BARC 2019
Electronical Engineering

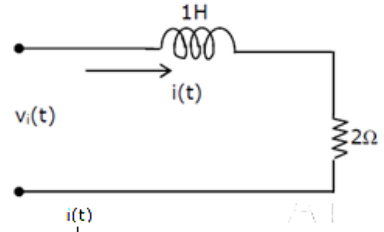
Free Mock Test

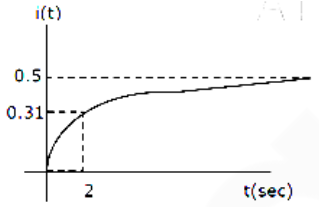
gradeup

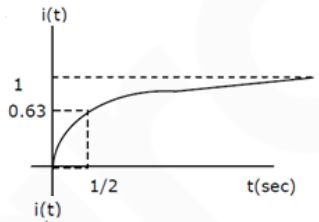
1. The average power delivered to impedance (4 – j3)Ω by a current 5 cos(10 πt + 100)A is
   A. 44.2 W B. 50 W
   C. 62.5 W D. 125 W
2. Two sequences $x_1[n]$ and $x_2[n]$ have the same energy. Suppose $x_1[n] = a\ 0.5^n\ u[n]$, where a is a positive real number and u[n] is the unit step sequence. Assume

$$x_2[n] = \begin{cases} \sqrt{1.5} & \text{for } n = 0, 1 \\ 0 & \text{otherwise.} \end{cases}$$

   Then the value of a is_____.
   A. 2 B. 1.5
   C. 2.5 D. 14
3. For the R-L circuit shown in Figure, the input voltage $v_i(t) = u(t)$. The current i(t) is



A.


B.


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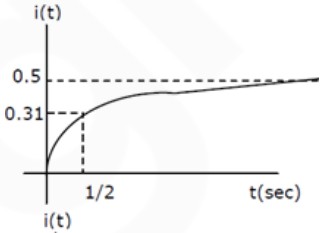

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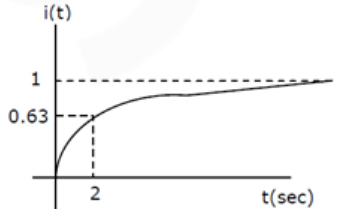


4. One single-phase energy meter operating on 230 V and 5 A for 5 hours makes 1940 revolutions. Meter constant is 400 rev/kWh. The factor of the load is
   A. 1.0 B. 0.8
   C. 0.7 D. 0.6
5. A resistance strain gauge with a gauge factor of 2.0 is fastened to a steel member subjected to a stress of 100 N/mm^2. The modulus of elasticity of steel is approximately 2 × 10^5 N/mm^2. The percentage change in resistance is
   A. 1.50 B. 1.00
   C. 0.15 D. 0.10
6. A piezoelectric crystal has a thickness of 2.5 mm and a voltage sensitivity of 0.05 V_m/N. The piezoelectric crystal is subjected to an external pressure of 1.6 X 10^6N/m^2, then the corresponding output voltage is
   A. 200 volts
   B. 3.2 × 10^9 volts/m of thickness
   C. 0.07 × 10^9 V/(m^3/New)
   D. 200 m volts
7. When the rotor speed, in a synchronous machine, becomes more than the synchronous speed during hunting, the damper bars develop
   A. induction motor torque
   B. induction generator torque
   C. synchronous motor torque
   D. dc motor torque
8. In a large power transformer, a "conservator" drum is provided above the completely oil filled transformer tank and connected to it by a short pipe. The conservator drum is linked to external air through a breather. What is the purpose of providing the conservator?
   A. To store reserve oil to make up oil losses due to leakage
   B. To prevent explosion due to rise in oil pressure inside the tank during a fault

C. To accommodate change in oil-level during the "load-cycle" of the transformer load
D. To exert additional pressure by the conservator-oil on the oil inside the main tank to prevent disintegration of oil at high temperature

9. In a P-N junction diode under reverse bias, the magnitude of electric field is maximum at
A. the edge of the depletion region on the P side
B. the edge of the depletion region on the N side
C. the centre of the depletion region on the N side
D. the P-N junction

10. Intermediate (i) layer of PIN-diode imparts which one of the following features to a p-n junction diode?
A. High reverse blocking capability
B. High forward current rating
C. Inverting capability
D. Poor turn off performance

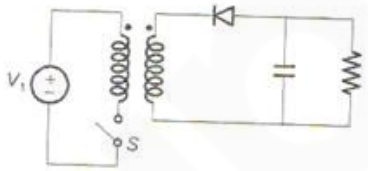
11. A JFET is set up as a follower, with $\mu = 200$, $r_d = 100$ kΩ and source load resistor $R_L = 1$kΩ. The output resistance R_0 is
A. 1000Ω B. 500 Ω
C. 333 Ω D. 666 Ω

12. A processor that has carry, overflow and sign flag bits as part of its program status word (PSW) performs addition of the following two 2's complement numbers 01001101 and 11101001. After the execution of this addition operation, the status of the carry, overflow and sign flags, respectively will be:
A. 0,0,0 B. 1,0,0
C. 1,0,1 D. 1,1,1

13. The Boolean expression:
$F = \overline{A+\bar{B}+C} + \overline{\bar{A}+\bar{B}+C} + \overline{A+\bar{B}+\bar{C}} + ABC$
reduced to
A. A B. B
C. C D. A+B+C

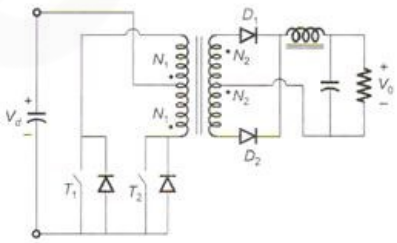
14. What is the simplified form of the Boolean expression
$T = (x+y)(x+\bar{y})(\bar{x}+y)$
A. $\bar{X}\bar{Y}$ B. $\bar{X}Y$
C. XY D. $X\bar{Y}$

15. For the isolated buck boost converter as shown in the circuit below, the output voltage is to be 35 V at a duty cycle of 30%. The DC input is obtained from a front end rectifier without voltage doubling fed from a 115 V AC. What is the peak forward blocking voltage of the switching element?



