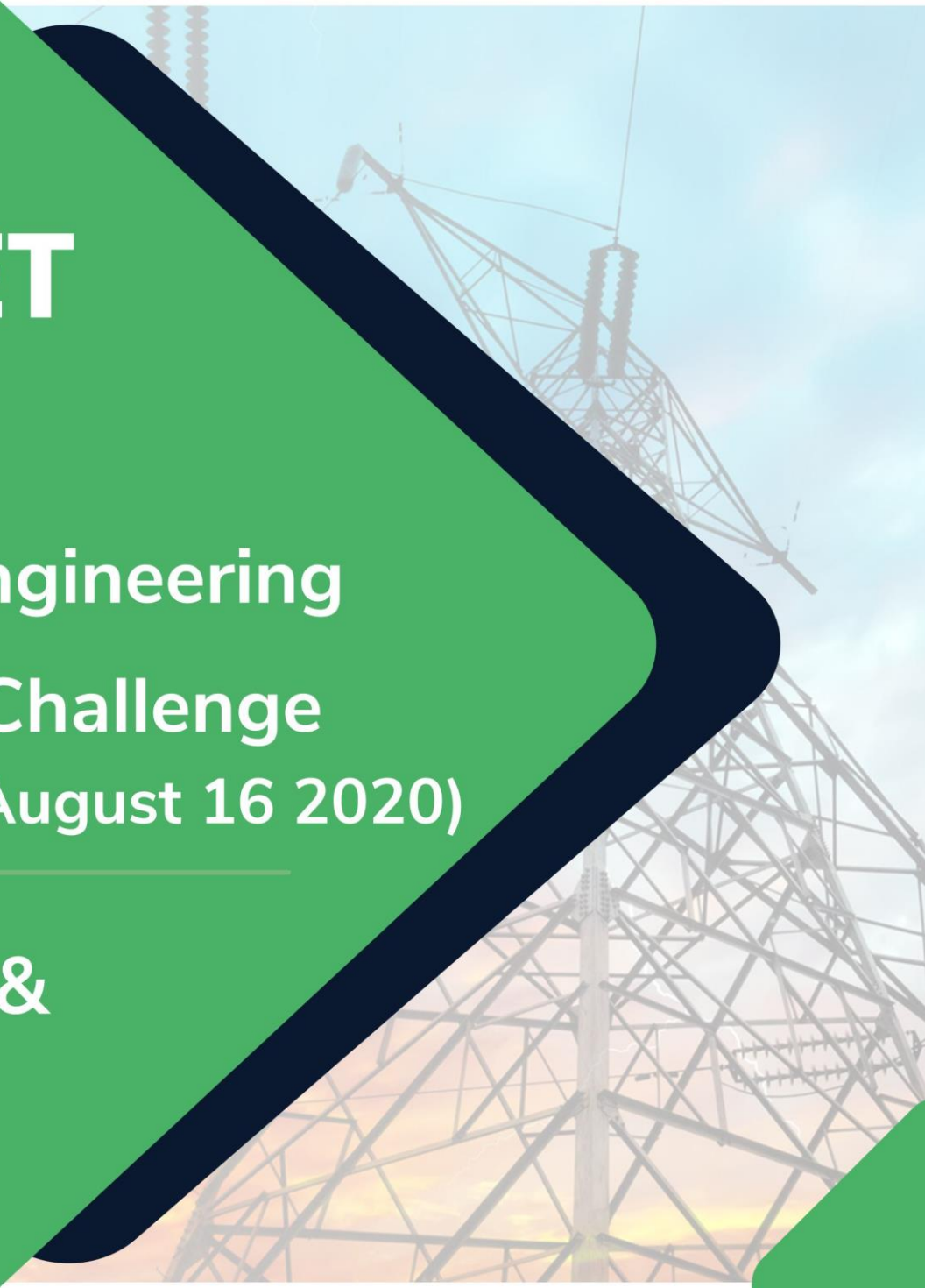
MEGA MOCK CHALLENGE

gradeup



NLC GET 2020

Electrical Engineering

Mini Mock Challenge

(August 15- August 16 2020)

Questions & Solutions

1. When a number is increased by 120, it becomes 130% of itself. What is the number?

A. 400 B. 520

C. 460 D. 580

Ans. A

Sol. Let the number be x

Then x+120=130%of x

$$x + 120 = \frac{130}{100} \times x$$

$120 = 1.3x - x$

$0.3x = 120$

$x = 400$

2. The HCF of two numbers is 15 and their LCM is 225. If one of the numbers is 75, then the other is:

A. 105 B. 90

C. 60 D. 45

Ans. D

Sol. First number × Second number = HCF × LCM

75 ×Second number = 15 × 225

$$\therefore \text{Second number} = \frac{15 \times 225}{75} = 45$$

3. If 25 is added to a number it becomes 3 less than thrice of the number. Then number is:

A. 15 B. 14

C. 19 D. 20

Ans. B

Sol. Let the number be x,

According to the question,

$x + 25 = 3x - 3$

$\Rightarrow 3x - x = 25 + 3$

$\Rightarrow 2x = 28$

$\Rightarrow x = 14$

4. Find the square root of 2401?

A. 49 B. 41

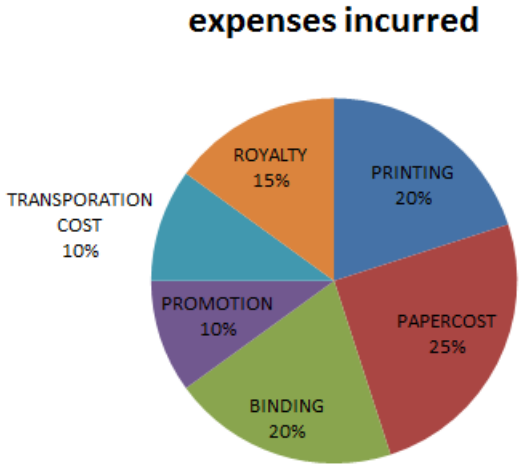
C. 51 D. 71

Ans. A

Sol. $2401 = 7 \times 7 \times 7 \times 7$

$$\sqrt{2401} = \sqrt{7 \times 7 \times 7 \times 7} = 7 \times 7 = 49$$

5. The following pie chart shows the percentage distribution of the expenses incurred by a publishing house. Study the pie chart and answer the following questions:



Royalty is less than printing cost by how much percent?

