Tikrit University
College of Engineering
Department of
Electrical Engineering

جامعة تكريت
كلية الهندسة
قسم الهندسة الكهربائية
الدراسات العليا : الامتحان التنافسى

Basic of Electrical Engineering

Q1/ For the network of Figure (1) , the Voltage V is:

a) 10 V
b) -10V
c) 28 V
d) -28 V

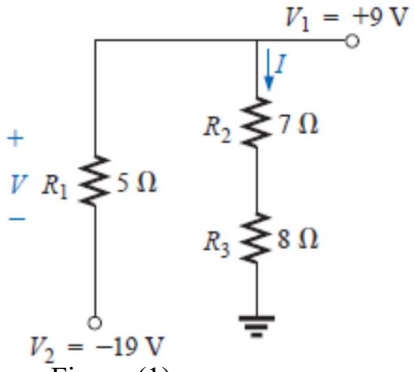

Figure (1)

Q2/ Superposition theorem is not applicable for:
a) current calculations.
b) voltage calculations.
c) power calculations.
d) None of the above.

Q3/ In ac RLC series circuit, the voltage across resistor, inductor and capacitor are 8V, 8V and 2V respectively. Find the total voltage.
a) 16V
b) 18V
c) 8V
d) 10V

Q4/ In a series resonant circuit, the impedance of the circuit is:
a) Minimum
b) Maximum
c) Zero
d) None of the above

Q5/ For the network of Figure (2), find the voltage V_C.

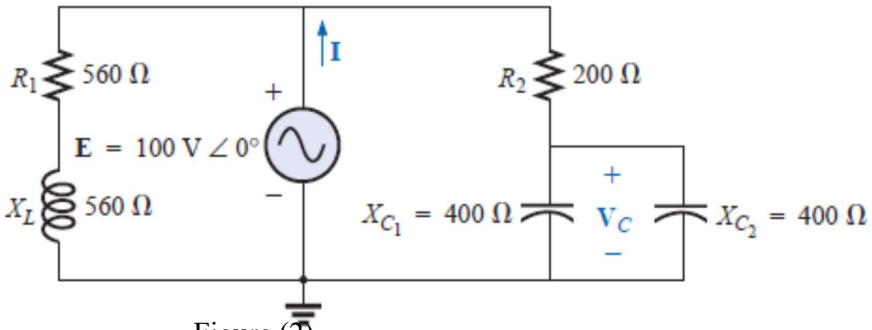

Figure (2)

a) 50 V
b) 70.7 V
c) 97 V
d) 100 V

Q6/ In a series resonance circuit if bandwidth is 1 MHz and inductance is 1 mH, then the value of the resistance is:

a) 1Ω
b) 1MΩ
c) 1mΩ
d) 1kΩ

Q7/ For the network of Figure (3), Z_{Th} is:

a) 10.099 -j 0.99 kΩ
b) 5 + j 0 kΩ
c) 5 -j kΩ
d) 10 – j kΩ

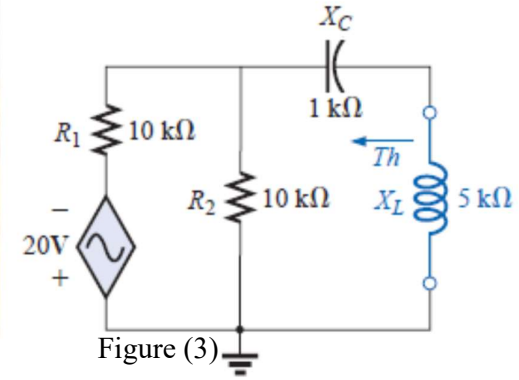

Figure (3)

Q8/ For the network of Figure (4), the current I is :

a) 9A
b) 6A
c) 0.9A
d) 0.6A

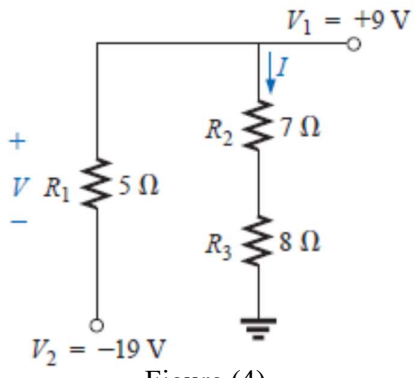

Figure (4)

Q9/ For the network of Figure (5), the Voltage across R_3 is :

a) 9V
b) 4.8V
c) 8V
d) 6.4V

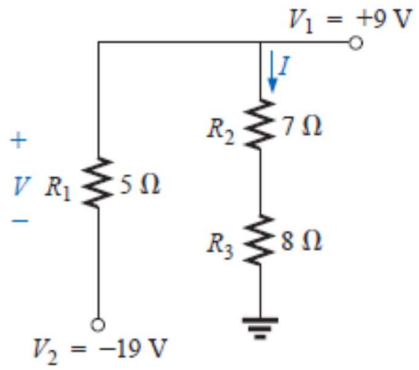

Figure (5)

Q10/ For the network of Figure (6), find the voltage across X_{L1}.

a) 30V
b) 18V
c) 60V
d) 12V

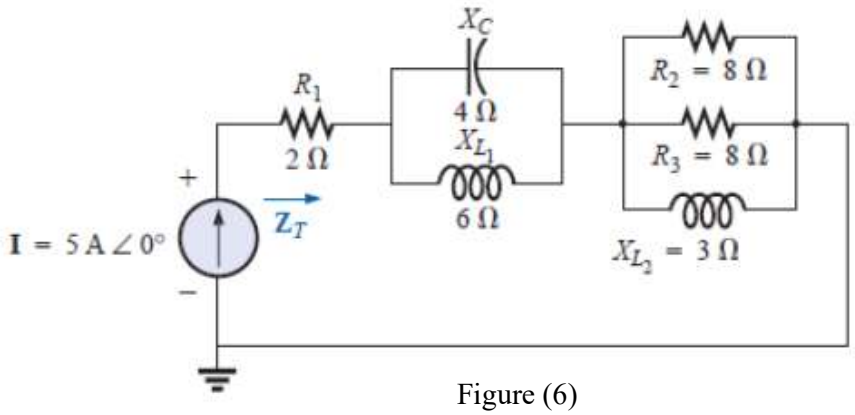

Figure (6)

Q11/ Find the bandwidth of a series resonant circuit having a resonant frequency of 6000Hz and a Qs of 15.

a) 90 kHz
b) 90 Hz
c) 400 kHz
d) 400 Hz

Q12/ In ac series RL circuit, the voltage across resistor and inductor are 3 V and 4 V respectively, then what is the applied voltage?

a) 7V
b) 5V
c) 1V
d) 4V

Q13/ In ac RC series circuit total voltage is 10V and voltage across resistor is 6V, then what is voltage across capacitor?

a) 16V
b) 4V
c) 10V
d) 8V

Q14/ In ac RLC series circuit, the voltage across resistor, inductor and capacitor are 5V, 2V and 2V respectively. Find total voltage?

a) 9V
b) 7V
c) 5V
d) 3V

Q15/ For the circuit shown in figure (7), the current I is :

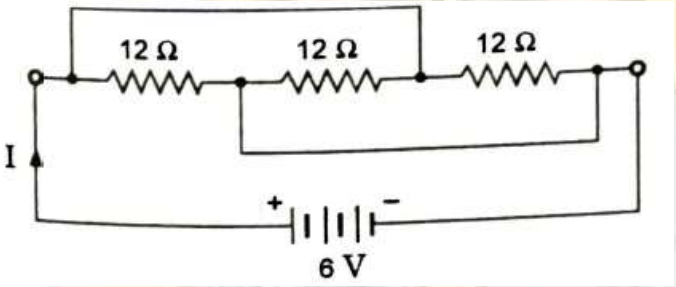

Figure (7)

a) 0.5A
b) 0.33A
c) 1.5A
d) 0.67A

Q16/ For the network in figure (8) , the value of current through 15kΩ is:

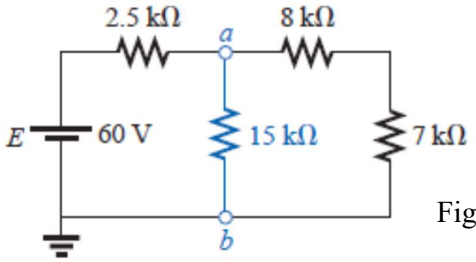

Figure (8)

a) 3 mA
b) 4 mA
c) 6 mA
d) 12 mA

Q17/ The algebraic sum of voltages around any closed path in a network is equal to:
a) Infinity
b) 1
c) 0
d) Negative polarity

