| < 3$ d) $\frac{1}{3} < |z| < 1$

9) The bus admittance matrix of a three-bus three-line system is

$$Y = j\begin{pmatrix} -13 & 10 & 5 \\ 10 & -18 & 10 \\ 5 & 10 & -13 \end{pmatrix}$$

If each transmission line between the two buses is represented by an equivalent π-network, the magnitude of shunt susceptance of the line connecting bus 1 and 2 is

a) 4 b) 2 c) 1 d) 0

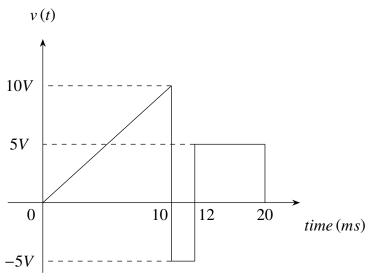
10) The slip of an induction motor normally does not depend on

a) rotor speed
b) synchronous speed
c) shaft torque
d) core-less component

11) A two-phase load draws the following phase currents: $i_1(t) = I_m \sin(\omega t - \phi_1)$, $i_2(t) = I_m \sin(\omega t - \phi_2)$. These currents are balanced if ϕ_1 is equal to

a) $-\phi_2$ b) ϕ_2 c) $\left(\frac{\pi}{2} - \phi_2\right)$ d) $\left(\frac{\pi}{2} + \phi_2\right)$

12) A periodic voltage waveform observed on an oscilloscope across a load is shown. A permanent magnet moving coil($PMMC$) meter connected across the same load reads



a) $4V$ b) $5V$ c) $8V$ d) $10V$

13) The bridge method commonly used for finding mutual inductance is

a) Heavy Campbell Bridge
b) Schering Bridge
c) De Sauty bridge
d) Wien bridge