A. 232.3 V
B. 69.69 V
C. 162.61 V
D. 542 V

16. In push-pull DC-DC converter the output voltage V_0 is given by



A. $V_0 = 2\frac{N_2}{N_1} \cdot V_d \left(\frac{t_{ON}}{t_{ON} + t_{OFF}} \right)$

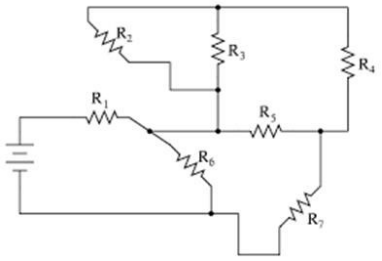
B. $V_0 = \frac{N_2}{N_1} \cdot V_d \left(\frac{t_{ON}}{t_{ON} + t_{OFF}} \right)$

C. $V_0 = 2\frac{N_2}{N_1} \cdot V_d \left(\frac{t_{ON}}{t_{OFF}} \right)$

D. $V_0 = \frac{N_2}{N_1} \cdot V_d \left(\frac{t_{ON}}{t_{OFF}} \right)$

17. Maximum power transfer occurs at _____ efficiency.
A. 100% B. 50%
C. 75% D. 25%

18. In the following network, what is the phase difference between current I and voltage V?



A. 62.97^0 B. 135.94^0
C. 0^0 D. 90^0

19. Calculate the form factor of a sinusoidal wave.
A. 1.11 B. 2
C. 3 D. 2.12

20. For a signal flow path with only one forward path and no loops, the gain is:
A. Product of all gain along the path
B. Sum of gain along the path
C. Logarithmic addition of gain along the path
D. Algebraic sum of gain along the path

21. For a feedback control system of type-2, the steady state error for a ramp input is:
A. Infinite B. constant
C. Zero D. Intermediate

22. Consider the following statements for continuous-time linear time invariant (LTI) systems.
I. There is no bounded input bounded output (BIBO) stable system with a pole in the right half of the complex plane.
II. There is non causal and BIBO stable system with a pole in the right half of the complex plane.
Which one among the following is correct?
A. Both I and II are true
B. Both I and II are false
C. Only I is true
D. Only II is true

23. An air-cored solenoid of 250 turns has a cross-sectional area A = 80 cm^2 and length l = 100 cm. The value of its inductance is
A. 0.425 mH B. 0.628 mH
C. 0.751 mH D. 0.904 mH

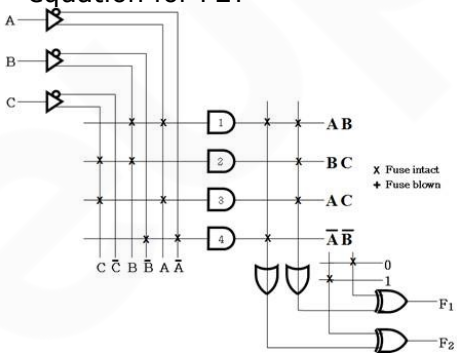
24. The Pointing vector on the surface of a long straight conductor of radius a and conductivity σ_0, which carries current I in the z-direction, is

A. $\frac{I^2}{\sigma_0 \pi b^3}\hat{a}_r$ B. $\frac{-I^2}{2\sigma_0 \pi^2 a^2}\hat{a}_r$

C. $\frac{I^2}{\sigma_0 \pi^2 a^3}\hat{a}_r$ D. $\frac{-I^2}{2\sigma_0 \pi^2 a^3}\hat{a}_r$

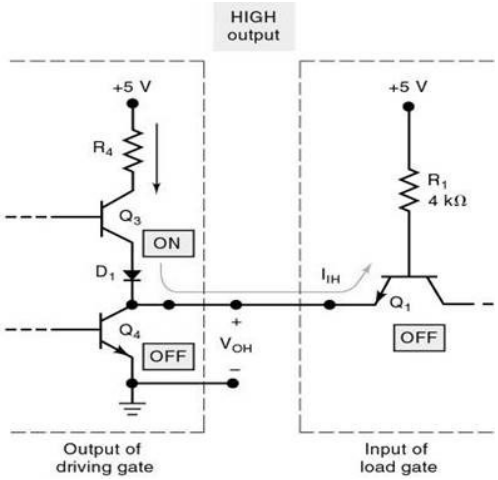
25. Which of the following is an invalid state in an 8-4-2-1. Binary Coded Decimal counter
A. 1 0 0 0 B. 1 0 0 1
C. 0 0 1 1 D. 1 1 0 0

26. In the PLA shown, what will be the equation for F2?



A. F2 = A'B + AB'
B. F2 = AB' + AB'
C. F2 = A'B + A'B
D. F2 = A'B' + AB'

27. In the TTL circuit show, which among the following will act as pull up transistor?

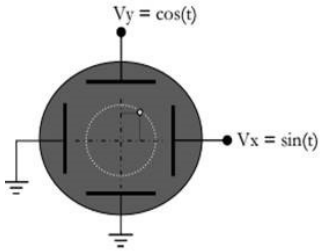


A. Q1 B. Q2
C. Q3 D. None of these

28. It is seen that the power dissipation of a JFET can be calculated by considering $P = V_{DS}I_D + V_{GS}I_G$, for all practical purposes and can be further simplified to $P = V_{DS}I_D$: Identify why the second term of the equation $V_{GS}I_G$ may be ignored for a junction field-effect transistor.
A. $I_G = 1$
B. I_G = infinite
C. I_G = neutral
D. $I_G = 0$

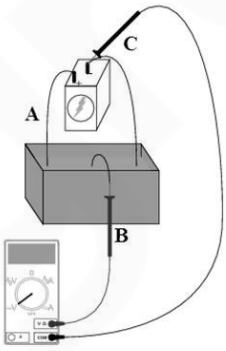
29. The DMA controller has _____ registers
A. 4 B. 2
C. 3 D. 1

30. In CRO, due to horizontal and vertical signal, bright spot is seen on circular path as shown. This bright spot will be located on extreme _____of the screen.