Q18/ $R_1 = 1\Omega$, $R_2 = 3\Omega$, $R_3 = 5\Omega$ and $R_4 = 7\Omega$ connected in series. Total voltage = 20V, Current I, and V_2 are:

a) $I = 1.23$, $V_2 = 3.75$
b) $I = 1.25$, $V_2 = 3.75$
c) $I = 1.15$, $V_2 = 3.73$
d) $I = 1.16$, $V_2 = 3.72$

Q19/ What will be the resistance between B and C in Figure (9) when the network given below is converted into delta?

a) 8.66Ω
b) 13Ω
c) 6.5Ω
d) 7.33Ω

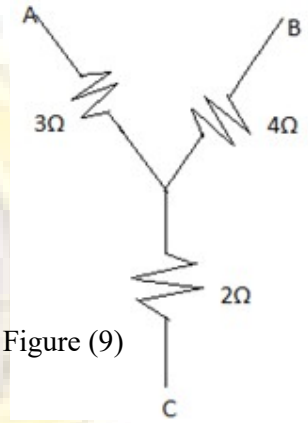

Figure (9)

Q20/ If there are n nodes, then how many node-voltage equations are required?
a) n
b) n+1
c) n-1
d) 1

Q21/ When there is a current source between two loops which method is preferred?
a) Mesh analysis
b) Supermesh
c) Nodel analysis
d) Supernode

Q22/ The practical voltage source is replaced by:
a) Voltage source in series with an impedance
b) Current source in parallel with an impedance
c) Voltage source in parallel with an impedance
d) Current source in series with an impedance

Q23/ Which element(s) has no effect in the circuit in Figure(10) ?
a) 10Ω
b) 7Ω
c) Both 7Ω and 10Ω
d) Voltage source.

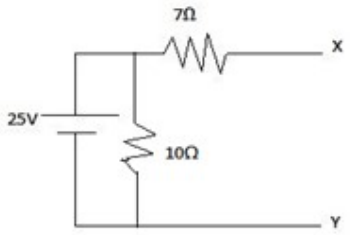

Figure (10)

Q24/ If there is a 12A current source in series with 2Ω and in parallel with a 4Ω resistor, then voltage V is:
a) 72V
b) 24V
c) 48V
d) 6V

Q25/ Find the current flowing through 4Ω resistor shown in Figure (11):

a) 1.33A
b) 2.35A
c) 2.66A
d) 1.66A

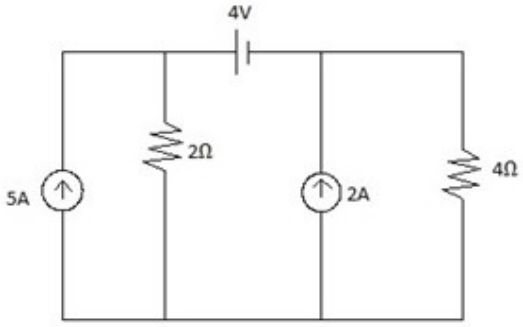

Figure (11)

Q26/ Norton's current is equal to:
a) Short circuit voltage
b) Open circuit current
c) Open circuit voltage
d) Short circuit current

Q27/ The power factor at resonance in R-L-C parallel circuits is:
a) 0
b) Unity
c) 0.8 lagging
d) 0.8 lagging

Q28/ For the circuit in Figure (12), the total power and reactive power are:

a) 1000W , 3000VAR
b) 1100W , 3800VAR
c) 900W , 2200VAR
d) 1100W , 200VAR

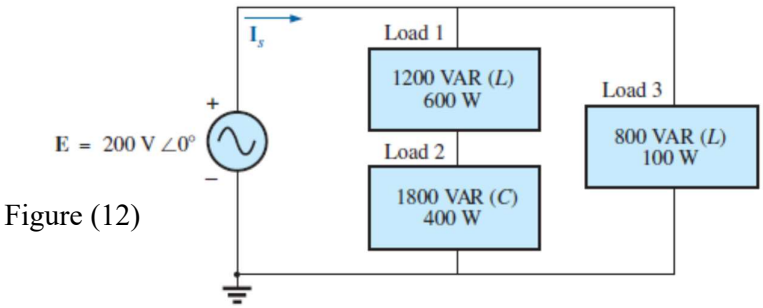

Figure (12)

Q29/ For the network in Figure (13) , to raise the power factor to unity must connect:

a) Capacitor in series with the source
b) Capacitor in parallel with the source
c) Inductor in series with the source
d) Inductor in parallel with the source

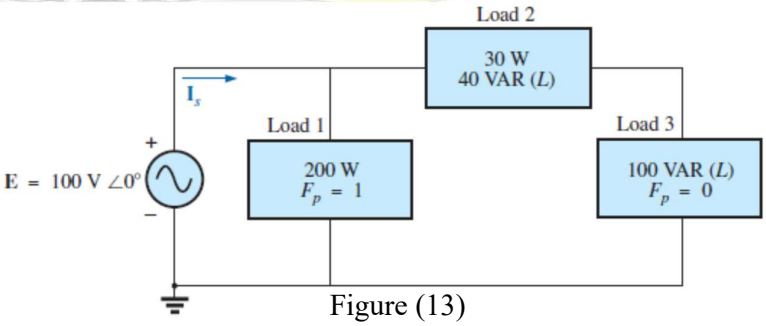

Figure (13)

Q30/ After power factor correction:

a) The source current is less than the load current
b) The source current is more than the load current
c) The source current is equal to the load current
d) The source voltage is less than the load voltage

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Mathematics

***Q1**: The derivative of the* $y = sin^{-1}(x\,e^{x})$ *at x=0 is:*

a) 0 *b)* 1 *c)* e *d)* $1/e$

***Q2**: The derivative of the* $y = [sec^{-1}(x)]^2$ *at x=2 is:*

a) $\frac{\pi}{\sqrt{3}}$ *b)* $\frac{\pi}{3}$ *c)* $\frac{2\pi}{3\sqrt{3}}$ *d)* $\frac{\pi}{3\sqrt{3}}$

***Q3**: The integral of* $\int_1^{\sqrt{3}} \frac{2}{(1+x^2)\,\tan^{-1}x}\,dx$ *is:*

a) $\ln\left(\frac{3}{4}\right)$ *b)* $2\ln\left(\frac{3}{4}\right)$ *c)* $2\ln\left(\frac{4}{3}\right)$ *d)* $\ln\left(\frac{4}{3}\right)$

***Q4**: The* $\mathrm{sech}(0)$ *is:*

a) 1 *b)* 2 *c)* $2e^2$ *d)* $\frac{2}{e^2}$

***Q5**: The integral of* $\int_0^{\pi/2} sin^3x\ cos^2x\,dx$ *is:*

a) $\frac{1}{5}$ *b)* $\frac{2}{15}$ *c)* $\frac{1}{3}$ *d)* $\frac{5}{3}$

***Q6**: If* $f(x,y,z) = x^2\,e^y + \ln(xz)$ *the* f_{xx} *at (1,1,2) is:*

a) e *b)* $2e^2$ *c)* $2e-1$ *d)* $2e^2-1$

***Q7**: the function* $u(x,y) = e^x \sin(y)$ *satisfies the Laplace equation*

a) True b) False c) sometimes at specific x and y d) illogical

***Q8**: If* $w(x,y) = x^2\,y + 3xy^4$ *,* $x = sin2t$ *and* $y = cost$ *. The* $\frac{\partial w}{\partial t}$ *at* $t = \frac{\pi}{2}$ *is:*

a) 0 *b)* $\frac{\pi^4}{8}$ *c)* 1 *d)* $\frac{8}{\pi^4}$

***Q9**: If* $w = x + 2y + z^2$ *,* $x = \frac{r}{s}$ *,* $y = r^2 + lns$ *, and* $z = 2r$ *. The* $\frac{\partial w}{\partial r}$ *at (r, s) = (1,1) is:*

a) 0 *b)* 12 *c) -11* *d) 13*

***Q10**: If* $w = x + 2y + z^2$ *,* $x = \frac{r}{s}$ *,* $y = r^2 + lns$ *, and* $z = 2r$ *. The* $\frac{\partial w}{\partial s}$ *at (r, s) = (1,1) is:*