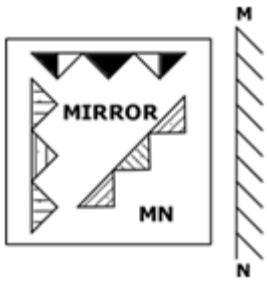
A. 5%
B. 33.33%
C. 20%
D. 25%

Ans. D

Sol. Percent Difference = 20% - 15% = 5%

We have to find out the percent difference with respect to printing cost. Hence, required percentage = (5/20)*100% = 25%

6. Which of the following options will give the mirror image of the given figure when a mirror is placed along MN?



A. 

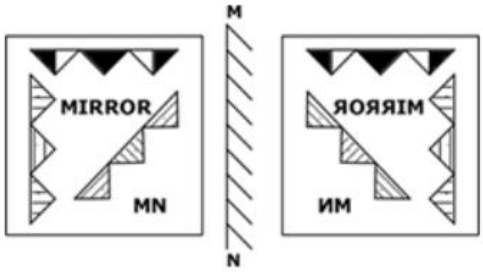
B. 

C. 

D. 

Ans. D

Sol. On observing the options we can see that the figure given under option (D) is the appropriate answer.



Hence, option D is correct.

7. In a certain language, 'sdr ngt olp' means 'Going to Patna', 'olp swq' means 'Going there' and 'yyt swq jht' means 'There was Golghar'. What is the code for 'there' in that language?

A. olp
B. swq
C. yyt
D. ngt

Ans. B

Sol. 'sdr ngt olp' = 'Going to Patna'_____(1)

'olp swq' = 'Going there' _____(2)

'yyt swq jht' = 'There was Golghar'_____(3)

From 1 and 2, 'Going' = olp.

Therefore, 'there' = swq

Hence, option (B) is the correct response.

8. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

7, 10, 15, 24, 41, 74, ?

A. 149
B. 169
C. 159
D. 139

Ans. D

Sol. Logic:

$2^1+5=7$

$2^2+6=10$

$2^3+7=15$

$2^4+8=24$

$2^5+9=41$

$2^6+10=74$

$2^7+11=139$

So, Missing Number=139

Hence, option D is the correct response.

9. If 'M' means '×', 'K' means '÷', 'G' means '+', and 'P' means '–', then what is the value of
34 P 12 M 5 G 20 K 4 M 2 P 3

A. 62 B. -19

C. 29 D. 41

Ans. B

Sol.

Symbols	M	K	G	P
Codes	×	÷	+	–

34 P 12 M 5 G 20 K 4 M 2 P 3

⇒ 34 – 12 × 5 + 20 ÷ 4 × 2 – 3

⇒ 34 – (12 × 5)+ (20 ÷ 4) × 2 – 3

⇒ 34 – 60 + (5× 2) – 3

⇒ 34 – 60 + 10 – 3

⇒ 34-50-3

⇒ – 19

Hence, option B is the correct response.

10. In the following question, select the odd word from the given alternatives.

A. Kufri B. Nainital

C. Dehradun D. Ranikhet

Ans. A

Sol. All except 'Kufri', all others are in Uttarakhand while 'Kufri' is in Himachal Pradesh.
Hence, the correct option is A.

11. Gandhiji was highly influenced by the book 'Unto the last'. Who was the author of this book?

A. Tolstoy B. John Ruskin

C. Louis Fischer D. Blavatsky

Ans. B

Sol. • **John Ruskin** was the author of the book '**Unto the Last'**.

• Some other **major works of Ruskin are**- Modern painters, The Seven Lamps of Architecture, Stones of Venice etc.

• Many founding fathers of Labour party in India were also influenced by this book.

12. White blood cells are also known as _____.

A. Erythrocyte B. Leukocytes

C. Thrombocytes D. None of these

Ans. B

Sol. * **White blood cells are also known as Leukocytes**.

* They help from protecting against diseases.

* The normal white cell count is usually between 4×10^9/L and 1.1×10^{10}/L.

* Decrease in the White Blood cells is called Leukopenia.

13. Knot is a unit of which of the following quantity?

A. Distance B. Velocity

C. Force D. Torque

Ans. B

Sol. **Knot** is a unit of speed which is equal to nautical mile per hour.

• The knot is a non-SI unit.

• The ISO standard symbol for the knot is **kn.**

• Nautical miles and knots are convenient units to use when navigating an aircraft or ship.

14. Coimbatore is famous for which of the following industries?

A. Textile industry B. Leather industry

C. Chemical industry D. None of these

Ans. A

Sol. • **Coimbatore** is also known as **Kovai and Koyamuthur**.

• It is a major city in the Indian state of Tamil Nadu.

• This city is famous for textile industry.

• Coimbatore is called the "**Manchester of South India**" due to its extensive textile industry.

15. Which among the following is the longest river of Peninsular India?

A. Narmada B. Krishna

C. Godavari D. Luni

Ans. C

Sol. • **Godavari is the longest river of Peninsular India** and 2nd longest river of India.

• This river is also known as Dakshin Ganga.

• It originates in Western Ghats of central India near Trimbak in Nashik District in Maharashtra.

16. Given below are four jumbled sentences. Pick the option that gives their correct order.

P: Shardul was waiting for his school bus.

Q: As a leader of the house, he wanted to win the General Championship by scoring maximum points.

R: It was 7 o' clock in the morning.

S: He was keenly looking at the approaching vehicles.

A. PRSQ B. SRPQ

C. RSPQ D. RPSQ

Ans. D

Sol. R is an introductory sentence as it starts with the time- 7 O' clock in the morning. Sentence P points out that he is waiting for his school bus. Sentence S focuses on how keenly he is looking at the vehicle approaching him. The only option with sequence RPS is **option D**. Hence, it is the answer.