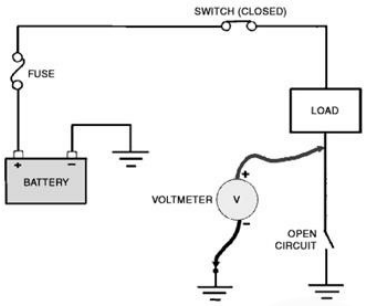
A. centre of the screen
B. top
C. left
D. right

31. In a liquid potentiometer, as shown which lead will affect the change in voltmeter reading?



A. lead A
B. lead B
C. lead C
D. Both lead A and C

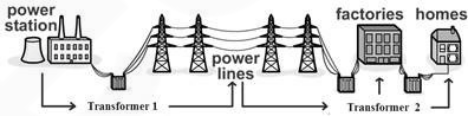
32. What will be the voltmeter reading in the circuit?



A. 12.0 volts
B. 0.0 volts
C. source voltage
D. 6.0 volts

33. To have best quality waveform, oscilloscope will trigger:
A. internally B. externally
C. automatic D. runoff

34. Identify the type of transformers used in the figure



A. step-up transformer, step-up transformer
B. step-up transformer, step-down transformer
C. step-down transformer, step-up transformer
D. step-down transformer, step-down transformer

35. Insulated cables are usually rated by their :
A. operating voltage.
B. operating voltage and highest operating temperature.
C. operating temperature.
D. cost.

36. Earthing or grounding cable is:
A. Green B. Yellow
C. Grey D. Black

37. Which is correct in case of High Voltage DC Transmission?
A. Can work for short distances
B. Sends required amount of signal
C. Transmit power from large hydroelectric dams
D. All of above

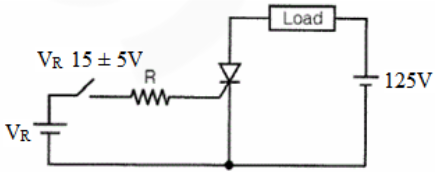
38. In coal fired thermal power plant, which among the following is applied as fuel in boiler
A. bituminous coal
B. brown coal
C. both a and b
D. a or b

39. In a transformer, to step 132V line down to 120V, then what will be the physical size so as to handle 10kVA load?
A. 0.41 kVA B. 0.33 kVA
C. 0.78 kVA D. 0.91 kVA

40. Find the efficiency of the motor during brake test, if the effective load on branch pulley is 45.25 kg with pulley radius as 25 cm and speed as 15 r.p.s while motor consumes current of 52 A at 230 V.
A. 81.25% B. 79.25%
C. 87.31% D. 92.27%

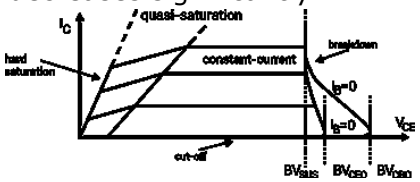
41. The role of micro-stepping mode in stepper motor is to
A. have rotation to 100% of angular displacement for single step
B. have 50% of angular displacement for single step
C. have twice the steps under half-stepping mode
D. have lower angular displacement similar to single step in a motor

42. The thyristor requires 20mA of gate current for making the triggering circuit ON. If a variable V_R is attached to the circuit as shown which caters all variable conditions, then what will be the value of resistor R needed by thyristor for making itself ON under all possible variations ?



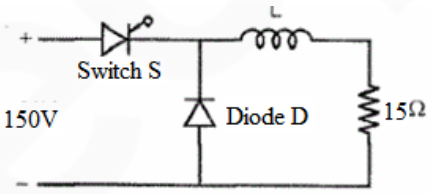
A. 750Ω B. 1500Ω
C. 500Ω D. 1000Ω

43. In Power BJT Output Characteristics Curve, in which region, value of ß decreases significantly?



A. Quasi – saturation region
B. Hard saturation region
C. Constant current region
D. Breakdown region

44. In the circuit shown, a chopper operates from 150V DC input. In the chopper circuit, the duty ratio of switch connected is 0.6 with ripple free load current. Under steady state, the average current through diode will be:

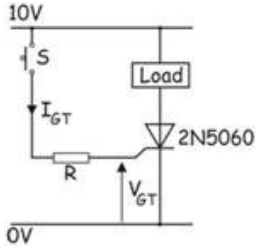


A. 0.6A B. 2.4 A
C. 2.67A D. 1.75A

45. During self-latching, a thyristor:
i. passes normal current which is more than holding current
ii. removes gate signal
iii. will allow collector current to flow in presence of base current
A. both i and ii
B. both ii and iii
C. both i and iii
D. i, ii and iii

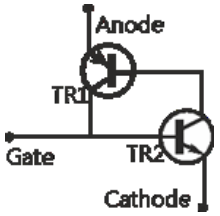
46. In a Single-phase semi converter bridge with R-L-E Load, the purpose of freewheeling diode is to:
A. prevent damage to circuit having inductor load with switching potential
B. changing the direction of current in the switching diode
C. increase the immense voltage across the switch
D. show the correct conduction path in the circuit

47. A thyristor 2N5060 circuit which controls current through a load has Minimum gate current I_{GT} 0.2mA and Minimum gate voltage V_{GT} 0.8V. Find the maximum value for resistor R.