a) 3 *b)* -1 *c) 1* *d) 0*

***Q11**: The area of the region bounded by:* $y = x^2$ *and* $y = x + 2$ *is:*

a) $\frac{9}{6}$ *b)* $\frac{9}{2}$ *c) 9* *d) 2*

***Q12**: The* $\iint_R (x+y)\,dA$ *, where R is the triangle with vertices (0,0), (1,0), (0,1) is:*

a) $\frac{2}{3}$ *b)* 3 *c) 1* *d)* $\frac{1}{3}$

***Q13**: The area of the region bounded by:* $y = x^3$ *and* $y = x$ *is:*

a) $\frac{1}{4}$ *b)* $\frac{1}{2}$ *c) 4* *d) 2*

***Q14**: The area of the region bounded by:* $y = x^2$ *and* $y = 4$ *is:*

a) $\frac{32}{3}$ *b)* $\frac{16}{3}$ *c)* $\frac{8}{3}$ *d) Not listed*

***Q15**: The $\iint_R (x+y)\,dA$, where R is the region bounded by $y=x$, $y=0$, $x=2$ is:*

a) $\frac{1}{4}$ *b)* 8 *c)*4 *d)*$\frac{1}{8}$

Q16: The differential equation $\frac{dy}{dx}+\frac{1}{x}y=2xy$ is:

a. Separable equation
b. Exact equation
c. Bernoulli's equation
d. Linear equation

Q17: The solution of the differential equation $y''+2y'+y=0$ is:

a. $y=c_1e^{x}+c_2e^{x}$
b. $y=c_1e^{-x}+c_2e^{x}$
c. $y=c_1e^{x}+c_2xe^{x}$
d. $y=c_1e^{-x}+c_2xe^{x}$

Q18: The differential equation $xdy+(y-xy^3sinx)dx=0$ is:

a. Separable equation
b. Exact equation
c. Bernoulli's equation
d. Linear equation

Q19: Which of the following satisfies the differential equation $y''+y=2cosx$

a. $xsinx$
b. $xcosx$
c. $sinx$
d. $cosx$

Q20: The homogeneous differential equation that has the solution $y(x)=2e^{-x}+5e^{x}$ is:

a. $y''-y=0$
b. $y''+y=0$
c. $y''-y'=0$
d. $y''+y=0$

Q21: The inverse of the matrix $A=\begin{bmatrix}-2 & 3\\ -1 & 2\end{bmatrix}$ is:

a. $\begin{bmatrix}2 & 3\\ -1 & -2\end{bmatrix}$
b. $\begin{bmatrix}-2 & 3\\ -1 & 2\end{bmatrix}$
c. $\begin{bmatrix}-2 & -3\\ 1 & 2\end{bmatrix}$
d. $\begin{bmatrix}-2 & -3\\ -1 & -2\end{bmatrix}$

Q22: If A is a 2x2 matrix and B is a 2x1 matrix then the solution of the equation $AX=B$ is:

a. $X=B/A$
b. $X=B.A^{-1}$
c. $X=A^{-1}.B$
d. None of the above

Q23: The determinant of the matrix $A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & -2 & 0 & 0 \\ -1 & 4 & 3 & 0 \\ 3 & 1 & -3 & 4 \end{bmatrix}$ is:

a. -24
b. 24
c. 20
d. -20

Q24: The Fourier series expansion of the function f(t) in the interval (-L, L)?

a) $\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n cos(\frac{n\pi t}{L}) + \sum_{n=1}^{\infty} b_n sin(\frac{n\pi t}{L})$
b) $a_0 + \sum_{n=1}^{\infty} a_n cos(\frac{n\pi t}{L}) + \sum_{n=1}^{\infty} b_n sin(\frac{n\pi t}{L})$
c) $\frac{a_0}{2} + \sum_{n=0}^{\infty} a_n cos(\frac{n\pi t}{L}) + \sum_{n=0}^{\infty} b_n sin(\frac{n\pi t}{L})$
d) $a_0 + \sum_{n=0}^{\infty} a_n cos(\frac{n\pi t}{L}) + \sum_{n=0}^{\infty} b_n sin(\frac{n\pi t}{L})$

Q25: If the function $f(t)$ is even, then which of the following Fourier coefficients is zero?

a) a_n and a_0
b) b_n
c) a_0
d) b_n and a_0

Q26: If the function $f(t) = t \ (-1 < t < 1)$, then the coefficient a_0 is:

a) 1
b) $\frac{1}{2}$
c) 0
d) None of the above

Q27: The integral $\int_{-L}^{L} f(t)dt = \int_{0}^{L} f(t)dt$ if:

a) $f(t)$ is an odd function
b) $f(t)$ is an even function
c) $f(t)$ is neither even nor odd function
d) None of these

Q28: The Fourier transform of the function $f(t) = 2rect(2t)$ is

a) $sinc(0.25\omega)$
b) $4sinc(\omega)$
c) $4sinc(0.25\omega)$
d) $sinc(\omega)$

Q29: The inverse Fourier transform of $F(\omega) = 3$ is:

a) $3\delta(t)$
b) $3\delta(3t)$
c) $\delta(t)$
d) 0

Q30: The Fourier transform of the function $f(t) = t\,e^{-a}\ \ a > 0$ is

a) $\frac{1}{(a-j\omega)^2}$

b) $\frac{1}{(a-\omega)^2}$

c) $\frac{1}{(a+j\omega)^2}$

d) $\frac{1}{(a+\omega)^2}$

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Electrical Networks

1. The s-domain equivalent of the capacitor reduces to a capacitor with impedance is:
   a) sC
   b) C
   c) 1/C
   d) 1/sC

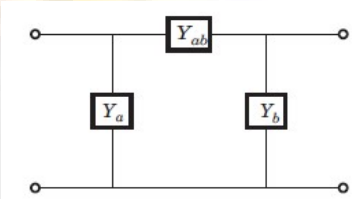
2. *The series circuit shown in figure below, if the current is defined as the response signal of the circuit, the transfer function is*

a) $\frac{sC}{(\frac{R}{L})s+\frac{1}{LC}}$

b) $\frac{1}{Rs^2+(\frac{Rc}{L})s+\frac{1}{LC}}$

c) $\frac{1}{R+sL+\frac{1}{sC}}$

d) $\frac{RC}{Ls^2+(\frac{Rc}{L})s}$



3. *In a certain low-pass filter, f_c = 3.5 kHz. The band will be pass:*
   a) 0 Hz to 3.5 kHz
   b) 0 Hz
   c) 3.5 kHz
   d) 7 kHz

4. *The network which modeled by the π-equivalent circuit in figure below, [y] parameters equal:*

a) $\begin{bmatrix} Y_a + Y_{ab} & -Y_{ab} \\ -Y_{ab} & Y_b + Y_{ab} \end{bmatrix}$

b) $\begin{bmatrix} Y_a - Y_{ab} & Y_{ab} \\ Y_{ab} & Y_b - Y_{ab} \end{bmatrix}$

c) $\begin{bmatrix} Y_{ab} - Y_a & Y_{ab} \\ Y_{ab} & Y_{ab} - Y_a \end{bmatrix}$

d) $\begin{bmatrix} Y_a - Y_{ab} & -Y_{ab} \\ -Y_{ab} & Y_b - Y_{ab} \end{bmatrix}$

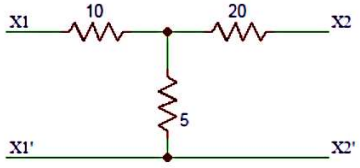
5. *The current through an RL series with input voltage v(t) is given in the s-domain as:*

a) $V(s)(R+sL)$
b) $\frac{V(s)}{R+sL}$
c) $\frac{V(s)}{R}$
d) $\frac{V(s)}{R+\frac{1}{sL}}$

