Electrical Engineering

Q1. Kits, the health authority of the town, 100 unidentified individual are covid positive. Due to lack of adequate covid testing kits, the health authority of the town devised a strategy to identify these covid positive individual. The strategy is to:
(i) Collect Saliva sample from all 1000 individual any randomly group them into sets of 5.
(ii) Mix the samples within each set and test the mixed sample for covid.
(iii) If the test done in (ii) gives a negative result, then release all the 5 individual to be covid negative.
(iv) If the test done in (ii) give positive result, then all the 5 individuals are separately tested for covid
Given this strategy, no more than _____ testing kits, will be required to identify all the 100 covid positive individuals irrespective of how they are group of
(a) 700
(b) 800
(c) 1000
(d) 600

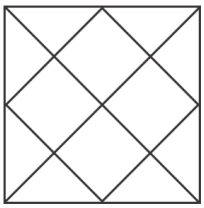
Q2. I cannot support this proposal my _____ will not permit it.
(a) Consensus
(b) Conscience
(c) ansent
(d) Conscious.

Q3. What is smallest number with statements digits whose digit adds up to 45.
(a) 99999
(b) 123457869
(c) 123456789
(d) 123555789

Q4. courts : _____ :: Parliament : Legislative
(a) Governmental
(b) Judiciary
(c) Executive
(d) Legal

Q5. A 1000 × 32cm Rectangular sheet is folded 5 times. Each times sheet is folded the long edge aligns with its opposite site. Eventually the folded sheet is a Rectangular of dimention 100 cm × 1 cm.
The total no. of crense visible when the sheet is unfolded is
(a) 63
(b) 32
(c) 5
(d) 31

Q6.



How many rectangles are present in the given figure

(a) 12

(b) 8

(c) 9

(d) 10

Q7. Let $V_1 = \begin{bmatrix}1\\2\\0\end{bmatrix}$ and $V_2 = \begin{bmatrix}2\\1\\3\end{bmatrix}$ be two vectors. The value of the coefficient α in the expression $v_1 = \alpha v_2 \pm e$ which minimizes the length of the error vector e is

(a) 7/2

(b) -2/7

(c) 2/7

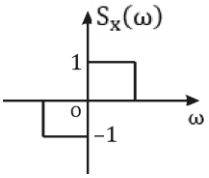
(d) -7/2

Q8. For a real signal, which of the following is/are valid power spectral density/densities.

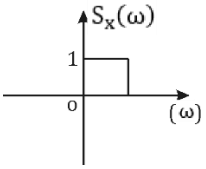
(a) $S_x(\omega) = e^{-\omega^2}\cos^2\omega$

(b) $S_x(\omega) = \frac{2}{9+\omega^2}$

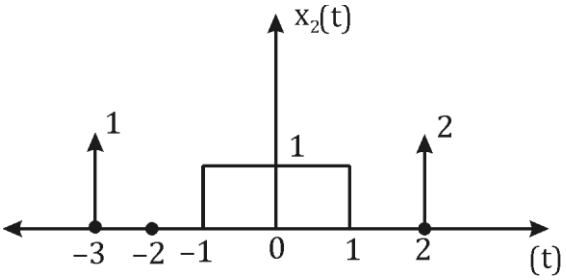
(c)



(d)



Q9. Let $x_1(t) = u(t + 1.5) - u(t - 1.5)$ and $x_2(t)$ is shown in the figure below for $y(t) = x_1(t) \times x_2(t)$ the $\int_{-\infty}^{\infty} y(t) + (t)$ is _____ (NAT)



Q10. Let x(t) = 10 cos(10.5wt) be passed through an LTI system having impulse response $h(t) = \pi\left(\frac{\text{Sin wt}}{\pi t}\right)^2$ cos10wt the output of the system is

(a) $\frac{15w}{2}\cos(10.5wt)$

(b) 15w cos (10.5wt)

(c) $\frac{15w}{8}\cos(10.5wt)$

(d) $\frac{15w}{4}\cos(10.5wt)$

Q11. The value of the line integral $\int_P^Q (z_1^2 dx + 3y^2 dy + 2xz_1 dx)$ along the straight line joining points P(1, 1, 2) Q(2, 3, 1) is

(a) –5

(b) 20

(c) 24

(d) 29

Q12. The value of contour integral $\oint_c \left(\frac{z_1+2}{z_1^2+2z_1+2}\right) dz$ where contour C is $\left\{z_1 : \left|z_1 + 1 - \frac{3}{2}j = 1\right|\right\}$ taken in the counter clockwise direction is