17. Select the most appropriate synonym of the given word.

CURSORY

A. little
B. quick
C. eager
D. tender

Ans. B

Sol. CURSORY means done quickly with little attention to detail.
Eager means strongly wanting to do or have something.
Tender means showing gentleness, kindness, and affection.
Hence, option B is the correct answer.

18. Identify the best way to improve the underlined part of the given sentence. If there is no improvement required, select 'no Improvement'.

Hold hands of your child while crossing the road.

A. your child's hands
B. your child's hand
C. hand of your child
D. No improvement

Ans. B

Sol. While crossing a road, a single hand is held not both hands. So, it is incorrect to say hold hands. Apart from this, the sentence should use apostrophe (') as it is used to denote ownership and make the sentence concise. The sentence must be written as "hold your child's hand while crossing the road". Hence, option B is the correct answer.

19. Choose the most appropriate option to change the voice (active/passive) form of the given sentence.

Have you been invited by Krishna?

A. Have you invited Krishna?
B. Has Krishna invited you?
C. Does Krishna have invited you?
D. Has Krishna invite you?

Ans. B

Sol. The given sentence is in passive voice. The structure for passive/active voices would be:
Passive: Has/have + Object + Verb (IIIrd form) + by + subject...?
Active: Has/have + subject + verb (IIIrd form) + object...?
So, the active voice of the given sentence would be:
Has Krishna invited you?
Hence, option B is the correct answer.

20. Select the most appropriate meaning of the idiom given in bold in the sentence.
There was a job for me **to cut my teeth on.**

A. to gain experience
B. to try
C. to sharpen my wits
D. to earn a decent salary

Ans. A

Sol. The idom "cut your teeth on something" means to do something that gives you your first experience of a particular type of work. Hence, option A is the correct answer.

21. A certain transformer is operating at a particular frequency has equal hysteresis and eddy current losses. If the voltage and frequency are doubled, the ratio of the hysteresis and eddy current losses is

A. 1 : 2
B. 1 : 4
C. 4 : 1
D. 2 : 1

Ans. A

Sol. As voltage and frequency both are doubled so $\frac{V}{f}$ remains constant

When $\frac{V}{f}$ is constant

Hysteresis loss Ph is directly proportional to f

& eddy current loss Pe is directly proportional to f^2

So, Ratio $= \frac{Ph}{Pe} = \frac{2f}{4f} = 1:2$

22. ind the capacitance of two spherical shells with outer sphere radius 6 cm and inner sphere radius 2 cm. A dielectric having $\varepsilon_r = 8$ is filled between these two spheres.

A. 26.67 nF
B. 13.33 PF
C. 15.68 pF
D. 26.67 pF

Ans. D

Sol. $C = \frac{4\pi\varepsilon}{\frac{1}{a} - \frac{1}{b}}$

$C = \frac{4\pi \times \varepsilon_0\varepsilon_r}{\frac{1}{a} - \frac{1}{b}} = \frac{4\pi \times 8.85 \times 10^{-12} \times 8}{\frac{1}{2\times10^{-2}} - \frac{1}{6\times10^{-2}}}$

C = 26.67 pF

23. The simplified SOP from of the K-map shown below is

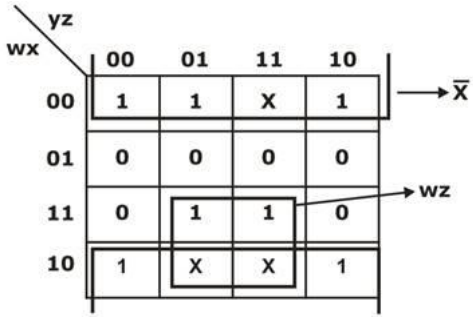
wx \ yz	00	01	11	10
00	1	1	X	1
01	0	0	0	0
11	0	1	1	0
10	1	X	X	1

A. $\bar{x} + wz$ B. $x + \bar{w}z$

C. $x + wz$ D. $w + \bar{x}z$

Ans. A

Sol.



SOP $= \bar{x} + wz$

24. A 220V dc shunt machine has an armature resistance of 1 ohm. The full load current is 10A . The difference in the induced emf when the machine is running as a generator and as a motor is?

A. 40 V B. 20 V

C. 10 V D. 50 V

Ans. B

Sol. For generator

$E_g = V + I_aR_a$

$E_g = 220 + 10 \times 1$

$E_g = 230$ V

For Motor

$E_b = V\ I_aR_a$

$E_b = 220 - 10 \times 1$

$E_b = 210$ V

So, difference $E_g - E_b$

$230 - 210 = 20$ V

25. In region $\bar{D} = 2x\,a\hat{x} + y\,a\hat{y} + 3a\hat{z}\ c/m^2$

The flux radiating out of a sphere of radius 1m centered at the origin is

A. 4π B. 2π

C. 8π D. 6π

Ans. C

Sol. $\nabla . \vec{D} = \frac{\partial D_x}{\partial x} + \frac{\partial D_y}{\partial y} + \frac{\partial D_z}{\partial z}$

= 2 + 1 + 3

= 6

We know $\nabla . \vec{D} = Pv$

So, $\boxed{Pv = 6}$

From Gauss's law $\psi_{net} = Q_{enc} - \int_v Pv\ dv$

Q = ρv × volume of sphere

$Q = 6 \times \frac{4}{3}\pi r^3$

$Q = 8\pi r^3$

$Q = 8\pi(1)^3 = 8\pi$

26. The value of integral $\int_{-\infty}^{t-8} \delta(\tau - 1)d\tau$ is

A. u(t -6) B. 0

C. U(t – 9) D. u(t)

Ans. C

Sol. From shifting property

$\int_{-\infty}^{\infty} f(t)\delta(t - t_0)\,dt = f(t_0)$

So, $I = \int_{-\infty}^{t-8} \delta(\tau - 1)\,d\tau = 1$

Only where t -8 > 1;

t > 9

I = 0 where t – 8 < 1;