6. *For a T shaped network, if the Short-circuit admittance parameters are y_{11}, y_{12}, y_{21}, y_{22}, then y_{11} in terms of Transmission parameters can be expressed as*

a) $\frac{D}{B}$
b) $\frac{D-C}{B}$
c) $\frac{D}{B-A}$
d) $\frac{B}{D}$

7. *In the circuit shown in figure below, the z-parameter Z_{12}*

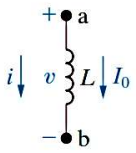


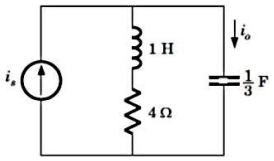
a. *1*
b. *5*
c. *10*
d. *15*

8. *In a series resonance circuit if bandwidth is 1 MHz and inductance is 1 mH. What is the power factor?*

a. 0.1
b. 1
c. 0.85
d. 0.9

9. The s-domain representation for the current in the circuit below is:





a. $\frac{1}{C}\int_0^t -idx + V_o$
b. $\frac{V}{sL} + \frac{I_o}{s}$
c. $\frac{I}{sC} + \frac{V_o}{s}$
d. $sCV + CV_o$

10. What is the ratio of the transfer function I_o/I_s in the circuit below?

A. $s(s+4)/(s^2+3s+4)$ B. $s(s+4)/(s+1)(s+3)$
C. $(s^2+3s+4)/\ s(s+4)$ D.$(s+1)(s+3)/s(s+4)$

11. How much inductance is needed to resonate at 5 kHz with a capacitance of 12 nF?

a) 2,652 H
b) 11.844 H
c) 3.333 H
d) 84.43 mH

12. The difference between the half-power frequencies is called the:

a) quality factor
b) resonant frequency
c) bandwidth
d) cutoff frequency

a)

13. In a series RLC circuit, which of these quality factors has the steepest magnitude response curve near resonance?
(a) Q=20
(b) Q=12
(c) Q=8
(d) Q=4

14. When the elements of an RLC circuit are both magnitude-scaled and frequency-scaled, which quality is unaffected?
a) Resistor
b) resonant frequency
c) bandwidth
d) quality factor

15. The impedance in the s-domain is defined as the ratio of the
a) the current transform to the voltage transform under zero initial conditions
b) the voltage transform to the current transform under zero initial conditions
c) the voltage transform to the impedance transform under zero initial conditions
d) the current transform to the impedance transform under zero initial conditions

16. In determining open circuit impedance parameters, among V1, V2, I1, I2, which of the following are dependent variables?
a) V_1 and V_2
b) I_1 and I_2
c) V_1 and I_2
d) I_1 and V_2

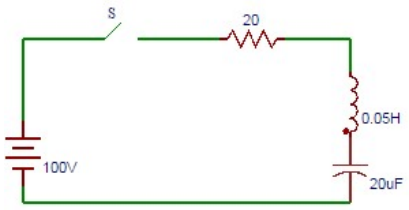
17. Which of the following expression is true in case of open circuit parameters?
a) $V_1 = Z_{11} V_1 + Z_{12} I_2$
b) $V_1 = Z_{11} I_1 + Z_{12} V_2$
c) $V_1 = Z_{11} I_1 + Z_{12} I_2$
d) $V_2 = Z_{11} I_1 + Z_{12} I_2$

18. The hybrid parameter h_{11} is called
    a) short circuit input impedance
    b) short circuit forward current gain
    c) open circuit reverse voltage gain
    d) open circuit output admittance

19. If the roots of an equation are complex conjugate, then the response will be?
    a) over damped
    b) critically damped
    c) damped
    d) under damped

20. If the roots of an equation are real and equal, then the response will be?
    a) over damped
    b) damped
    c) critically damped
    d) under damped

21. The voltage across the inductor at t = 0 in the circuit shown below.



    a) 50
    b) 100
    c) 150
    d) 200

22. From the circuit shown below, find the value of current in the loop.

    a) (V/R)/(s+1/RC)
    b) (V/C)/(s+1/R)

c) (V/C)/(s+1/RC)
d) (V/R)/(s+1/R)

23. The voltage across the resistor in the circuit shown below is?

a) $Ve^{t/R}$
b) $Ve^{-t/RC}$
c) $Ve^{-t/R}$
d) $Ve^{t/R}$

24. The expression of power (P_1) at lower half power frequency is?
a) $(I^2_{max}R)/8$
b) $(I^2_{max}R)/4$
c) $(I^2_{max}R)/2$
d) $I^2_{max}R$

25. At upper half power frequency, the expression for power (P_2) is?
a) $I^2_{max}R$
b) $(I^2_{max}R)/2$
c) $(I^2_{max}R)/4$
d) $(I^2_{max}R)/8$

26. The resistance element _____ while going from the time domain to frequency domain.
a) increases exponentially
b) increases
c) decreases
d) does not change

27. The expression of ωr in a parallel resonant circuit is?
a) $1/(2\sqrt{LC})$
b) $1/\sqrt{LC}$
c) $1/(\pi\sqrt{LC})$
d) $1/(2\pi\sqrt{LC})$

28. Find the Laplace transform of ramp function r (t) = t.
    a) 1/s
    b) $1/s^2$
    c) $1/s^3$
    d) $1/s^4$

29. What is the filter type when both the capacitor and the inductor have finite impedances in the frequency region between $w=0$ and $w=\infty$?
a) Low pass filter
b) High pass filter
c) Band stop filter
d) Band pass filter

30. In a series resonant band-pass filter, a lower value of Q results in…….?
a. a higher impedance
b. a smaller bandwidth
c. a higher resonant frequency
d. a larger bandwidth

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Electrical Machines

Q1: A series motor has an armature resistance of (0.2 Ω) and a series field resistance of (0.3 Ω). It is connected to a (240 V) supply and at a particular load runs at (1440 r.p.m) when drawing (15 A) from the supply
(a) Determine the back e.m.f at this load.

A. 133 V
B. 232.5 V
C. 300.6 V
D. 212 V

Q2: A D.C motor has a speed of (900 r.p.m) when connected to a (460 V) supply. Find the approximate value of the speed of the motor when connected to a (200 V) supply, assuming the flux decreases by (30%) and neglecting the armature volt drop?

A. 559 r.p.m
B. 750 r.p.m
C. 1200 r.p.m
D. 500 r.p.m

Q3: A Six pole D.C generator, duplex lap winding has has an armature containing 66 slots, in each of which are 12 conductor, if the flux in each pole 0.0218 wb and armature speed 870 r.p.m . determine the generated voltage

A 62.58 volt
B 250.34 volt
C. 125.17 volt
D. 300 volt

Q4: To achieve generator used For high output current, is used

A. wave winding
B. lap winding
C. compound winding
D. none of the above

Q5: A 220V DC shunt motor draws 10A at 1800rpm. The armature resistance is 0.2Ω and field winding resistance is 440Ω. Calculate electromagnetic torque?

A. 11 N.M
B. 22 N.M
C. 9 N.M
d. 12 N.M

Q6: single phase transformer has 500 turns in the primary and 1200 turns in the secondary. The cross-sectional area of the core is 80 cm^2. If the primary winding is connected to a 50 Hz supply at 500 V, calculate (i) Peak flux-density

A. 0.433 tesla
B. 0.563 tesla
C. 0.004 tesla
d. 0.2 tesla

Q7. In shunt motor, the armature current equal to

A. $I_a = I_{se} = I_L$
B. $I_a = I_L - I_{se}$
C. , $I_a = I_{se} + I_L$
D. None of above

Q8. The series motor is characterized by

A. High starting torque
B. High regulation voltage
C. none of above
D. Low starting torque

Q9. The armature resistance of the dc generator is

A .high resistance
B. low resistance
C. zero
D. infinity

Q10. Voltage terminal of a dc Motor is

A. $V_t > E_b$
B. $V_t < E_b$
C. $V_t = E_b$
D. none of above

Q11. In step up transformer, the transformer ratio (K) is

A. greater than one
B. Smaller than one
C. equal to one
D. equal to zero

Q12. One of elements of dc machines used for holds the magnetic pole cores of the generator and acts as cover of the generator is

A. Armature
B. Yoke
C. Poles
D. Commutator

Q13. A 6 pole lap wound DC generator has 720 conductors and a flux of 80 mrm Wb per pole is driven at 1000 RPM. Find the generated EMF?