(a) π (i – j)

(b) - π (1 – j)

(c) - π (1 + j)

(d) π (1 + j)

Q13. Let m(t) be a strictly band limited signal with bandwidth B and energy Assuming $\omega_0 = 10B$, the energy in the signal m(t) cosω_0t is

(a) E/2

(b) E

(c) 2E

(d) E/4

Q14. The fourier transform X(ω) of $x(t) = e^{-t^2}$ is

Note: $\int_{-\infty}^{\infty} e^{-y^2}\, dy = \sqrt{\pi}$

(a) $\sqrt{\pi}e^{-\omega^2/2}$

(b) $\frac{e^{-\omega^2/4}}{2\sqrt{\pi}}$

(c) $\sqrt{\pi}e^{\omega^2/2}$

(d) $\sqrt{\pi}e^{-\omega^2/4}$

Q15. In a semiconductor if the fermi energy level lies in the conduction band then the semiconductor is known as

(a) Non degenerate P type

(b) degenerate P type

(c) non degenerate n type

(d) degenerate n type

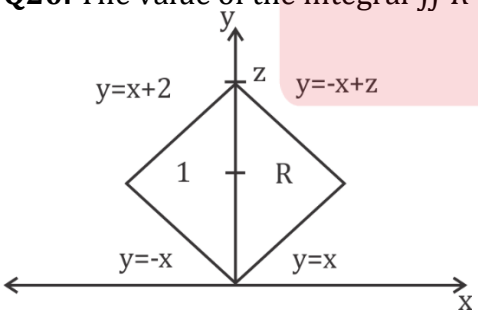
Q16. Consider a system with input x(t) and output y(t) $= x(e^t)$ the system is
(a) Non causal & time invariant
(b) Causal & time varying
(c) Causal & time invariant
(d) Non causal & time varying

Q17. Let $\omega^4 = 16j$ which of the following cannot be a value of ω
(a) $2e^{j\pi/8}$
(b) $2e^{j9\pi/8}$
(c) $2e^{j2\pi/8}$
(d) $2e^{j5\pi/8}$

Q18. Consider a narrow band signal, propagating in a loss less dielectric median $(\varepsilon_r = 4, u_r = 1)$ with phase velocity v_p and group velocity v_g which of following statement is true
(a) $v_p > c, v_g > c$
(b) $v_p < c,\ v_g < c$
(c) $v_p < c, v_g > c$
(d) $v_p > c, v_g < c$

Q19. Let an input x[n] having discreate time fourier transform.
$X\left(e^{j\Omega}\right) = 1 - e^{-j\Omega} + 2e^{-3j\Omega}$
be passed through an LTI system
The frequency response of the LTI system is $H\left(e^{j\Omega}\right) = 1 - \frac{1}{2}e^{-j2\Omega}$. The output y[n] of the system is
(a) $\delta[n] - \delta[n-1] - \frac{1}{2}\,\delta\,[n-2] - \frac{5}{2}\,\delta[n-3] + \delta[n-5]$
(b) $\delta[n] - \delta[n-1] - \frac{1}{2}\,\delta\,[n-2] + \frac{5}{2}\,\delta[n-3] - \delta[n-5]$
(c) $\delta[n] + \delta[n-1] + \frac{1}{2}\,\delta\,[n-2] + \frac{5}{2}\,\delta[n-3] + \delta[n-5]$
(d) $\delta[n] + \delta[n-1] - \frac{1}{2}\,\delta\,[n-2] - \frac{5}{2}\,\delta[n-3] + \delta[n-5]$

Q20. The value of the integral $\iint R\ xydxdy$ order the region R given in the figure is _____ (NAT).



Q21. Let X(t) be a white Gaussian noise with power spectral density ½ W/HZ. If X(t) is input to an LTI system with impulse response $e^{-t}\,u(+)$. the average power of system output is _____ ωatt. (upto 2 decimal)

Q22. In a semiconductor device the Fermi energy level is 0.35ev above the valence band energy. The effective density of states in the valence Band at T = 300k is $1 \times 10^{19}\ cm^{-3}$. The thermal equilibrium hole concentration in silicon at 400k is _____ $\times 10^{13} cm^{-3}$ (upto 2 decimal) given k7 at 300k = 0.026ev