ASSIGNMENT 5

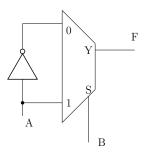
EE24BTECH11011 - PRANAY

14) A function y(t), such that y(0) = 1 and $y(1) = 3e^{-1}$, is a solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$. Then y(2) is

c) $7e^{-1}$

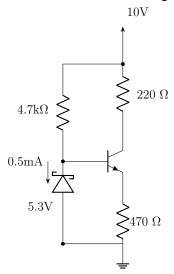
b) $5e^{-2}$

a) $5e^{-1}$	b) $5e^{-2}$	c) $7e^{-1}$	d) $7e^{-2}$
15) The value of the integral			
	$\oint_{c} \frac{1}{\left(z - \frac{1}{z}\right)}$	$\frac{2z+c}{+(z^2-4z+5)}dz$	(1)
over the contour $ z = 1$, taken in anticlockwise direction, would be			
a) $\frac{24\pi i}{13}$	b) $\frac{48\pi i}{13}$	c) $\frac{24}{13}$	d) $\frac{12}{13}$
16) The transfer function of a system is $\frac{Y(s)}{R(s)} = \frac{s}{s+2}$. Then the steady state output $y(t)$ is $A\cos(2t + \varphi)$ for the input $\cos(2t)$. Then the values of A and φ , respectively are			
a) $\frac{1}{\sqrt{2}}, -45^{\circ}$	b) $\frac{1}{\sqrt{2}}$, +45°	c) $\sqrt{2}$, +45°	d) $\sqrt{2}$, -45°
17) The phase cross-over frequency of the transfer function $G(s) = \frac{100}{(s+1)^3}$ in rad/s is			
a) $\sqrt{3}$	b) $\frac{1}{\sqrt{3}}$	c) 3	d) $3\sqrt{3}$
18) Consider a continuous-time system with input $x(t)$ and output $y(t)$ given by			
	y(t)	$=x(t)\cos t$	(2)
This system is a) linear and time-invariant b) non-linear and time-invariant c) linear and time-varying d) non-linear and time-varying			
19) The value of $\int_{-\infty}^{+\infty} e^{-t} \delta(2t-2) dt$, where $\delta(t)$ is the Dirac delta function, is			
a) $\frac{1}{2e}$	b) $\frac{2}{e}$	c) $\frac{1}{e^2}$	d) $\frac{1}{2e^2}$
20) A temperature in the range of -40°C to 55°C is to be measured with a resistance of 0.1°C. The minimum number of ADC bits required to get a matching dynamic range of the temperature sensor is			
a) 8	b) 10	c) 12	d) 14
21) Consider the following unit which uses $2 - to - 1$ multiplier as shown in the figure. The boolean expression for output F in terms of A and B is			

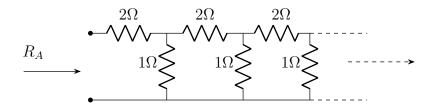


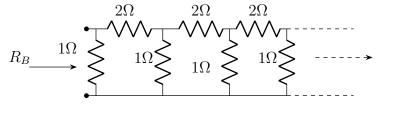
- a) $A \oplus B$
- b) $\overline{A+B}$

- c) A + B
- d) $\overline{A \oplus B}$
- 22) A transistor circuit is given below. The Zener diode breakdown volatge is 5.3 V as shown. Take base to emitter volatge drop to be 0.6V. The value of the current gain β is ______



- 23) In cylindrical coordinate system , the potential produced by a uniform ring charge is given by $\varphi = f(r,z)$ where f is a continous fraction of r and z. Let \mathbf{E} be the resulting electric field. Then the magnitude of $\nabla \times \mathbf{E}$
 - a) increases with r
 - b) is 0
 - c) is 3
 - d) decreases with z
- 24) A soft-iron toroid is concentric with a long straight conductor carrying a direct current I. If the relative permeability μ_r of soft-iron is 100, the ratio of the magnetic flux densities at two adjacent points located just inside and just outside the toroid, is ______
- 25) R_A and R_B are the input resistances of circuits as shown below. The circuits extend infinitely in the direction shown. Which one of the following statements is TRUE?





- a) $R_A = R_B$
- b) $R_A = R_B = 0$
- c) $R_A < R_B$
- d) $R_B = \frac{R_A}{1 + R_A}$
- 26) In a constant $\frac{V}{f}$ induction motor drive , the slip at maximum torque
 - a) is directly proportional to the synchronous speed
 - b) remains constant with respect to the synchronous speed
 - c) has an inverse relation with the synchronous speed
 - d) has no relation with the synchronous speed