A. 41kΩ B. 43kΩ
C. 46kΩ D. 49kΩ

48. In an equivalent gate turn off thyristor circuit, when the current is passed in the circuit:

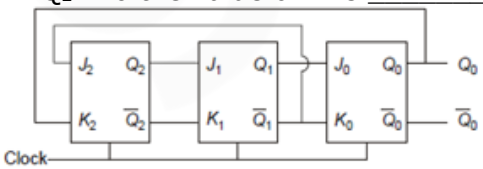


i. TR1 is ON
ii. TR2 is OFF
iii. TR2 is ON
iv. Current flows in TR1
A. both i and ii
B. both ii and iii
C. both i and iii
D. both iii and iv

49. How fast can be output of an OP Amp change by 10 V, if its slew rate is 1v/μs?
A. 5μs B. 10μs
C. 15μs D. 20μs

50. What is the hexadecimal representation of $(657)_8$?
A. 1 AF B. D 78
C. D 71 D. 32 F

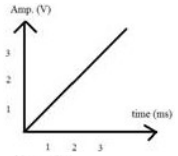
51. The divide by N counter is shown below. If initially $Q_0 = 0$, $Q_1 = 1$, $Q_2 = 0$ the value of N is _____.

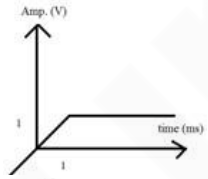


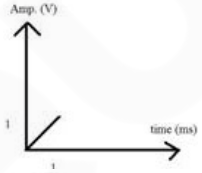
A. 4 B. 5
C. 8 D. 10

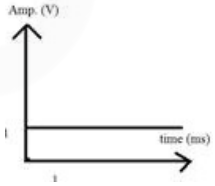
52. Which of the following is the mathematical representation of unit sinc function?
A. (sin πt)/(πt)
B. (sin t)/(t)
C. 1, for t > = 0; 0 otherwise.
D. $1 + t^2$, for t > = 0; 0 otherwise.

53. Which of the following signals represents unit ramp signal?

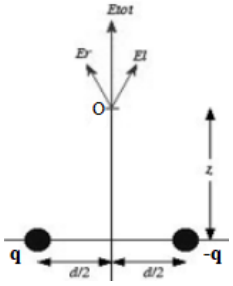
A.


B.


C.


D.


54. The expression of electric field at midpoint between charge 'q' at a distance 'd' when z = d will be:



A. $E = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{d^2}$

B. $E = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{d^3}$

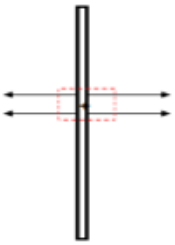
C. $E = \frac{1}{4\pi\epsilon_0} \cdot \frac{2q}{d^3}$

D. $E = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{d}$

55. A parallel plate capacitor having plates with area 8 x 10^{-4} m^2 is separated by distance 1.77 mm. The capacitor is connected to 12 volt battery with dielectric constant K= 3 inserted in the plates. If the capacitor was fully charged before inserting in dielectric, then what will be the extra charges supplied by the battery?

A. 75pC B. 96 pC
C. 105pC D. 85pC

56. The expression of electric field E outside the insulating rod that carry charges inside it with surround electric field on both sides will be:



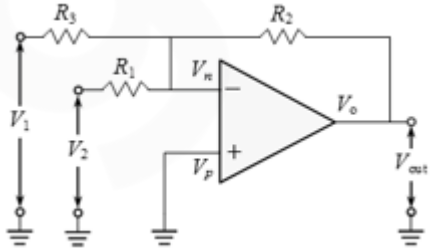
A. $E = \frac{\sigma}{2+\varepsilon_0}$

B. $E = \frac{2\sigma}{\varepsilon_0}$

C. $E = \frac{\sigma}{\varepsilon_0}$

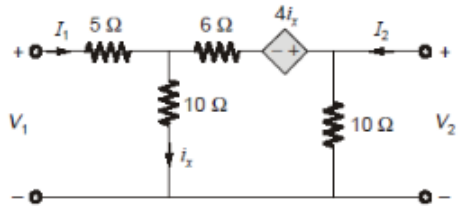
D. $E = \frac{\sigma}{2\varepsilon_0}$

57. In filter circuit, when total resistance value of 3 resistors is 20 kΩ with voltages V_1 = 1.5 V, V_2 = 2.5 V, then V_{out} will be:



A. -4.0 V B. +4.0 V
C. –3.24 V D. 5.345 V

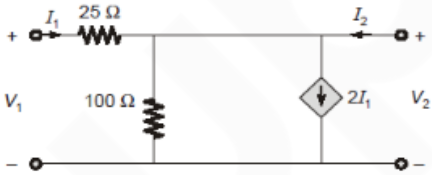
58. Consider the 2 port circuit given below



Hybrid parameter h_{12} for the circuit is _____.

A. 0.5 B. 1.24
C. 1.5 D. 2.3

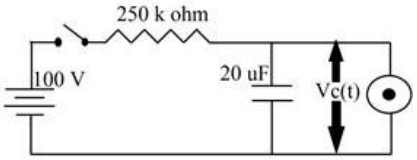
59. Consider the two port network given below



For the given network admittance parameter Y_{12} is _____ mʊ.

A. 120 B. 40
C. 130 D. 100

60. The following figure shows a simple circuit for a neon glow tube. It ignites at 80V and extinguishes at 50V. Assume that the cycle starts when the voltage across the tube is 50V. Find the time (in seconds) for which the switch must be on so that the tube may ignite.