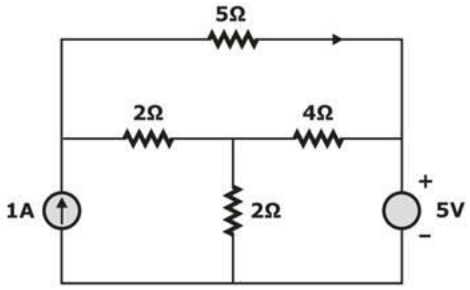
t < 9

So, I = 1; t > 9

I = 0; t < 9

I = u (t – 9)

27. Consider the following circuit

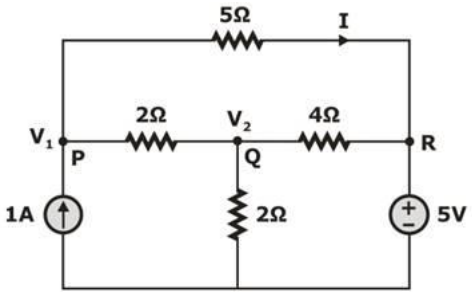


What is the value of current I in the 5Ω resistor?

A. 4 A
B. 6 A
C. 0 A
D. 2 A

Ans. C

Sol.



Applying kVL at node P

$$-1+\frac{V_1-V_2}{2}+\frac{V_1-5}{5}=0$$

$-10 + 5V_1 - 5V_2 + 2V_1 - 10 = 0$

$7V_1 - 5V_2 = 20$ …(1)

Applying kVL at node Q

$$\frac{V_2-V_1}{2}+\frac{V_2}{2}+\frac{V_2-5}{4}=0$$

$2V_2 - 2V_1 + 2V_2 + V_2 - 5 = 0$

$- 2V + 5V_2 = 5$ …(2)

Solving eq. (1) & (2) adding,

$$\begin{array}{r} 7V_1-5V_2=20 \\ -2V_1+5V_2=5 \\ \hline 5V_1 \qquad\quad =25 \end{array}$$

$V_1 = 5$

So, $I=\frac{5-5}{5}=0$

28. Conventional Artificial Intelligence is different from soft computing in the sense

A. Conventional Artificial Intelligence deals with predicate logic whereas soft computing deal with fuzzy logic

B. Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data

C. Both A and B

D. None of the above

Ans. C

Sol. Conventional Artificial Intelligence is different from soft computing in the sense:

1. Conventional Artificial Intelligence deals with predicate logic whereas soft computing deals with fuzzy logic.

2. Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data.

29. A 3 phase 10 –pole star connected alternator runs at 600 rpm. It has 140 slots with 10 conductor per slot. The slot harmonics may be of order?

A. 25, 23 B. 19, 21

C. 17, 19 D. 27, 29

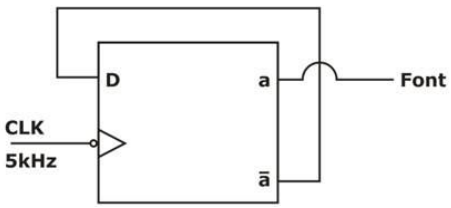
Ans. D

Sol. Number of Slots/Pole $= \frac{140}{10} = 14$

Slot harmonics will be of order $\frac{2s}{P} \pm 1$

So, slot harmonics = 27, 29

30. The output signal frequency of the circuit shown below is – if the input clock signal frequency is 5 kHz



A. 1 kHz B. 2.5 kHz

C. 4 kHz D. 10 kHz

Ans. B

Sol. The above D flip flop operates in toggle mode.

So, font $= \frac{f_0}{2}$

So, font $= \frac{5}{2} = 2.5$ kHz

31. The signal that remains the same under time scaling operation on it is

A. $t^3\,u(t)$ B. $e^{-t}\,u(t)$

C. $|t|$ D. $u^2(t)$

Ans. D

Sol. Time scaling operation of x(t) is x(at)

$u(t) = 1, t > 0$

$u(t) = 0, t < 0$

$u^2(t) = u(t)\,u(t) = u(t)$

$u(at) = 1, at > 0$

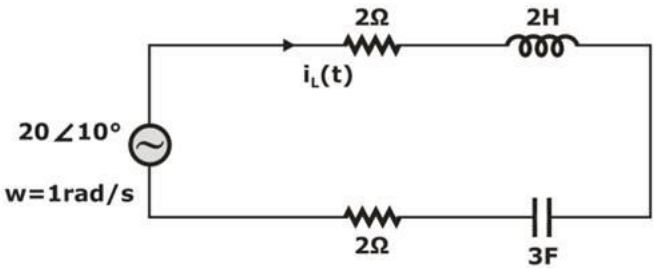
$t > 0$

$u(at) = 0\ at < 0$

$t < 0$

So, time scaling operation does not affect u(t), remaining all the signals are affected by time scaling property.

32. In the circuit shown in the figure, the current $i_L(t)$ is



A. 10 ∠ -35° B. 5 ∠ 30°

C. 7.07 ∠ 45° D. 7.07 ∠ −35°

Ans. D

Sol. $i_L(t) = \dfrac{20\angle 10^\circ}{2 + 2j}$ {as $X_L = wL = 1\times 2 = 2\ \Omega$ }

$$i_L(t) = \frac{20\angle 10^\circ}{2.828\angle 45^\circ} = 7.07\angle -35^\circ$$

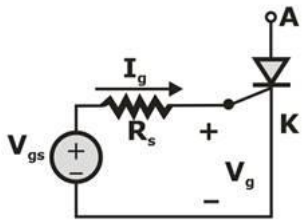
33. For an SCR, the gate cathode characteristics has a straight-line slope of $\dfrac{V_g}{I_g} = 130$. For triggering source voltage of 15 V and allowable gate source power dissipation of 0.5 W the gate source resistance is.

A. 111.93 Ω B. 130 Ω

C. 142.62 Ω D. 123.67 Ω

Ans. A

Sol.



