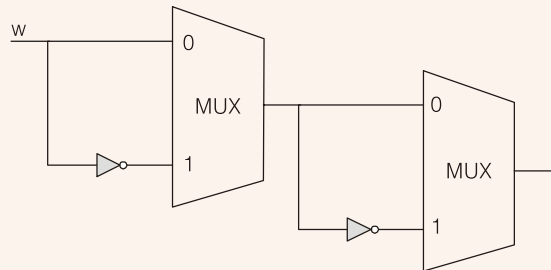**Gate 16th Feb Morning**

Q.1 Consider the multiplexer based logic ckt. Find the boolean function = ?

(a) $f = w\overline{S}_1\overline{S}_2$

(b) $f = wS_1 + wS_2 + S_1S_2$

(c) $f = \overline{w} + S_1 + S_2$

(d) $w \oplus S_1 \oplus S_2$

Solution: (d)

s_1	f
0	$f_1 \to \overline{s}_1 f_1$
1	$\overline{f}_1 \to s_1\overline{f}_1$

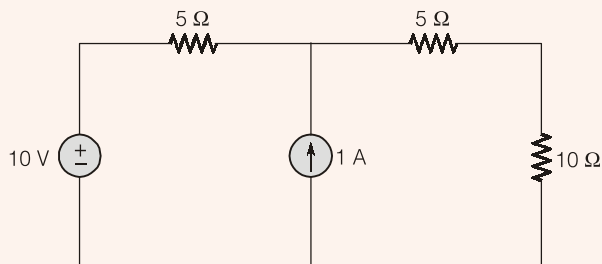$$f = \overline{s}_1 f_1 + s_1\overline{f}_1$$
$$f = f_1 \oplus s_1$$
$$f_1 = w \oplus s_2$$
$$\therefore \quad f = w \oplus s_1 \oplus s_2$$

Q.2 find the current I in the following branch.

Solution: (0.75 A)

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GATE-2014 Exam Solutions (16 Feb)
Electronics Engineering (Morning Session)

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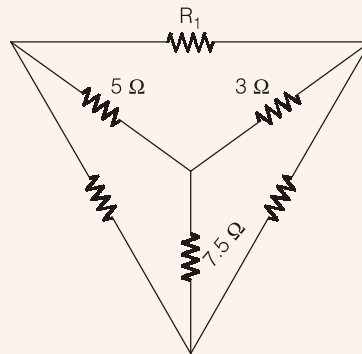
Q.3 A series Rc circuit is connected to DC voltage source at time $t_0 = 0$. The relation between the source voltage V_s, the resistance R, the capacitance C, the current i(t) is below:

$$V_s = Ri(t) + \frac{1}{C}\int_0^t i(t)dt.$$ Which one of the following i(t) represents

(a)

(b)

(c)

(d)
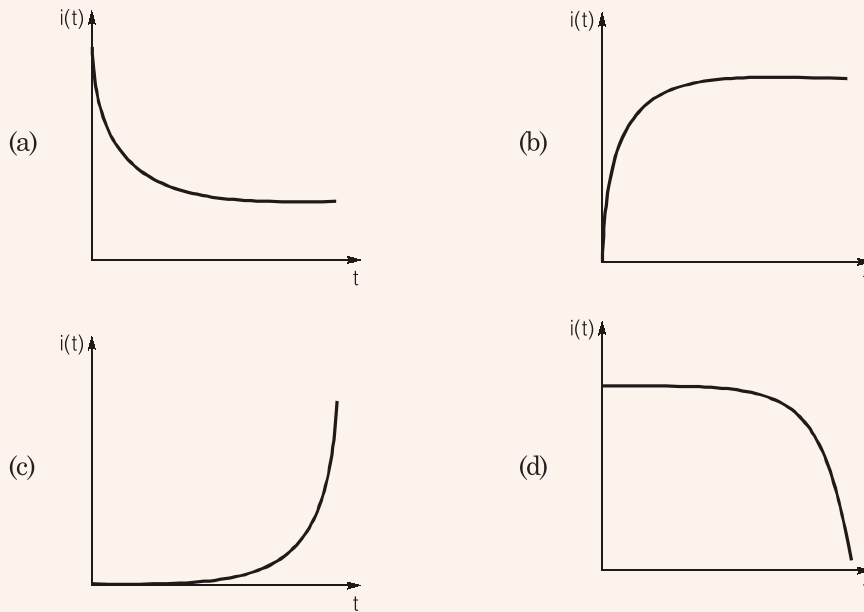
Solution: (a)