A. 2 B. 12
C. 4.58 D. 16

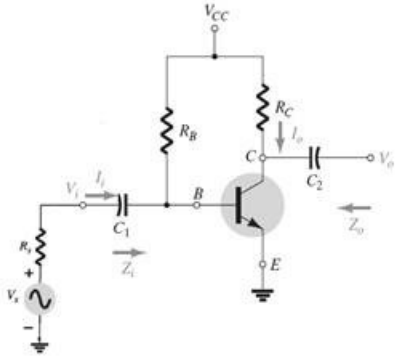
61. Identify the characteristic equation of X-Y flip flop whose truth table is given

X	Y	Q (n+1)
0	0	0
0	1	$\overline{Q}_n$
1	0	Q_n
1	1	1

A. $XY\overline{Q}$ B. $XY + \overline{XQ}$
C. $XQ + Y\overline{Q}$ D. XY + XQ + YQ

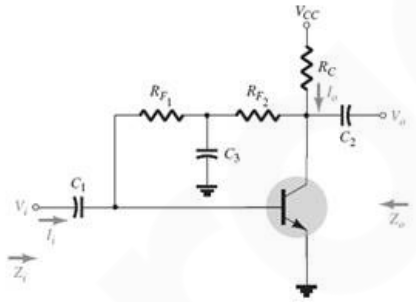
62. Determine the trans-conductance for a JFET at $V_{GS} = -2V$, if $g_{m0} = 8$ mS and $I_D = I_{DSS}/6$
A. 2.6 mS B. 3.2 mS
C. 4 mS D. 4.8 mS

63. For the given network, determine the current gain in terms of the hybrid parameters.



A. $\frac{h_{re}}{(1+h_{oe}R_C)}$ B. $\frac{h_{fe}}{(1+h_{oe}R_C)}$
C. $\frac{h_{re}}{(1+h_{ie}R_B)}$ D. $\frac{h_{fe}}{(1+h_{ie}R_B)}$

64. Which of the following expression gives the input impedances of the given network?

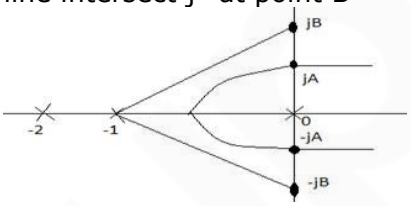


A. $R_{F_1} \| \beta r_e$
B. $R_{F_2} \| \beta r_e$
C. $R_{F_1} \| R_{F_2} \| \beta r_e$
D. βr_e

65. Find the value of R_1, R_2 to design second order butter worth trigger with $\omega_C = 100$ rad/sec, gain $k = 2$, $C_1 = C_2 = 1$ μF, $R_A = 1$ kΩ ?
A. 6.325 kΩ,12.654kΩ
B. 2.365 kΩ, 4.658 kΩ
C. 7.071kΩ, 14.142kΩ
D. None of these

66. Which of the following statements is correct?
A. $I_{gGTO} > I_{gSCR}$
B. $I_{gGTO} = I_{gSCR}$
C. $I_{gGTO} < I_{gSCR}$
D. Can't say anything

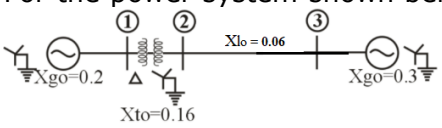
67. The open loop transfer function of the system is $G(s)\,H(s) = \frac{k}{s(s+1)(s+2)}$. The root locus will intersect j^{ω} axis at A, the asymptotic line intersect j^{ω} at point B



The values are
A. A = √2 , B = 2
B. A = √2 , B = √6
C. A = √2 , B = √3
D. A = √3 , B = √2

68. An unloaded three phase star connected alternator is shorted by a 3 phase fault at its terminals. The generator neutral is earthed through an impedance. Which of the following groups correctly represents the relationships among positive, negative and zero sequence components of voltages and current?
A. $V_{a1} = V_{a2} = V_{a0} = 0$ $I_{a1} = I_{a2} = I_{a0} = 0$
B. $V_{a1} = 1/2V_{a2} = V_{a0} = 0$ $I_{a1} = -I_{a2}$, $I_{a0} = 0$
C. $V_{a1} = V_{a2} = V_{a0} = 0$ $I_{a1} = E_a/Z_1$, $I_{a2} = I_{a0} = 0$
D. $V_{a1} = 2V_{a2}$, $V_{a0} = 0$ $I_{a1} = ½\ I_{a2}$, $I_{a0} = 0$

69. For the power system shown below



the zero sequence reactance in pu are indicated. What is the zero sequence driving point reactance of the bus 3 in pu?
A. 0.13pu B. 0.1pu
C. 0.2pu D. 0.02pu

70. If I_{a1} is the positive sequence current of an alternator and Z_1, Z_2 and Z_0 are the sequence impedance of the alternator. What is the drop produced by the alternator I_{a1}?
A. $I_{a1}(Z_1 + Z_2)$
B. $I_{a1}(Z_1 + Z_2 + Z_0)$
C. $I_{a1}Z_1$
D. None of the above

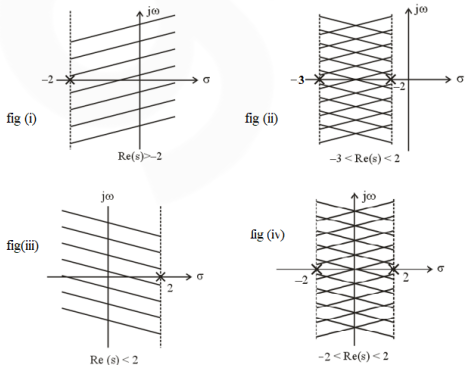
71. If φ(t) is the state transition matrix of a system then, φ(kt) implies which of the following [where 'k' is a scalar constant]
A. φ(t) added 'k' times
B. φ(t) multiplied 'k' times
C. Both of the above
D. None of the above

72. Let a_k denotes the exponential Fourier series coefficients of a continuous time signal x(t), the fundamental frequency is $\omega_0 = 1$ rad/s and a_k is given as $a_k = \left(-\frac{1}{2}\right)^{|k|}$

Then the value of $\frac{1}{4}\left\{3\left[x(t)\right]^{-1} - 5\right\}$ is given by
A. −cost B. sint
C. cost D. $3(5 + 4\cos t)^{-1}$