$V_gI_g = 0.5$ W

$$\frac{V_g}{I_g} = 130$$

$$130I_g^2 = 0.5 \Rightarrow I_g = \sqrt{\frac{0.5}{130}} = 0.062 \text{ A}$$

Gate voltage $V_g = 130 \times 0.062 = 8.06$ V

Applying KVL in the Loop,

$-V_{gs} + I_gR_s + V_g = 0$

$-15 + 0.062\ Rs + 8.06 = 0$

$$R_s = \frac{15 - 8.06}{0.062} = 111.93\ \Omega$$

Option A is correct.

34. A BJT is operating in the cutoff region. Which of the following junction of the transistor is reverse-biased?

A. collector base
B. emitter base
C. both A and B
D. none of these

Ans. C

Sol. The output characteristics region of a BJT consists of 3 regions:

Active region – In this region, the base-emitter junction is forward-biased, while the collector-base junction is reverse-biased.

Cut-off region – In this region, the base-emitter and collector-base junctions are both reverse-biased.

Saturation region – In this region, the base-emitter and collector-base junctions are both forward-biased.

35. Which of the following statement is incorrect with reference to 'Harmonics'?

A. Harmonics refers to the distortion of a sinusoidal signal by the waveforms of different frequencies.

B. Harmonic frequencies are multiples of the fundamental frequency of the signal.

C. The fundamental component is the lowest-order harmonic of a signal.

D. None of the above.

Ans. C

Sol. The fundamental component is the fundamental frequency of the signal. The lowest-order harmonic is the harmonic component whose frequency is closest to the fundamental component. In case of odd symmetry, the lowest-order harmonic is the 3rd harmonic.

36. The characteristic equation of feedback control system is given by $2s^4 + s^3 + 2s^2 + 5s + 8 = 0$. The number of roots in the right half of s plane is

A. 0 B. 3

C. 2 D. 1

Ans. C

Sol.

s^4	2	2	8
s^3	1	5	0
s^2	−8	8	
s^1	6	0	
s^0	8		

There are two sign changes in 1st column Routh aeray. So, 2 Poles are located in plane.

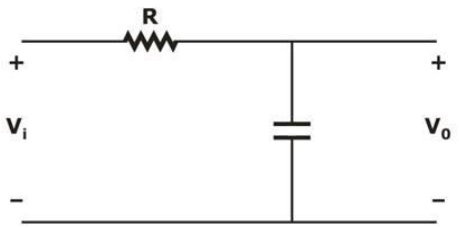
37. A first order low pass R-C circuit is excited with a unit step function. The voltage response across the capacitor is? (Capacitor is initially discharged)

A. $e^{-t/RC}$ B. $-e^{-t/RC}$

C. $1 - e^{-t/RC}$ D. $C\,e^{-t/RC}$

Ans. C

Sol.



$$V_0 = \frac{Vi}{R + \frac{1}{Cs}} \cdot \frac{1}{C_s} = \frac{Vi}{1 + RCs}$$

Vi is unit step function so, $Vi(s) = \frac{1}{s}$

So, $V_0 = \frac{1}{s(1 + RCs)} = \frac{\frac{1}{RC}}{s\left(s + \frac{1}{RC}\right)}$

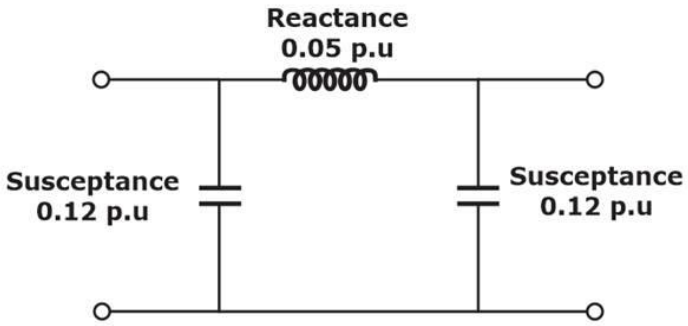
$V_0 = \frac{1}{s} - \frac{1}{s + \frac{1}{RC}}$ {By Partial function)

So, $V_0 = (1 - e^{-t/RC})\,u(t)$

38. The bus admittance matrix for a power system network is given by,

$$[Y]_{BUS} = \begin{bmatrix} -j9.75 & j2 & j2.5 \\ j2 & -j6.25 & j3.7 \\ j2.5 & j3.7 & -j8.3 \end{bmatrix}$$

A new transmission line which is represented below is connected between bus 1 and 3.



The modified bus admittance matrix is

A. $\begin{bmatrix} -j9.75 & j2 & j17.5 \\ j2 & -j6.25 & j3.70 \\ j17.5 & j3.70 & -j20.42 \end{bmatrix}$

B. $\begin{bmatrix} -j29.87 & j2 & j17.5 \\ j2 & -j6.25 & j3.70 \\ j17.5 & j3.70 & -j28.42 \end{bmatrix}$

C. $\begin{bmatrix} j29.63 & -j2 & j17.5 \\ -j2 & -j6.25 & j3.70 \\ -j22.5 & j3.70 & -j8.30 \end{bmatrix}$

D. $\begin{bmatrix} -j29.63 & j2 & j22.5 \\ j2 & -j6.25 & j3.70 \\ j22.5 & j3.70 & -j28.18 \end{bmatrix}$

Ans. D

Sol. The new transmission line is connected between bus (1) and (3), so element has to be changed, are Y_{11}, Y_{13}, Y_{31}, Y_{33}

$$Y_{11(new)} = Y_{11(old)} + \frac{1}{jX_{13}} + jY_{susceptance}$$

$$Y_{11(new)} = -j9.75 + \frac{1}{j0.05} + j0.12$$

$Y_{11(new)} = -j29.63$

$$Y_{13} = -j2.50 + \frac{1}{j0.05} = -j22.5$$

$Y_{13} = j22.5$

Similarly, $Y_{31} = j22.5$

$$Y_{33(new)} = Y_{33(old)} + \frac{1}{jX_{13}} + jY_{susceptance}$$

$$Y_{33} = -j8.30 + \frac{1}{j0.05} + j0.12$$

$Y_{33} = -j28.18$

Modified bus admittance matrix,

$$[Y_{BUS}]_{new} = \begin{bmatrix} -29.63 & j2 & j22.5 \\ j2 & -j6.25 & j3.70 \\ j22.5 & j3.70 & -j28.18 \end{bmatrix}$$