A.960 V B. 1000 V

C. 1880 V D. 1882 V

Q14. A 6 pole machine has an armature with 720 conductors and runs at 1000 RPM. Flux per pole is 0.05wb. Determine the Induced EMF if winding is lap

A.600 V B. 1800 V

C. 400 V D. 350 V

Q15. Characteristic that gives the relation between generated e.m.f on no load and field current is called

A.internal characteristic
B. external characteristic
C. Open circuit characteristic
D. regulation characteristic

Q16/ The starting torque of a 3-phase induction motor is ..... supply voltage.
(1) independent of
(2) directly proportional to
(3) directly proportional to square of
(4) inversely proportional of

Q17/ A 3-phase induction motor is running at 5% slip. If the input to rotor is 2000 W, then mechanical power developed by the motor is .....
(1) 20 W
(2) 980 W
(3) 500 W
(4) 200 W

Q18/ The nameplate of a single-phase, 4-pole induction motor gives the following data : Output 373 W; 230 V; 50 Hz Input current 2.9 A ; Power factor 0.71 Speed 1410 r.p.m. The full-load slip of the motor is……and the efficiency of the motor…….
(1) 6% , 78.7%.
(2) 2 %, 65.3%

(3) 4% , 70.6%
(4) 3 % , 89.2%

Q19/ A 500 kVA, 1100 V, 50 Hz, Y-connected, 3-phase alternator has armature resistance of 0.1 Ω/phase and synchronous reactance/phase of 1.5Ω. The generated e.m.f. per phase is ……
(1) 769.2 V
(2) 832.6 V
(3) 692.4 V
(4) 935.5 V

Q20/ A 3-phase, 60 Hz, 15 H.p., 460 V, 4-pole, 1728 r.p.m. induction motor delivers full output power to a load connected to its shaft. The windage and friction loss of the motor is 750 W. The rotor copper loss is…….
(1) 297.5 W
(2) 397.5 W
(3) 497.5 W
(4) 597.5 W

Q21/ A 4-pole, 250 W, 110 V, 60 Hz, capacitor-start induction motor takes a full load line current of 3.5 A at 1760 r.p.m. if the efficiency of the motor is 64% , the power factor is ……
(1) 0.64 lag
(2) 0.74 lag
(3) 0.64 led
(4) 0.74 led

Q22/ The relation among synchronous speed (N_s), rotor speed (N) and slip (S) is
(1) N= N_s (s-1)
(2) N= N_s (1-s)
(3) N= N_s (1+s)
(4) N= sN_s

Q23/ A 3-phase, 4-pole, 50 Hz, induction motor. At full-load delivers 120 N.m torque at 0.03 slip. if the total stator losses are 10% of output power and mechanical losses are 1% of output power. The motor efficiency is…….. .
(1) 86.3%.
(2) 87.3%
(3) 88.3%

(4) 89.3%

Q24/ A 2 MVA, 3-phase, 8-pole alternator runs at 750 r.p.m and operates in parallel with other machines on 6000 V bus-bars. the synchronous reactance of the machine is 4Ω/phase. what the synchronising power and synchronising torque per mechanical degree of rotor displacement at no-load ?
(1) 528.644 kw, 8000 N.m /mech. degree .
(2) 628.644 kw, 8000 N.m /mech. degree .
(3) 728.644 kw, 7000 N.m /mech. degree .
(4) 828.644 kw, 7000 N.m /mech. degree .

Q25/ A 2 MVA, 3-phase, 8-pole, synchronous generator runs at 750 r.p.m and operates in parallel with other machines on 6000 V bus-bars, the synchronous reactance of the machine is 6Ω/phase. The synchronising power on full-load at p.f. 0.8 lagging per mechanical degree of displacement is……
(1) 608.6 KW
(2) 618.6 KW
(3) 628.6 KW
(4) 638.6 KW

Q26/ The per phase d.c. armature resistance of synchronous generator is 0.5 Ω. The effective a.c. armature resistance would be about……
(1) 0.5 Ω
(2) 0.75 Ω
(3) 4 Ω
(4) 0.25 Ω

Q27/ A single-phase induction motor employs ..... rotor.
(1) squirrel cage
(2) wound
(3) either squirrel cage or wound
(4) none of the above

Q28/ For the same rating, the size of a single- phase induction motor is about that of a 3-phase induction motor.
(1) 3 times
(2) 1.5 times
(3) less than
(4) 0.33 times

Q29/ A 50 Hz, 4-pole, single-phase induction motor will have a synchronous speed of
(1) 1500 r.p.m.
(2) 1200 r.p.m.
(3) 750 r.p.m.
(4) none of the above

Q30/ In split-phase induction motor, the main winding has…….
(1) high resistance and high inductance
(2) high resistance and low inductance
(3) low resistance and high inductance
(4) low resistance and low inductance

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Electrical Power Systems

1. The mathematical model of a **hydro-electric** power plant is:
a) Number of atoms divided by number of fissions
b) Fuel burn is multiplied by its calorific value
c) The acceleration due to gravity times discharge water times height times efficiency
d) None of anyone above

2. In the process of generating electrical power, the utilization factor refers to:
a) Maximum load divided by installed capacity
b) Average load divided by installed capacity
c) Output divided by input
d) Average load divided by maximum load

3. The **power factor** can be represented mathematically as:
a) The tan of angle
b) The sine of angle
c) The cosine of angle
d) The hyperbolic sine of angle

4. The material that used for made the **insulators** of overhead lines is:
a) Wood
b) Rubber
c) Plastic
d) Porcelain or toughened glass

5. Using the bundle system in the transmission line has many advantages:
a) Reduce the inductance of the line, which is reduce the line losses and improve system stability
b) Reduce the corona losses
c) Reduce the radio interference
d) All the above

6. Transmission lines can be classified due to its length to:

a) Short line model, medium line model and long line model
b) Resistance, inductance and capacitance
c) Active power, reactive power and apparent power
d) (Suspension or underground cables), (single or three phase) and (AC or DC transmission)

7. A three-phase transmission line formed equilateral triangle with 1.956 cm diameter conductor of each phase, the **corona** takes place if the line voltage exceeds 210 kV (disruptive voltage). Find the spacing (d) between the conductors.
Hint: the air density factor (δ) is 1 and the irregularity factor (mo) is 1

a) d= 138.9 cm
b) d= 238.9 cm
c) d= 338.9 cm
d) d= 438.9 cm

8. There are different types of **underground cables** for example:

a) Solid type cables
b) Oil-filled cables
c) Pressurized cables
d) All the above

9. If the declared voltage is 230 v, what are the limits of highest and lowest voltage provided to the consumers in a good **distribution** system?

a) The highest voltage = 243.8 v, the lowest voltage = 216.2 v
b) The highest voltage = 240 v, the lowest voltage = 220 v
c) The highest voltage = 253.8 v, the lowest voltage = 206.2 v
d) The highest voltage = 250v, the lowest voltage = 210v

10. If a two-wire (conductor) DC **distribution** cable is 600 m long, the resistance of each conductor is 0.01 Ω per 1 km. Calculate the resistance of all the cables.

a) 0.006 Ω
b) 0.008 Ω
c) 0.010 Ω
d) 0.012 Ω

11- Buses for load flow studies are classified as load bus, generator bus ,and slackbus. The correct combination of the pair of quantities specified having their usual meaning for different buses, is

	Load bus	Generator bus	Slack bus
a)	P,|V|	P,Q	P, δ
b)	P,Q	P,|V|	|V|,δ
c)	|V|,Q	P, δ	P ,Q
d)	P, δ	Q,|V|	Q, δ

12-Current limiting reactor is used in power system in order to use …….rating circuit breaker.
a) higher b) lower c) full d) none of these

13- A generator has a rating of 10 MVA, 5 kV has a reactance of 0.02 pu. Find the reactance at a new base values of 50 MVA, 10 kV? a) 0.02 b) 0.025 c)0.05 d)0.25

14-The primary protection for alternator in case of line to line fault is
a)distance protection b)over current protection c)differential protection d)none of these

15- The time of backup protection is ……. the time of primary protection.
a) more than b) less than c) equal to

16-For 800 MJ stored energy in the rotor at synchronous speed, what is the inertia constant H for a 50 Hz, four pole turbo generator rated 100 MVA, 11 kV?
a) 2 MJ/MVA b) 4 MJ/MVA c) 6MJ/MVA d) 8MJ/MVA

17-Self admittance and matual admittance elements of
a) Zbus matrix b) Ybus matrix c) Jacobain matrix d) none of the above

18-Find the relation between sub transient (X"),transient (X') and synchronous reactance (X) ?
a) X > X' > X" b) X" < X' > X c) X" > X' < X d) X"> X'> X

19-The method of neutral grounding affects the
a) positive sequence network b) negative sequence network
c) zero sequence network d) all of the above