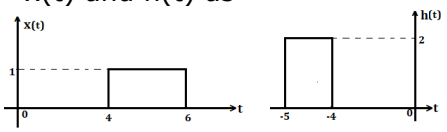
73. Energy of the signal $A \cdot \delta[n]$ is given by:
A. $\frac{A^2}{2}$ B. 0
C. $\frac{A^2}{4}$ D. A^2

74. The ROCs of different impulse responses are shown below. Which of the following impulse responses are stable?

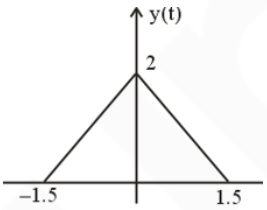


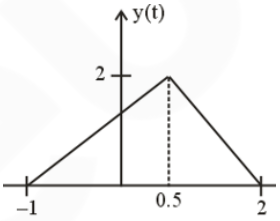
A. (i) & (ii)
B. (i) & (iv)
C. (i), (iii) & (iv)
D. (i), (ii) & (iv)

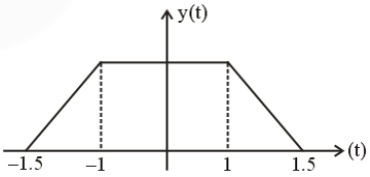
75. The figure shows two signals x(t) and h(t) as

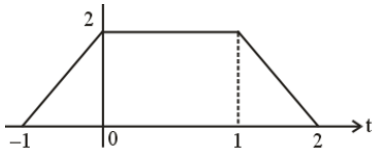


Which of the waveform in the options corresponds to x(t) * h(t) where * denotes convolution.

A.


B.


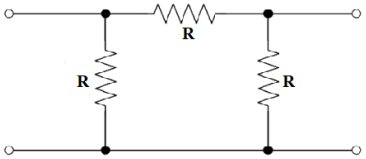
C.


D.


76. If the transfer function of a system is given by $H(s) = \frac{1}{(s+2)^2}$, then find the output of the system for step input.
A. $\frac{1}{4} - \frac{1}{2}e^{-2t} - \frac{1}{2}t \cdot e^{-2t}$
B. $\frac{1}{4} - \frac{1}{4}e^{-2t} + \frac{1}{2}t \cdot e^{-2t}$
C. $\frac{1}{4} - \frac{1}{4}e^{-2t} - \frac{1}{2}t \cdot e^{-2t}$
D. $\frac{1}{4} + \frac{1}{4}e^{-2t} - \frac{1}{2}t \cdot e^{-2t}$

77. A signal x(t) is having Nyquist rate = $2\omega_0$. Then the Nyquist rate of $x(t)\cos^2 \omega_0 t$ is
A. $2\omega_0$ B. $4\omega_0$
C. $6\omega_0$ D. $8\omega_0$

78. Consider two similar two port network given below one with R = 2Ω and the other with R = 3Ω.



If the two networks are connected in parallel, then find the Z-parameter matrix of the resultant network.

A. $\begin{bmatrix} \frac{13}{25} & -\frac{13}{50} \\ -\frac{13}{50} & \frac{13}{25} \end{bmatrix}$

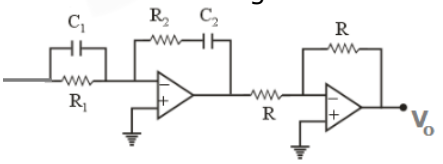
B. $\begin{bmatrix} \frac{13}{25} & \frac{13}{50} \\ \frac{13}{50} & \frac{13}{25} \end{bmatrix}$

C. $\begin{bmatrix} \frac{13}{25} & -\frac{13}{25} \\ -\frac{13}{25} & \frac{13}{25} \end{bmatrix}$

D. None of these

79. For $G(s)=10\frac{s-2}{s(s+9)(s+5)}$, which of the following is true?
A. Non-minimum phase system, unstable.
B. Minimum phase system, stable.
C. Non-minimum phase system, stable.
D. Minimum phase system, unstable.

80. Consider the electronic PID controller shown in figure below



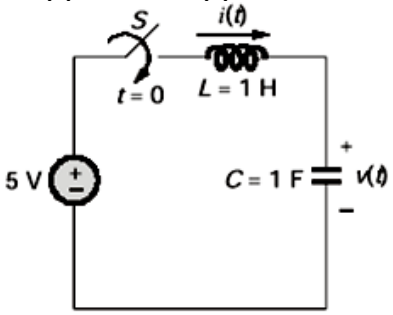
If $R_1 = R_2 = R$ and $C_1 = C_2 = C$, then find K_p, K_d and K_i.
A. $K_p=1, K_d=R/C$ and $K_i=RC$
B. $K_p=2, K_d=1/RC$ and $K_i=RC$
C. $K_p=2, K_d=RC$ and $K_i=1/RC$
D. $K_p=1, K_d=RC$ and $K_i=1/RC$

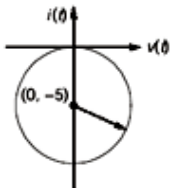
81. A 110KVA, lighting transformer has a full load loss of 4KW, the losses being equally divided between iron and copper. During a day, transformer operates on full load for 3 hours, one half-load for 4 hours, the output being negligible for the rest of the day. The all day efficiency of the transformer is
A. 92.86
B. 93.75
C. 90.75
D. 91.73

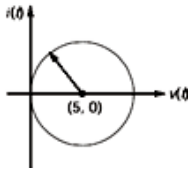
82. A starter is required for a 240V shunt motor. The maximum current limits to be 60A and the minimum limit about 4/3 of his value. The armature resistance is 0.5Ω. what is the value of number of section and resistance of 3rd section.
A. 7 and 7.12 Ω
B. 6 and 5.34 Ω
C. 5 and 6 Ω
D. 7 and 5.34 Ω

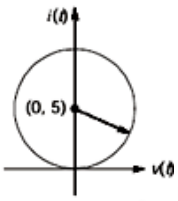
83. A 440V, 50Hz, delta connected alternator has a X_d= 0.2Ω and X_q=0.07Ω per phase. The armature resistance is negligible. The alternator is supplying 1200A at 0.8 lagging pf. What is the value of excitation emf by taking into account the saliency.
A. 436.9 V
B. 459.76 V
C. 490.46 V
D. 476.89 V

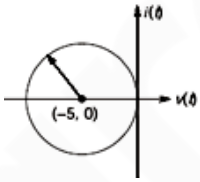
84. A DC voltage source is connected to a series L-C circuit by turning on the switch S at time t = 0 as shown in the figure. Assume i(0) = 0, v (0) = 0. Which one of the following circular loci represents the plot of i(t) versus v(t) ?