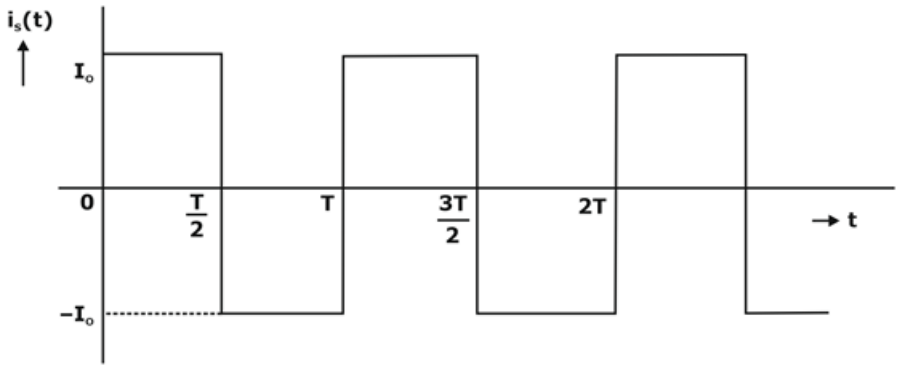
39. A single-phase, full-bridge rectifier fed from 230V, 50 Hz sinusoidal source supply a series combination of finite resistance 'R' and a very large inductance, L. The two most dominate frequency components in the source current are:

A. 150 Hz, 250 Hz
B. 50 Hz, 100 Hz
C. 50 Hz, 0 Hz
D. 50 Hz, 150 Hz

Ans. D

Sol. In a single-phase full bridge diode rectifier, since load is a series combination of finite resistance (R) and a very high Inductance (L). Load current is constant (I_o)

Source current is square wave form.



Fourier series representation of source current

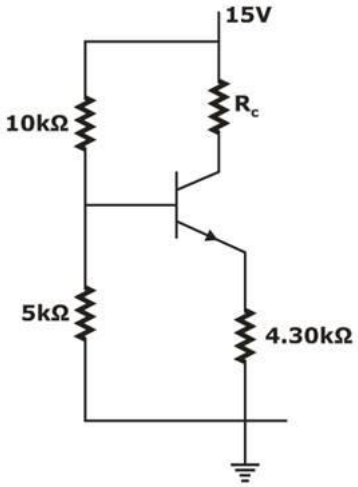
$$i_s(f) = \sum_{n=1,3,5}^{\infty} \frac{4I_o}{n\pi} \sin n\omega t, \quad \text{where } \omega = \frac{2\pi}{T}$$

Two most dominant frequency

Components are f,3f [fundamental and third harmonics]

50 Hz, 150 Hz.

40. In the circuit given below, assume that the transistor is in active region. It has a large β and its base-emitter voltage is 0.7V. The value of I_C is



A. 1 mA
B. 6 mA
C. 10 mA
D. 4 mA

Ans. C

Sol. Given it has large β, so $I_\beta \approx 0$

By using voltage division principle

$$V_B = V_{cc} \times \frac{R_1}{R_1 + R_2}$$

$$V_B = 15\left(\frac{5}{5+10}\right)$$

$V_B = 5V$

$V_B = V_B - V_E = 0.7$ V

$V_E = V_B - 0.7 = 4.3$ V

$$I_C \simeq I_E = \frac{V_E}{R_E} = \frac{4.3}{430} = 10 \text{ mA}$$

$I_c = 10$ mA

41. Two signals $x_1[n]$ and $x_2[n]$ are given by $x_1(n) = \{\underset{\uparrow}{1}, 1, 2, 4\}$ and $x_2(n)\{0, 2, \underset{\uparrow}{1}\}$ If x[n] is the convolution of $x_1[n]$ and $x_2[n]$ then the value of x[n] at n = 1 is?

A. 7
B. 5
C. 3
D. 2

Ans. B

Sol.

$x(n) = x_1(n) * x_2(n) =$

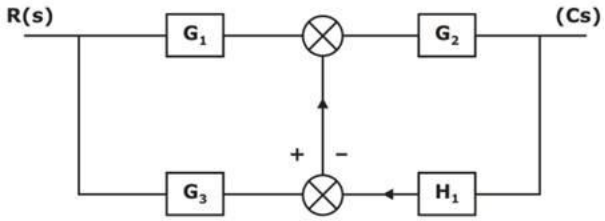
	0	2	1
1	0	2	1
1	0	2	1
2	0	4	2
4	0	8	4

$$x(n) = \left\{ \begin{matrix} 0, & 2, & 3, & 5, & 10, & 4 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ -2 & -1 & 0 & 1 & 2 & 3 \end{matrix} \right\}$$

Lower limit = - 2 + 0 = - 2

So, x(n) at $n = 1$ is 5

42.



What is the transfer function of the block diagram given above

A. $\frac{G_1G_3 + G_2G_3}{1 + G_2H_1}$

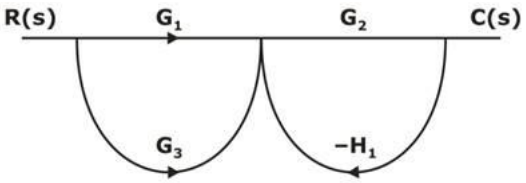
B. $\frac{G_1G_2 + G_2G_3}{1 + G_1G_2G_3H_1}$