Q.4 Find the resistance R_1 from y network

Solution: (10)

$$R_1 = 5 + 3 + \frac{5 \times 3}{7.5} = 10 \ \Omega$$

Q.5 Find the next number of the given sequence 84, 54, 36, 24, ___?___.
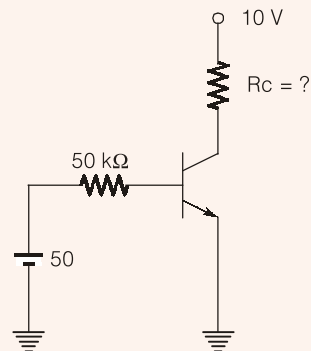
Solution: (18)

Q.6 'advice' is
    (a) noun   (b) verb
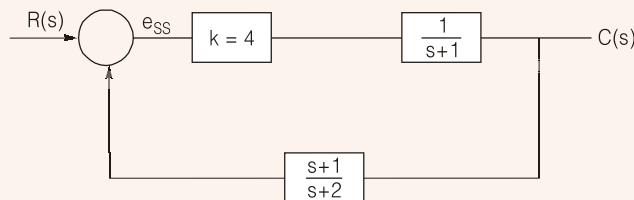   (c) both   (d) proverb

Solution: (a)

Q.7 $V_{BE} = 0.7$ V, $V_{CE\,sat} = 0.2$ V, $\beta = 50$, then find the value of Rc

    (a) $100\,\Omega$, saturation region   (b) $300\,\Omega$, saturation region
    (c) $200\,k\Omega$, cutoff region   (d) $120\,\Omega$, active region
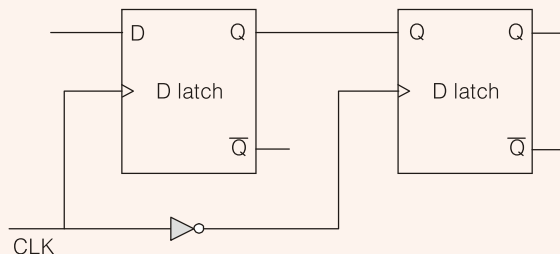
Solution: (d)

Q.8 Find the steady state error for given system for unit step input

Solution: (–1/3)

Q.9

Current option is
    (a) Jk flip-flop   (b) SR flip-flop
    (c) D flip-flip   (d) Master-slave arrangement

Solution: (d)

Q.10 A fm modulated signal is given $S_{fm}(t) = 10\cos(2\pi f_c t + \beta_1 \sin f_1 t + \beta_2 \sin f_2 t)$ then the maximum frequency deviation

(a) $\beta_1 f_1 + \beta_2 f_2$

(b) $\beta_1 f_2 + f_2 f_1$

(c) $\beta_1 + \beta_2$

(d) none of these

Solution: (a)

Q.11 If A modulate signal $S(t) = m(t) \cos 40000\pi t$ is given and $m(t)$ does not contain frequency component more then 5 kHz, then find the minimum sampling frequency for proper reconstruction of signal.

Solution: (25 kHz)

Q.12 A PCM system have impure $\sin 100\pi t + \cos 100\pi t$ and sampled at Nequist sampling rate and the modulated step size $\Delta = 0.75$ then find the maximum bit rate (bits/sec)

Solution: (200 bits)

Q.13 Find the output
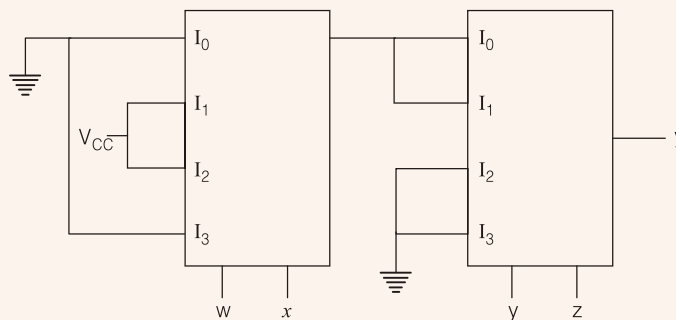
$y = $ _____.