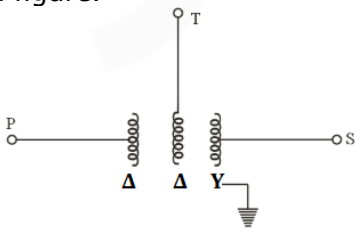
A.


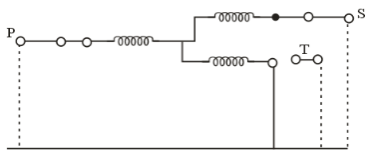
B.


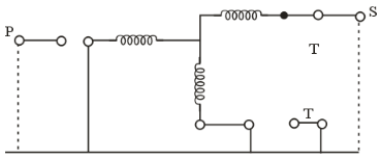
C.


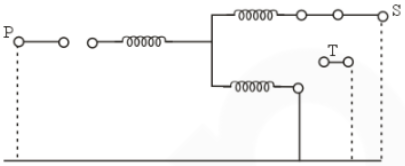
D.


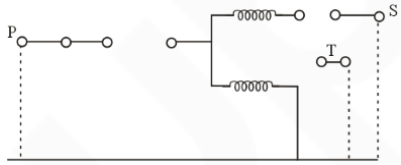
85. Which one of the following is the correct sequence diagram if there is a tertiary winding introduced between the conventional connection of transformer as shown in figure.



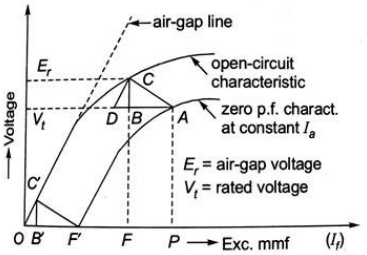
A.


B.


C.


D.


86. Consider the ZPF characteristic along with OC characteristic as shown in the below figure are used to determine leakage reactance drop I_aX_l at the rated current I_a from the Potier Triangle ABC. In this triangle, BC represents the $I_aX_l = V_x$ drop, because



A. Vx is induced by the mmf AB
B. Vx is induced by the mmf BD
C. Vx is induced by the mmf OF
D. Vx and air gap voltage Er are 180 °out of phase at ZPF load.

87. An alternator requires an excitation of 3A to produce on SC its full load current of 70A. The same excitation on OC gives an emf of 250V. If the resistance of armature is 0.793Ω and of the ammeters and lead used in the SC test 0.007Ω. What is the full load regulation when the PF is 0.8 leading if the terminal pd on full load is 1100V.

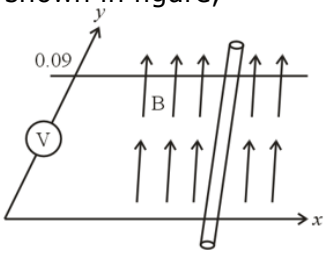
A. -2.97%% B. -4.67%
C. 2.97% D. 4.67%

88. The drooping power-frequency characteristics of two generators G_1 and G_2 are Generator G_1: Slope of power-frequency characteristic is 1MW/Hz No-load frequency is 52Hz Generator G_2: Slope of power-frequency characteristic is 0.5MW/Hz No-load frequency is 51Hz The generators G_1 and G_2 are connected in parallel and loaded with total load of 10MW. The load shared by G_1 and G_2 are respectively.
A. 3MW, 7MW B. 7MW, 3MW
C. 5MW, 5MW D. 4MW, 6MW

89. The Transfer function of two cascaded systems $H_1(z)$ & $H_2(z)$ is known to be $H(z)=\frac{z^2+0.25}{z^2-0.25}$ It's also known that the unit step response of first system is $[2-(0.5)^n]u(n)$.
Then find the value of $H_1(z)$ & $H_2(z)$?
A. $H_1(z)=\frac{1}{1-0.5z^{-1}}$ & $H_2(z)=\frac{1+0.25z^{-2}}{1+0.5z^{-1}}$
B. $H_1(z)=\frac{1}{1+0.5z^{-1}}$ & $H_2(z)=\frac{1+0.25z^{-2}}{1-0.5z^{-1}}$
C. $H_1(z)=\frac{1}{1+0.5z^{-1}}$ & $H_2(z)=\frac{1+0.25z^{-2}}{1+0.5z^{-1}}$
D. $H_1(z)=\frac{1}{1-0.5z^{-1}}$ & $H_2(z)=\frac{1-0.25z^{-2}}{1-0.5z^{-1}}$

90. The Nyquist stability criterion and the Routh criterion both are powerful analysis tools for determining the stability of feedback controllers. Identify which of the following statements is FALSE.
A. Both the criteria provide information relative to the stable gain range of the system.
B. The general shape of the Nyquist plot is readily obtained from the Bode magnitude plot for all minimum-phase systems.
C. The Routh criterion is not applicable in the condition of transport lag, which can be readily handled by the Nyquist criterion.
D. The closed-loop frequency response for a unity feedback system cannot be obtained from the Nyquist plot.