C. $\frac{G_1G_2 + G_2G_3}{1 + G_2H_1}$

D. $\frac{G_1G_3 + G_2G_3}{1 + G_2G_3H_1}$

Ans. C

Sol. Drawing SFG



So, Number of loops = 1 = - G_2H_1

Number of forward path = 2,

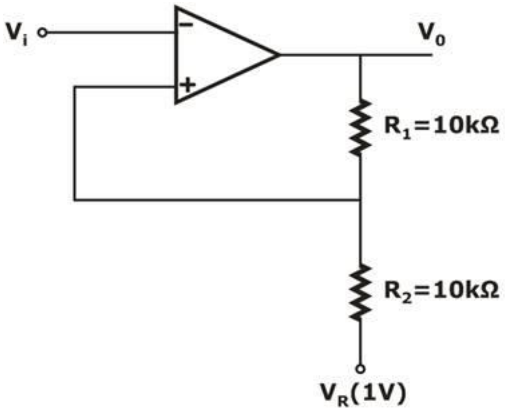
$P_1 = G_1G_2$, $P_2 = G_3G_2$

$\Delta_1 = 1$, $\Delta_2 = 1$

Applying Mason's Gain formula

$$T.F = \frac{G_1G_2 + G_3G_2}{1 + G_2H_1}$$

43. In the circuit of Schmitt trigger of fig the hysteresis V_H is? Assume $V_i < V_1$ $V_0 = +5$ V



A. 1 V
B. 0.01 V
C. 0.1 V
D. 0.5 V

Ans. C

Sol. From the circuit

$$\frac{V_1 - V_0}{10000} + \frac{V_1 - 1}{100} = 0 \quad \ldots(i)$$

With $V_0 = +5$

Putting in equation 1

We get $V_1 = V_{UTP} = 1.04V$

With $V_0 = -5V$

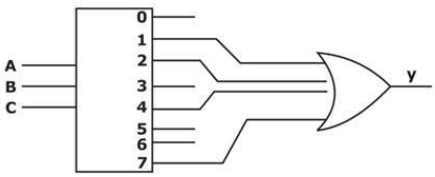
Putting in equation 1,

We get, $V_1 = V_{LTP} = 0.94V$

So, $V_H = V_{UTP} - V_{LTP}$

$= 1.04 - 0.94 = 0.1$ V

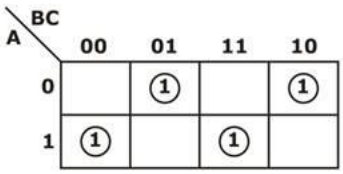
44. The circuit show below is



A. Half Adder
B. Full Adder
C. 3 Input Ex – OR Gate
D. 3 Input Ex- NOR Gate

Ans. C

Sol. $y = \Sigma m\ (1, 2, 4, 7)$



$Y = A \oplus B \oplus C$ represent 3 Input Ex – OR gate

45. If the vector field $\vec{A} = x\,a\hat{x} + 4y\,\hat{a}y + kz\,a\hat{z}$ represents a magnetic field then the value of k must be

A. – 3 B. - 2

C. – 5 D. 1

Ans. C

Sol. Given $\vec{A} = x\,a\hat{x} + 4y\,a\hat{y} + kz\,a\hat{z}$

as $\vec{A}$ represent magnetic field

So, $\nabla \cdot A = 0$

So, $\frac{\partial A_x}{\partial x} + \frac{\partial A_y}{\partial y} + \frac{\partial A_z}{\partial z} = 0$

1 + 4 + k = 0

$\boxed{k = -5}$

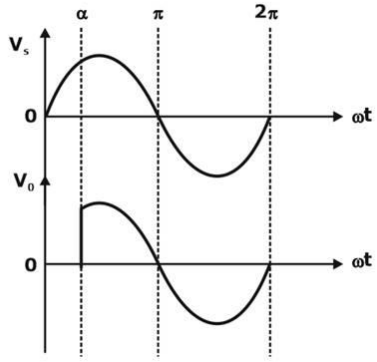
46. A single phase, half wave, A .C voltage controller feeds a load of R = 10 Ω with an input voltage of 230 V, 50 Hz. Firing angle for thyristor is 60°. The average input current is _____.

A. – 4.61 A B. – 2.58 A

C. 1.21 A D. 2.58 A

Ans. B

Sol.



The average output voltage is

$$V_{o(avg)} = \frac{V_m}{2\pi}\left[\cos\alpha - 1\right]$$

$$V_{o(avg)} = \frac{230 \times \sqrt{2}}{2\pi}\left[\cos 60° - 1\right]$$

$V_{o(avg)}$ = -25.89 V

The average input current,

$$I_{in} = \frac{V_{o(avg)}}{R} = -\frac{25.89}{10} = -2.58\ A$$

47. The full load copper loss of a transformer working at unity power factor is W_c watts. The copper low at full load 0.8 Pf will be?

A. 0.8 W_c B. $(0.8)^2$ W_c

C. W_c D. None

Ans. C

Sol. Copper loss does not depends on power factor and depends only on the friction of full load. So here copper loss = W_c watts

48. Who initiated the idea of Soft Computing?

A. Charles Darwin B. Lofti A Zadeh

C. Rechenberg D. Mc Culloch

Ans. B

Sol. The idea of Soft Computing was initiated by Lofti A Zadeh.

49. The compliment of the function

$F = (A + \bar{B})(\bar{C} + D)(\bar{B} + C)$ is

A. $A\bar{B} + \bar{C}D + \bar{B}\bar{C}$ B. $\bar{A}B + C\bar{D} + B\bar{C}$

C. $A\bar{B} + C\bar{D} + BC$ D. $AB + B\bar{C} + CD$

Ans. B

Sol. $F = (A + \bar{B})(\bar{C} + D)(\bar{B} + C)$

Using Demorgon's law.

Complement of $F = \bar{F} = \overline{(A + \bar{B})(\bar{C} + D)(\bar{B} + C)}$

$\bar{F} = \overline{A + \bar{B}} + \overline{\bar{C} + D} + \overline{\bar{B} + C}$

$\boxed{\bar{F} = \bar{A}B + C\bar{D} + B\bar{C}}$

50. What is the ratio of stating torque and maximum torque of a 3- phase 50 Hz 4 Pole induction motor for a maximum torque at 1300 rpm?