(a) $w'x'y + wx'y$

(b) $wxy + wx'y'$

(c) $w'x'y' + xw'y + xyw$

(d) none

Solution: (b)

Q.14 In a semiconductor (Si) the donor and accenptor concentrations are 1×10^{16} and $5 \times 10^{18}/cm^3$ respectively at temperature 300° k, $V_T = 26$ mV then the voltage at equilibrium condition.

Solution: (0.8589 V)

Q.15 For a air filled rectangular wave guide have diamention 5 cm × 3 cm then find the cutoff frequency of the wave guide in (MHz) for TE_{21} mode.

Solution: (78.1024 MHz)

Q.16 For given pnp transistor $|VBE| = 0.7$, $\beta = 50$, find the output voltage

$V_0 = $ _____.
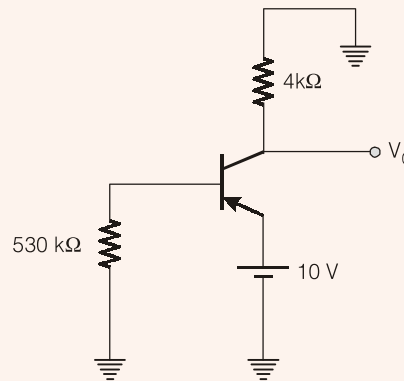
Solution: (3.4 V)

Q.17 For a function $x(t)$ the energy function is $S(f)$, then find the energy function for input $x(2t + 1)$

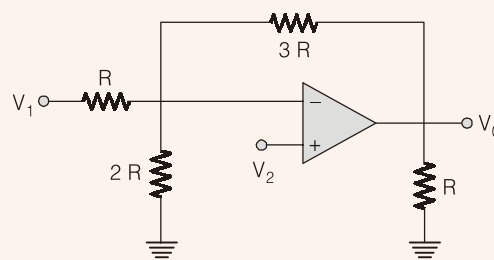(a) $S\left(\dfrac{f}{2}\right) \cdot e^{-j\pi f}$ (b) $\dfrac{1}{2}S\left(\dfrac{f}{2}\right) e^{-j\pi f}$

(c) $\dfrac{1}{2}S \cdot \left(\dfrac{f}{2}\right)$ (d) $\dfrac{1}{2}S\left(\dfrac{f}{2}\right) e^{-if}$

Solution: (c)

Q.18 Given $H_1(z) = (1 - az^{-1})^{-1}$ and $H_2(z) = (1 - Bz^{-1})^{-1}$, $H(z) = H_1(z) + rH_2(z)$ where a, b and r are real number and also $a = \dfrac{1}{4}$, $b = \dfrac{-1}{2}$, then find the value of r if zero of $H(z)$ lies on the $|z| = 1$. r = _____.

Solution: (–2)
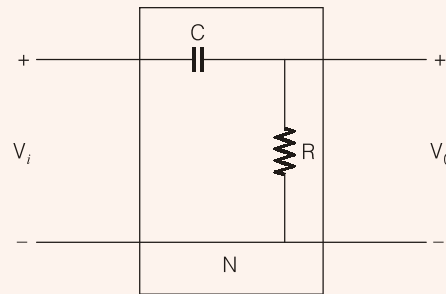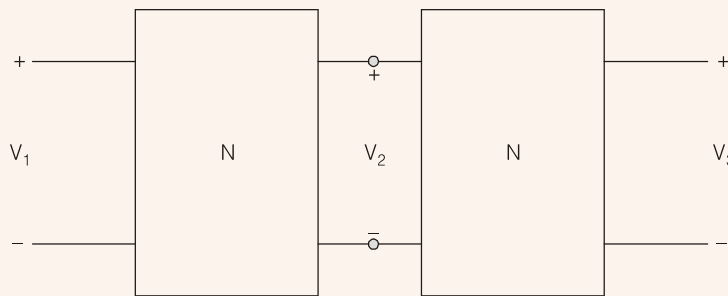
Q.19 Find the V_0