20- Neutral current for a balance three phase star connected load equal to
a)Iao b) Iao + Ibo +Ico c)zero d) none of these

21- A full-wave fully controlled bridge has a highly inductive load with a resistance of 55 Ohm, and a supply of 110V at 50Hz. The value of load power for a firing angle α=75° is
A. 10W B. 11W C. 10.5W D. 10.9W

22- Thermal runaway is not possible in FET because as the temperature of FET increases
A. The mobility decreases B. The transconductance increases C. The drain current increases D. None of the above

23- In a full-wave rectifier using two ideal diodes,Vdc & Vm are the dc & peak values of the voltage respectively across a resistive loaD. If PIV is the peak inverse voltage of the diode,then the appropriate relationships for the rectifier is
A. Vdc=Vm/π,PIV=2Vm
B. Vdc=2Vm/π,PIV=2Vm
C. Vdc=2Vm/π,PIV=Vm
D. Vdc=Vm/π,PIV=Vm

24- If a half wave rectifier is used with 165Vpk AC input, the effective dc output voltage is
A. considerably less than 165V
B. slightly less than 165V
C. exactly 165V
D. slightly more than 165V

25- The average output voltage(Vdc) of the full wave diode bridge rectifier is
A. Vm/2 B. 2Vm/pi C. 3Vm/pi D. 4Vm/pi

26- In the 3 phase inverter circuit shown, the load is balanced and the gating scheme is 180 degree conduction mode. All the switching devices are ideal , Vd = 300V If the dc bus voltage Vd = 300v, the power consumed by 3 phase load is
A. 1.5kW B. 2.0 kW C. 2.5 kW D. 3.0 kW

27- The power electronic converter shown in the figure has a single pole double throw switch. the pole P of the switch is connected alternately to throws A and B. The converter shown is a
A. Step down chopper(buck converter)
B. Half- wave rectifier
C. Step Up chopper (boost converter)
D. full wave converter

28- If the output voltage of a bridge rectifier is 100V, the PIV of diode will be
A. 100 * Square root(2) V B. 200/(pi) V C. 100 * (pi) V D. 100/2 V
HINT:-Peak inverse voltage = max secondary voltage = Vdc= 2Vm/pi = 100 Vm = 100 * pi/2

29-An SCR is considered to be a semi-controlled device because
A. It can be turned OFF but not ON with a gate pule
B. It conducts only during one half-cycle of an alternating current wave
C. It can be turned ON but not OFF with a gate pulse
D. It can be turned ON only during one half-cycle of an alternating voltage wave

30- A three phase fully controlled thyristor bridge converter is used as line commutated inverter to feed 50KW power at 420V DC to a three phase 415V(line), 50Hz as mains. Consider Dc link current to be constant. The rms current of the thyristor is
A. 119.05A B. 79.37A C. 68.73A D. 39.68A

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Electronics

Q1: By what factor does an audio level change if the power level changes from 4W to 4096W?

A) 2
B) 4
C) 6
D) 8

Q2: The input power to a device is 10000W at 1000V. The output power is 500W, and the output impedance is 100Ω. Find the voltage gain in decibels.

A) −30.01dB
B) −20.0 dB
C) −13.01 dB
D) −3.01dB

Q3: A change in frequency by a factor of --------- is equivalent to 1 octave.

A) 2
B) 5
C) 10
D) 20

Q4: For the low frequency response of BJT amplifier, the maximum gain is at:

A) $R_B = 0\Omega$
B) $R_C = 0\Omega$
C) $R_E = 0\Omega$
D) None of the above

Q5: A 3-dB drop in h_{fe} will occur at a frequency defined by:

A) f_{∞}
B) f_{β}
C) 1
D) 2

Q6: Two stages have voltage gains of 100 and 200. The total decibel voltage gain is:

A) 46 dB
B) 66 dB
C) 86 dB
D) 106 dB

Q7: If the power gain doubles, the decibel power gain increases by:

A) A factor of 2
B) 3 dB
C) 6 dB
D) 10 dB

Q8: A certain amplifier has a bandwidth of 22.5KHz with a lower cut-off frequency of 600Hz. What is the value of upper cut-off frequency?

A) 600Hz
B) 22.5KHz
C) 23.1KHz
D) 21.9KHz

Q9: The main advantage in using a three Op-Amp instrumentation amplifier over a single Op-Amp differential amplifier lies in:

A) higher values of CMRR.

B) lower noise figure.

C) elimination of the need for accurate matching of resistors.

D) simplicity of gain adjustment.

Q_{10}: Which factor determines the output voltage of an op-amp?

A) Positive saturation

B) Negative saturation

C) Both positive and negative saturation voltage

D) Supply voltage

Q_{11}: Find the input voltage of an ideal op-amp. It's one of the inputs and output voltages are 2v and 12v. (Gain=3).

A) 8v

B) 4v

C) -4v

D) -2v

Q_{12}: The output voltage of an op-amp circuit is always ___ the level of the power supply.

A) larger than

B) the same as

C) smaller than

D) None of the above

Q_{13}: A voltage summing amplifier has:

A) several inputs and several outputs

B) several inputs and one output

C) one input and several outputs

D) one input and one output

Q14: An operational amplifier has a ___ input impedance and a ___ output impedance.

A) high, low
B) high, high
C) low, low
D) low, high

Q15: What is the voltage difference between the input terminals of an op-amp in normal operation?

A) Virtually zero
B) 5 V
C) 15 V
D) 22 V

Q16: The chosen transition from a state in a sequential circuit is controlled by _____

A) The state of the circuit
B) One or more combinational inputs
C) The number of states in the state diagram
D) Name of the next state

Q17: The architecture whose next state depends both on input and current state is _____.

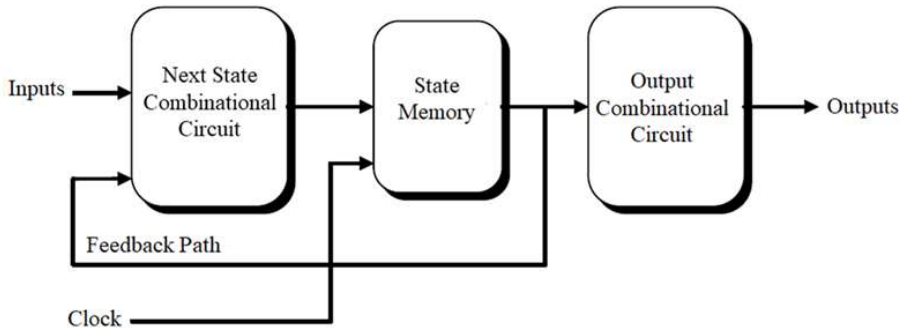
A) Mealy machine
B) Moore machine
C) Both Mealy and Moore machines
D) Neither Mealy nor Moore machine

Q18: The state machine described in figure shown below is a _____.

A) Mealy machine
B) Moore machine.

C) Mealy and Moore machine hybrid

D) Neither a Mealy nor Moore machine



Q19: A hardware implementation of a state machine containing 19 states will require _____ flip-flops.

A) 3

B) 4

C) 5

D) 6

Q20: The assigned state table shown below describes the operation of _____.

A) Mealy machine

B) Moore machine.

C) Hybrid Mealy and Moore machine hybrid

D) Neither a Mealy nor Moore machine

Present State	Next State		Output z	
	$x = 0$	$x = 1$	$x = 0$	$x = 1$
S_0	S_0	S_1	0	0
S_1	S_0	S_2	0	0
S_2	S_0	S_2	0	1

Q21: The state table of a finite state machine shown below has _____.

A) One redundant state.

B) Two redundant states.

C) Three redundant states.

D) Four redundant states.

Present State	Next State		Output z
	$x = 0$	$x = 1$	
A	A	B	0
B	C	F	0
C	C	B	0
D	A	G	0
E	E	H	1
F	D	E	0
G	E	G	1
H	G	H	1

Q22: In analog to digital converter (ADC) circuits, the input signal is sampled and then must be held constant until the next sample occurs. The reason for this is to:

A) Reduce the DC power dissipation in the circuit.

B) Minimize the ADC integrated circuit size.

C) Allow sufficient time required to process the sampled value.

D) None of the above.

