2010-EE-1-13

EE24BTECH11006 - Arnav Mahishi

1) The value of the quantity P, where $P = \int_0^1 xe^x$ is equal to

a) 0 b) 1 c) e d) $\frac{1}{e}$

2) Divergence of the three-dimensional radial vector field $\vec{r}$

a) 3 b) $\frac{1}{r}$ c) $\hat{i}+\hat{j}+\hat{k}$ d) $3\left(\hat{i}+\hat{j}+\hat{k}\right)$

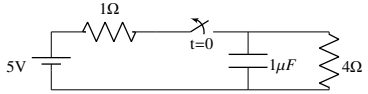
3) The period of the signal $x(t) = 8\sin\left(0.8t + \frac{\pi}{4}\right)$ is

a) $0.4\pi s$ b) $0.8\pi s$ c) $1.25s$ d) $2.5s$

4) The system represented by the input-output relationship $y(t) = \int_{-\infty}^{t} x(\tau)\,d\tau, t>0$ is

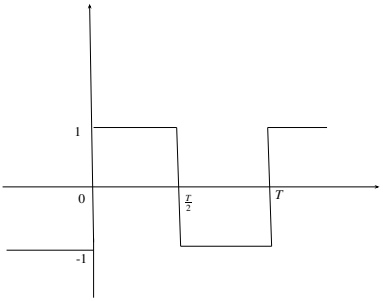
a) Linear and casual
b) Linear but non casual
c) Casual but not linear
d) Neither linear nor casual

5) The switch in the circuit has been closed for a long time. It is opened at $t = 0$. At $t = 0^+$, the current through the $1\mu F$ capacitor is.



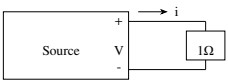
a) $0A$ b) $1A$ c) $1.25A$ d) $5A$

6) The second harmonic component of the periodic waveform given in the figure has an amplitude of



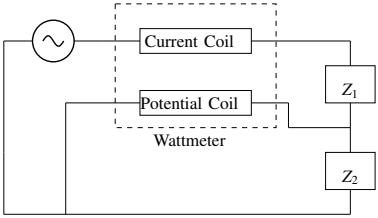
a) Normal b) Gamma c) Beta d) Cauchy

7) As shown in the figure, a resistance 1Ω resistance is connected across a source that has a load line $v + i = 100$. The current through the resistance is



a) $25A$ b) $50A$ c) $100A$ d) $200A$

8) A wattmeter is connected as shown in the figure. The wattmeter reads



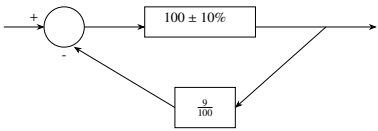
Text

a) Zero always
b) Total power consumed by Z_1 and Z_2
c) Power consumed by Z_1
d) Power consumed by Z_2

9) An ammeter has current range $0 - 5A$ and its internal resistance is 0.2Ω. In order to change the range to $0 - 25A$, we need to add a resistance of

a) 0.8Ω in series with the meter.
b) 1.0Ω in series with the meter.
c) 0.04Ω in parallel with the meter.
d) 0.05Ω in parallel with the meter.

10) As shown in the figure, a negative feedback system has an amplifier of gain 100 with $\pm 10\%$ tolerance in the forward path, and an attenutator of value $\frac{9}{100}$ in the feedback path. The overall system gain is approximately.

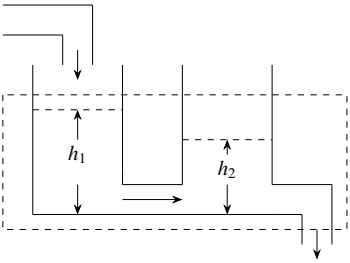


a) $10 \pm 1\%$ b) $10 \pm 2\%$ c) $10 \pm 5\%$ d) $10 \pm 10\%$

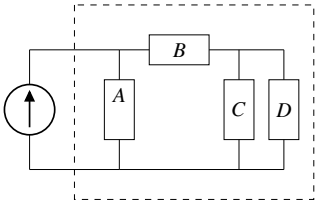
11) For the system $\frac{2}{s+1}$, The approximate time taken for a step response to reach 98% of its final value is

a) $1s$ b) $2s$ c) $4s$ d) $8s$

12) If the electrical circuit of figure(b) is an equivalent of the coupled tank system of figure(a), then



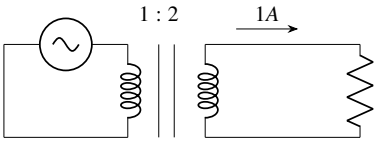
(a) Coupled Tank



(b) Electrical Equivalent

a) A, B are resistances and C, D are capacitances
b) A, C are resistances and B, D are capacitances
c) A, B are resistances and C, D are capacitances
d) A, C are resistances and B, D are capacitances

13) A single-phase transformer has turns ratio of $1 : 2$ and is connected to a purely resistive load as shown in the figure. The magentizing current drawn is $1A$ and the secondary current is $1A$. If core losses and leakage reactances are neglected, the primary current is



a) $1.4A$ b) $2A$ c) $2.24A$ d) $3A$