91. The bar conductor integral to y-axis as shown in figure,



completes the loop by sliding contact with the conductors at y=0m, y= 0.09m. The induced voltage when the bar is stationary at x=0.09m, $B=0.4\sin 10^4 t\ \hat{a}_z$ is…..
A. $-7.5\cos(10^4t)$
B. $7.5\sin(10^4t)$
C. $-32.4\cos(10^4t)$
D. $32.4\sin(10^4t)$

92. A filter has filter response given by h(t) = (sin(0.25πt))/πt. An input signal x(t) is applied at the input. Determine which of the signal component would be visible at the output.
x(t) = cos(0.125πt) – 2sin(0.125πt) + 0.125sin(0.5πt)
1) cos(0.125πt)
2) sin(0.125πt)
3) sin(0.5πt)
A. 1, 2 B. 1
C. 2, 3 D. 1, 2, 3

93. Find the value of electric field at a distance r = 10 cm from the centre of a non conducting sphere of radius R = 1 cm which has an extra positive charge equal to 7C uniformly distributed within the volume of sphere.
A. 36×10^{12}N/C
B. 6.3×10^{12} N/C
C. 63×10^{12} N/C
D. 3.6×10^{12} N/C

94. A current carrying filament of 3A along the z-axis is in the $\hat{a}_z$ direction. The flux crossing the portion of plane $\phi=\frac{\pi}{4}$ defined by 0.02 <r < 0.04 m and 0 < z < 1m is
A. 3.81 μwb B. 0.831 μwb
C. 8.31 μwb D. 0.381 μwb

95. A vector $\bar{B} = -\rho \hat{a}_\phi + Z\hat{a}_z$ is given in cylindrical coordinates. The conversion into Cartesian is given by :

A. $-y\,\hat{a}_x + x\,\hat{a}_y + z\,\hat{a}_z$

B. $-y\,\hat{a}_x + x\,\hat{a}_y - z\,\hat{a}_z$

C. $y\,\hat{a}_x - x\,\hat{a}_y + z\,\hat{a}_z$

D. $y\,\hat{a}_x + x\,\hat{a}_y + z\,\hat{a}_z$

96. The Maxwell's equation which is derived from Ampere law is _____.

A. Div (I) = H
B. Curl (H) = J
C. Curl (D) = B
D. Div (H) = J

97. Four ammeter M_1, M_2, M_3 and M_4 with the following specification are available (Full scale, accuracy value as percentage of FS)

$M_1 = 20 \pm 10$ $M_2 = 10 \pm 0.20$

$M_3 = 5 \pm 0.50$ and $M_4 = 1 \pm 1.00$

A current of 1A is to be measured . To obtain minimum errors in the reading one should select meter

A. M_1 B. M_2
C. M_3 D. M_4

98. In a circuit of single phase induction energy meter, the pressure coil current lags the voltage by 88, the errors while measuring power in two circuits having power factors unity and 0.5 lagging respectively

A. -0. 061%, +6.1%
B. +0. 061%, -6.1%
C. -0. 061%, -6.1%
D. -6.1%, -6.1%

99. The declared constant of 5A, 220V DC watt hour meter is 3275 Rev/. In a test run at half load, the meter takes 59.5 sec to complete 30 revolutions. The error of meter is_____

A. 0.84% slow
B. 0.84% fast
C. 0.76% slow
D. 0.76% fast

100. The transfer function of a PID controller is given by G(s) = 10[1+ $\frac{1}{5s}$ +2s] as ω tends to zero

A. Magnitude of G (jω) tends to zero and phase angle of G (jω) tends to +90°.

B. Magnitude of G (jω) tends to infinity and phase angle of G (jω) tends to +90°.

C. Magnitude of G (jω) tends to zero and phase angle of G (jω) tends to -90°.

D. Magnitude of G (jω) tends to infinity and phase angle of G (jω) tends to -90°.

ANSWER KEY

1. Ans. B.	26. Ans. A.	51. Ans. B.	76. Ans. C.
2. Ans. B.	27. Ans. C.	52. Ans. A.	77. Ans. C.
3. Ans. C.	28. Ans. D.	53. Ans. A.	78. Ans. B.
4. Ans. B.	29. Ans. C.	54. Ans. A.	79. Ans. C.
5. Ans. D.	30. Ans. D.	55. Ans. B.	80. Ans. C.
6. Ans. A.	31. Ans. B.	56. Ans. D.	81. Ans. C.
7. Ans. B.	32. Ans. C.	57. Ans. A.	82. Ans. A.
8. Ans. C.	33. Ans. B.	58. Ans. A.	83. Ans. C.
9. Ans. D.	34. Ans. B.	59. Ans. B.	84. Ans. B.
10. Ans. A.	35. Ans. B.	60. Ans. C.	85. Ans. B.
11. Ans. C.	36. Ans. A.	61. Ans. C.	86. Ans. A.
12. Ans. B.	37. Ans. C	62. Ans. B.	87. Ans. A.
13. Ans. B.	38. Ans. D.	63. Ans. B.	88. Ans. B.
14. Ans. C.	39. Ans. D.	64. Ans. A.	89. Ans. A.
15. Ans. A.	40. Ans. C.	65. Ans. C.	90. Ans. D.
16. Ans. C.	41. Ans. D.	66. Ans. A.	91. Ans. C.
17. Ans. B.	42. Ans. C.	67. Ans. C.	92. Ans. A.
18. Ans. C.	43. Ans. A.	68. Ans. C.	93. Ans. B.
19. Ans. A.	44. Ans. B.	69. Ans. A.	94. Ans. B.
20. Ans. A.	45. Ans. D.	70. Ans. C.	95. Ans. C.
21. Ans. C.	46. Ans. A.	71. Ans. B.	96. Ans. B.
22. Ans. A.	47. Ans. C.	72. Ans. C.	97. Ans. D.
23. Ans. B.	48. Ans. C.	73. Ans. D.	98. Ans. C.
24. Ans. D.	49. Ans. B.	74. Ans. C.	99. Ans. B.
25. Ans. D.	50. Ans. A.	75. Ans. D.	100. Ans. D

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