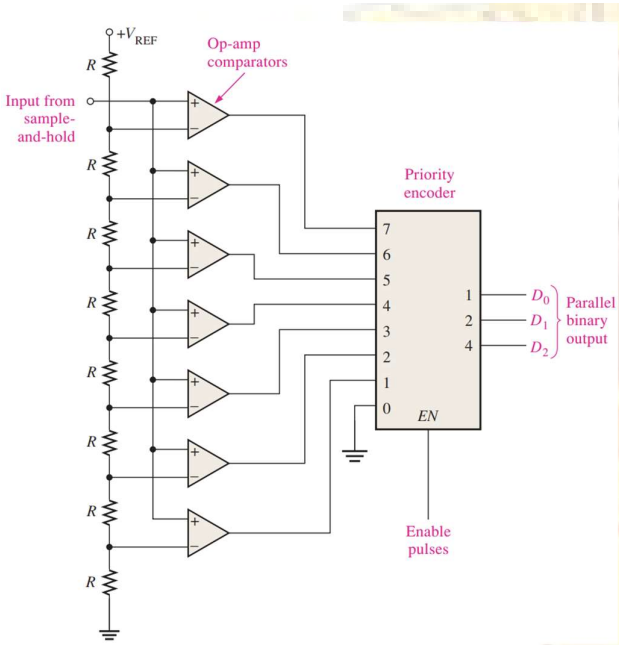
Q23: Determine the binary code output of a 3-bit analog to digital converter (ADC) circuit shown below, assume that $V_{REF} = 8\,V$ and $V_{in} = 6.5\,V$.

A) 101

B) 111

C) 110

D) 100



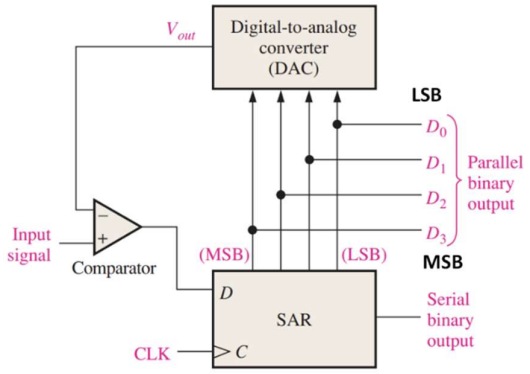
Q24: Determine the conversion time for Successive-Approximation- analog to digital converter (ADC) converter shown below with a clock frequency is 1MHz.

A) 1µsec

B) 2µsec

C) 4µsec

D) 5µsec



Q25: What is the largest value of output voltage from a 6-bit Binary-Weighted digital to analog converter (DAC) that produces 1.0V for a digital input of 010110?

A) 5.1V

B) 0.44V

C) 2.7V

D) 3.2V

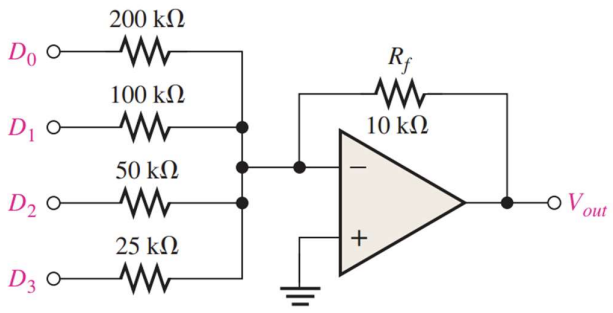
Q26: Determine the output voltage of the Binary-Weighted digital to analog converter (DAC) converter shown in the figure below, if the 4-bit digital code input is 1010. Assume that the data inputs have a low value of 0 V and a high value of +5 V.

A) 2.25V

B) -2.5V

C) 2.5V

D) –7.5V



Q27: Assume that a 6-bit digital to analog converter (DAC) with a full-scale output of 10.5V, determine the digital input that is equivalent to 6V output voltage.

A) 101010

B) 001100

C) 100011

D) 100100

Q28: Solid State Drive (SSD) is a type of storage device that uses integrated circuits to store data as can be described by:

A) It is a non-volatile memory built typically with NAND flash.

B) It is a volatile memory built typically with NAND flash.

C) It is a volatile memory built typically with magnetic film.

D) All of the above.

Q29: The total bit capacity of a ROM that has 14 address lines and 8 data outputs is:

A) 2kB

B) 4kB

C) 8kB

D) 16kB.

Q30: Static RAM (SRAM) memories can be compared with Dynamic RAM (DRAM) memories as follows:

A) SRAMs are faster, simple to implement but require refreshing circuitry.

B) SRAMs are faster, difficult to implement, and no refreshing circuitry is required.

C) SRAMs are slower, simple to implement, and no refreshing circuitry is required.

D) SRAMs are slower, difficult to implement and require refreshing circuitry.

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Communications

1-Quadurature Amplitude Modulation (QAM) is a process by which the wave signal is transmitted by modulating the .
a) amplitude of the signal
b) b) frequency of the signal
c) c) phase of the signal
d) d) amplitude and phase of the signal

2-Which modulation consists of both lower and upper sidebands only
a) AMDSB-SC b)AMVSB c) AMSSB-SC d)AMDSB-LC

3-What is the standard form of QAM
a) Quality AM
b)Quadrature amplitude modulation
c) Quadrature analoge modulation
d) none of the above

4-Demodulation is done at _____ side.
a) Transmitter b) Receiver c) Channel d) Both a and b

5-AM spectrum consists of _____
a) Carrier frequency b) Upper sideband c) Lower sideband d) Carrier frequency with both upper and lower sideband

6-What is the bandwidth of a FM wave when maximum allowed deviation is 50KHz and the modulating signal has a frequency of 15KHz?
a) 130 KHz b) 260 KHz c) 65 KHz d) 50 KHz

7-Armstrong method is used for the generation of
a) Direct FM b) Indirect FM c) AMSSB-SC d) AMDSB-SC

8-The modulation index of FM is given by
a) $\beta = \Delta f / fm$ b) $m = \beta = fm/ \Delta f$ c) $m = fm/ fc$ d) $m = fc / fm$

9- 100MHz carrier is frequency modulated by 5 KHz wave. For a frequency deviation of 100 KHz, calculate the carrier swing of the FM signal.
a) 2000 KHz b) 100 KHz c) 105 KHz d) 200 KHz

10-TDM requires
a) Constant data transmission
b) Transmission of data samples
c) Transmission of data at random
d) Transmission of data of only one measured

11-In base band signal the frequency range of amplitude modulation is around _____
a) 550KHz-1650KHz b) 500KHz-1600KHz
c) 520 KHz-1620KHz d) 400 KHz-1650KHz

12-In which case the step size is not fixed?
a) Pulse Code Modulation b) Delta Modulation
c) Differential Pulse Code Modulation d) Adaptive Delta Modulation

13-A periodic signal is of _____ pattern with respect to time.
a) Repetitive b) Nonrepetitive c) Alternative d) None of the above

14-Which type of modulators are used in AM wave generation?
a) Square law modulator b) Switching modulator
c) Triangular modulator d) Both a and b

15- An AM signal $\varphi AM(t)= [20 + 4 \sin (500\pi t)] \times \cos(200000\pi t)$. The modulation percentage is
a) 20%; b) 40%; c) 60%; d) 80%;

16- A non-anticipative system is a
(a) memoryless system
(b) memory system
(c) causal system
(d) non-causal system

17- The output signal when a signal $x(n) = (0,1,2,3)$ is processed through a 'Delay' system is?

(a) (3,2,1,0)
(b) (1,2,3,0)
(c) (0,1,2,3)
(d) (3,2,0,1)

18- What is the Z-transform of the following finite duration signal ?

x(n)={2,4,5,7,0,1}?
↑

(a) $2 + 4z + 5z^2 + 7z^3 + z^4$
(b) $2 + 4z + 5z^2 + 7z^3 + z^5$
(c) $2 + 4z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$
(d) $2z^2 + 4z + 5 + 7z^{-1} + z^{-3}$

19- The convolution of two signals $x(n)=\{1,2,3\}$ and $h(n)=\{3,2,1\}$ is equal to

(a) {3,8,14,8,3}
(b) {3,8,8,3}
(c) {3,8,12,8,3}
(d) {2,3,8,14,8,3}

20- The cross correlation of two signals $x(n)=\{1,2,1\}$ and $h(n)=\{1,2\}$ is equal to

(a) {1,4,5,2}
(b) {2,5,4,1}
(c) {1,2,1,1,2}
(d) {1,3,5,2}

21- If $x(n)$ is a real sequence and $X(k)$ is its N-point DFT, then which of the following is true?