(a) $\dfrac{5}{2}V_1 - 3V_2$ (b) $2V_1 - \dfrac{5}{2}V_2$

(c) $\dfrac{-3}{2}V_1 - \dfrac{7}{2}V_2$ (d) $-3V_1 + \dfrac{11}{2}V_2$

Solution: (d)

Q.19 For the N-Network is given C = 100 μF, R = 10 kΩ

if Two such ckt are cascade then find the response of the system

(a) $\dfrac{S}{S+1}$

(b) $\dfrac{S^2}{(S+1)^2}$

(c) $\dfrac{1}{(S+1)^2}$

(d) $\dfrac{S}{(S+1)^2}$

Solution: (b)

Q.21 In p-type semiconductor if uniformly light is distributed than the recombination rate is directly proportional to
(a) Excess minority carriers
(b) Minority carries life time
(c) Excess majnity carries
(d) Majnity carries

Solution: (a)

Q.22 Transconductance characteristics depends on
(a) high input resistance and high output resistance
(b) high input resistance and low output resistance
(c) Low input resistance and high output resistance
(d) Low input and low input resistance

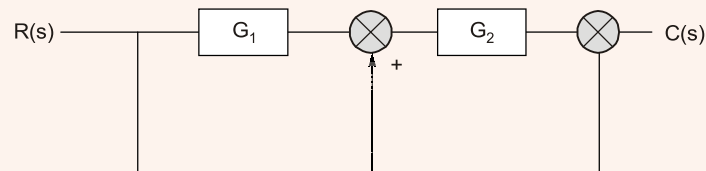Solution: (a)

Q.23 $f(x) = 2x^3 - 9x^2 + 12x - 3; 2 \le x \le 3$

What will be maximum value of f(x) in the interval.

Solution: (6)

Q.24

Overall transfer fxⁿ:

(a) $G_1G_2 + G_2 + 1$

(b) $G_2G_2 + G_1 + 1$

(C) $\dfrac{G_1 G_2}{G_1 G_2} + 1$

(b) $\dfrac{G_1 G_2}{1 - G_1 G_2}$

Solution: (a)

Q.25 A vector $\overline{F}$ is given by $\overline{F} = \sin x \cos y \hat{a}_x + \cos x \sin y \hat{a}_y$, curl of $\overline{F}$ will be _____.

Solution: $(-\cos(x - y)\hat{a}_z)$

Q.26 Which one of the given differential equation is non homogeneous, non linear. x and y are independent and dependent variable respectively

(a) $\dfrac{dy}{dx} + xy = 0$

(b) $\dfrac{dy}{dx} + xy = e^{-x}$

(c) $\dfrac{dy}{dx} + xy = e^{-y}$

(d) $\dfrac{dy}{dx} + x = 0$

Solution: (c)

Q.27

$f(x) = l n (1 + x) - x; \quad x > -1$

Maximum value of $f(x)$ will be on what value of x _____.

Solution: (0)

Q.28 A fair coin is tossed infinite times then find the probability of 4th head occurs exactly at 10th times.

Solution: (0.205)

Q.29 A man swim 8 km/h in still water. He takes to 3 times time when her swim upstream compare to down stream then find the velocity of water in (km/h)

Solution: (4)

Q.30 What will be the number of the sequence 7G, 11K, 13M, ____
(a) 15 P
(b) 17 Q
(c) 17O
(d) 15 Q

Solution: (b)

Q.31 100 bulbs produced by a company it having of 5 defective bulbs with it. For checking section verifies with by taking 4 bulbs at a time from 100 bulbs of there is any bulb is defective then it will be rejected otherwise it allow to marketing. The probability of getting non defective section of 100 bulbs is

Solution: (0.95)

Q.32 India is a land of rich heritage and cultural diversity, which of the following points corroborates this
(a) In Indian cricket team, players are selected from more than 10 states
(b) There are more than 25 languages and over 2000 dialects
(c) India has 29 of states and 7 union tertiaries
(d) India population has 1.1 million people

Solution: (b)

■■■■