(a) $X(N-k) = X(-k)$
(b) $X(N-k) = X^*(k)$
(c) $X(-k) = X^*(k)$
(d) All of the mentioned

22- If the DFT of real signal $X(k) = \{1, 2-j, A, 5, 3+j2, 2+j\}$, the value of A is

(a) $A = 3 + j2$
(b) $A = 3 - j2$
(c) $A = 2 - j3$
(d) $A = 2 + j3$

23- The number of additions involved in the computation 256-point DFT by radix-2 FFT is

(a) 256
(b) 2048
(c) 1024
(d) 128

24- Chebyshev filter have

(a) Wideband transition region
(b) Sharp transition region
(c) Oscillation in the transition region
(d) None of the above

25- The number of multiplications involved in the computation 256-point DFT by radix-2 FFT is

(a) 256
(b) 2048
(c) 1024
(d) 128

26- In the bilinear transformation, the relationship between analog and digital frequencies Ω and ω respectively is

(a) $\Omega = 2\ tan(\frac{w}{2})$

(b) $\Omega = \frac{2}{T}\ tan(\frac{w}{2})$

(c) $\Omega = \frac{1}{T}\ tan(\frac{w}{2})$

(d) $\Omega = \ tan(\frac{wT}{2})$

27- The unit of average mutual information is

(a) bits
(b) bytes
(c) bits per symbol
(d) bytes per symbol

28- When probability of error during transmission is 0.5, it indicates that

(a) Channel is very noisy
(b) No information is received
(c) Channel is very noisy and No information is received
(d) Channel is lossless

29- Optimal coding is a

(a) Distinct code
(b) Prefix-free code
(c) Instantaneous code
(d) All of the mentioned

30- Which are uniquely decodable codes?

(a) Fixed length codes
(b) Variable length codes
(c) Fixed & Variable length codes
(d) None of the mentioned

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Control System Engineering

Q1: The transfer function for the state representation of the continuous time LTI system:

$$\frac{dx}{dy} = Ax + Bu, \quad y = Cx + Du$$

is:

A. $TF = C(sI - A)^{-1}B + D$

B. $TF = C(sI - A)^{-1}B - D$

C. $TF = B(sI - A)^{-1}C - D$

D. $TF = B(sI - A)^{-1}C + D$

Q2: First column elements of the Routh's tabulation are 3, 5, -3/4, ½, 2. It means that there are:

C. One root in the left half of s-plane

D. Two roots in the left half of s-plane

C. Two roots in the right half of the s-plane

D. One root in the right half of s-plane

Q3: The derivative control action is typically used when controlling, but rarely used when controlling:

A. Temperature, Flow

B. Flow, Level

C. Level, Temperature

D. Pressure , Flow

Q4: Processes always require some degree of control action to achieve set point.

A. Integrating, Derivative

B. Self-regulating, Proportional

C. Runaway, Linear

D. Self-regulating, Integral

Q5: Consider the following statements(Routh-Hurwitz criterion gives):

1. Absolute stability
2. The number of roots lying on the right half of the s-plane
3. The gain margin and the phase margin:

The correct performance of the Routh-Hurwitz criterion :

A.1,2 and 3 B.1 and 2

C. 2 and 3 D. 1 and 3

Q6: In a control system integral error compensation _____ steady state error:

A. Increases B. Minimizes

C. Does not have any effect on D. All of the mentioned

Q7: Phase lag controller:

A. Improvement in transient response B. Reduction in steady state error

C. Reduction is settling time D. Increase in damping constant

Q8: In frequency domain the speed of response is measured in terms of.

A. Resonant frequency B. Bandwidth

C. Resonant peak and bandwidth D. Maximum peak overshoot

Q9: The Routh-Hurwitz criterion cannot be applied when the characteristic equation of the system contains any coefficients which is :

A. Negative real and exponential function B. Negative real, both exponential and sinusoidal function of s

C. Both exponential and sinusoidal function of s D. Complex, both exponential and sinusoidal function of s

Q10: State space representation of the system is obtained by converting the order of the system:

A. Higher order
B. Set of first order systems
C. Second order
D. Second order with type zero

Q11: In a PID controller, the overshoot has increased. The derivative time constant has to be…… so as to reduce the overshoots:

A. Decreased
B. Increased
C. Cancelled
D. Kept constant

Q12: 80% of PID controllers in use have the …….. part switched off

A. Integral B. Proportional C. Derivative D. none

Q13: Eliminating the Set-Point Kick---PI-D Control is used by:

A. Type B PID B. Type A PID C. Type C PID D. Traditional PID

Q14: I-PD Moving Proportional and Derivative Action to the Feedback is :

A. Type B PID B. Type A PID C. Type C PID D. Traditional PID

Q15: The ……. PID Controller have the following performance:

A. A box, not an algorithm, B. Manual/cascade mode switch, C. Loop alarms, D. Bumpless transfer

Q16: The state variables that completely describe the behavior of a given system are said to be components of……..

A. Computer vector, B. Problem vector , C. State vector , D. System vector

Q17: The matrix operator which determines the transition of any initial state x(0) at / = 0 to a state x(t) at time **t** is known as ……..

A. Column Matrix , B. Vertical Matrix, C. state transition matrix ,D. Resolvent matrix

Q18: For the system given by

$$\begin{bmatrix}\dot{x}_1(t)\\ \dot{x}_2(t)\end{bmatrix} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u(t)$$

$$y(t) = [3 \quad 1]\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix}$$

$\frac{y(s)}{u(s)} = \frac{s+3}{s^2+3s+2}$,if the solution is is due to the ……..form?

Q19: A system is unstable if the natural response approaches …….. as time approaches …….
A. Zero, infinity B. infinity, infinity C. 90^0 , 90^0 D. 180^0, 180^0

Q20: Marginally stable systems have closed-loop transfer functions with only imaginary axis poles of multiplicity …….. and …….. in the left half-plane
A.1, poles B.1,zeros C.poles,1 D. zeros, poles

Q21: To test the stability ,the method that requires two steps: (1) Generate a data table and (2) interpret the table to tell how many closed-loop system poles are in the left half-plane, the right half-plane, and on the jω-axis is known as…….
A. Ziegler Nichols method B. Manual tuning method C. Bode method D. Routh- -Hurwitz method

Q22: For the following system represented in state space, there are…… poles are in the left half-plane,……. in the right half-plane, and …….on the jω-axis.

$$\dot{x} = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 7 & 1 \\ -3 & 4 & -5 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} r$$

$$y = \begin{bmatrix} 0 & 1 & 0 \end{bmatrix} x$$

A. Two Rhp , one Lhp,zero Jw B. one Rhp , one Lhp,1Jw C. Three Rhp, one Lhp,2Jw D. zero Rhp ,one Lhp,2Jw

Q23: The magnitude frequency response to be the ratio of the…… magnitude to the ……. magnitude.
A. output sinusoid's, input sinusoid's B. input sinusoid's, output sinusoid's C. Laplace output, Laplace input D. Laplace input, Laplace output

Q24: for second order system, the difference between the asymptotic approximation and the actual frequency response can be great for some values of…….
A. Natural frequency B. damping frequency C .damping ratio D. undamped frequency

Q25: The …….. is the change in open-loop gain, expressed in decibels (dB), required at 180° of phase shift to make the closed-loop system unstable.
A. Proportional gain B. integral gain C. gain margin D .proportional band

Q26: A series RLC circuit driven by a constant voltage source contains two energy storage elements, an inductor and a capacitor. Accordingly the state variables will be.
A. L,C,i(t) B.R,i(t) C.L,C, $v_c(t)$ D. i(t),$v_c(t)$

Q27: For linear system models, defined by: dx/dt=Ax+Bu , the origin $x_c = 0$ serves as an ……..
A. Initial condition B. equilibrium point C. state space D. state vector

Q28: The phase contribution of the PD controller increases from…….. at low frequencies to…… at high frequencies.
A. 0,90 B. 90,180 C. 0,180 D. 0,270

Q29: The modified PD controller is very similar to a …… controller; it is similarly employed to improve the transient response of the system.

A. First order lead B. first order lag C. second order lead D. second order lag

Q30: The PI-PD controller adds ……. and ……. to the loop transfer function.

A. Two zeros, two poles B. one zero, one pole C. two zero, one integrator D. one zero, two poles