A. 0.34 B. 0.29

C. 0.40 D. 0.255

Ans. D

Sol. $Ns = \frac{120 \times f}{P} = \frac{120 \times 50}{4} = 1500$

$Sm = \frac{1500 - 1300}{1500} = 0.13$

$\frac{T_{\delta t}}{T_{max}} = \frac{2\,Sm}{1 + Sm^2} = \frac{2 \times 0.13}{1 + (0.13)^2} = 0.255$

51. Consider the following statements:

X. The kirchoff's Laws are valid only for linear networks

Y. The Ohm's law is applicable only to the lumped elements

Z. The Ohm's law is valid only at a constant temp.

Which of the above statements is/are true

A. X and Y
B. Y and Z
C. Z and X
D. Z only

Ans. D

Sol. 1. Ohm's law is applicable for both lumped and distributed elements

2. The Ohm's law is valid only at a constant temp.

3. Kirchoff's laws are valid for linear as well as non linear networks.

52. The unit impulse response of a unity feedback control system is given by $C(t) = -2te^{-t} + 4e^{-t}$. The open loop transfer function is equal to

A. $\frac{4s+2}{s^2-2s-1}$
B. $\frac{4s+2}{s^2}$
C. $\frac{4s+2}{s^2+4}$
D. $\frac{4s+2}{s^2+2s}$

Ans. A

Sol. TF = L [Impulse Response]

So $T.F = \frac{-2}{(s+1)^2} + \frac{4}{s+1} = \frac{-2+4s+4}{(s+1)^2}$

$T.F = \frac{4s+2}{(s+1)^2}$

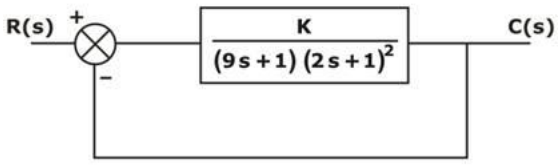
Now Open loop $T.F = \frac{CLTF}{1-CLTF}\left\{\begin{matrix}CLTF = Closed\\ loop\ T.F\end{matrix}\right.$

So, open loop $T.F = \frac{\frac{4s+2}{(s+1)^2}}{1-\frac{4s+2}{(s+1)^2}}$

$= \frac{4s+2}{s^2+1+2s-4s-2}$

$= \frac{4s+2}{s^2-2s-1}$

53. The system shown in the figure has a unit step input. In order that the steady stat error is 0.2 the value of k required is



A. 3 B. 9

C. 8 D. 4

Ans. D

Sol. Given unit step input

So, positional error constant

$$K_p = \lim_{s\to 0} G(s) = \frac{K}{(1)(1)^2} = K$$

Steady state error

$$= \frac{A}{1+K_p} = \frac{1}{1+K_p} = 0.2$$

$1 + K_P = 5$

$\boxed{K_P = 4}$

54. Which amongst the following is true?

A. Transient stability limit is more than steady state stability limit.

B. Transient stability limit is equal to steady state stability limit.

C. Transient stability limit is less than steady state stability limit.

D. None

Ans. C

Sol. Transient stability limit is lower than steady state stability limit because TSL is the maximum power transferrable during the fault condition, whereas steady state limit is gradual increasing of load/power. Hence, the gradual increase will be obviously more than the sudden increase.

55. Which of the following are advantages of using bundled conductors?

(i) Reduced Reactance

(ii) Reduced Voltage gradient

(iii) Reduced surge impedance

A. (ii) only B. (ii) and (iii)

C. (i) and (iii) D. All of the above

Ans. D

Sol. Reactance and surge impedance of bundle conductors are reduced because self GMD of the bundle conductors is increased. By using bundle conductors, spacing between the conductors of bundle is more which decreases the voltage gradient.

56. What is the power and RMS value of

$$x(t) = 12\sin\left(10t + \frac{\pi}{6}\right) + 14\sin\left(30t + \frac{\pi}{3}\right)$$

A. 144, $\sqrt{144}$ B. 156, $\sqrt{156}$

C. 170, $\sqrt{170}$ D. 180, $\sqrt{180}$

Ans. C

Sol. RMS value $= \sqrt{\left(\frac{12}{\sqrt{2}}\right)^2 + \left(\frac{14}{\sqrt{2}}\right)^2}$

$$= \sqrt{\frac{144+196}{2}} = \sqrt{170}$$

Power = RMS^2 =170

57. In a Fast-decoupled load flow method. Which of the following assumption does not hold good (symbols with usual notation are given)?

A. $G_{ij}\sin(\theta_{ij}) \ll B_{ij}$ B. $Q_i \gg B_{11}|V_1|^2$

C. $\cos(\delta_1 - \delta_j) = 1$ D. $|V_1|^2 = |V_1|$

Ans. B

Sol. Fast decoupled load flow studies have following assumption:

1. $\cos(\delta_1 - \delta_j) = 1$
2. $\sin(\delta_1 - \delta_j) = 0$
3. $G_{ij}\ \text{Sin}\ \theta_{ij} \ll B_{ij}$
4. $Q_i \ll B_{ij}|V_1|^2$
5. $|V_i|^2 = |V_i| < |V_j| = 1$
6. All angles are taken in radians.

58. In order to obtain static voltage equalization in series-connected SCRs, Connections are made of

A. One resistor across the string

B. Resistors of different value across each SCR

C. One resistor in series with the string

D. Resistors of the same value across each SCR

Ans. D

Sol. In series connected SCR's uniform voltage distribution in steady state can be achieved by connecting a suitable resistance across each SCR such that each parallel combination has the same resistance. This will require different value of resistance for each SCR which is a

difficult proposition. A more practical way of obtaining a reasonably uniform voltage distribution during steady state working of series-connected SCR's is to connect the same value of shunt resistance 'R' across each SCR.

59. A 80 MVA , 11 KV synchronous generator has X_d = 0.5 pu. The X_d value (in pu) to the base of 120 MVA , 22 KV is ?

A. 0.1875 B. 0.5625

C. 0.625 D. 0.1125

Ans. A

Sol. X_d = 0.5 pu is given on its rating base i.e.

$X_{pu(old)}$ = 0.5 on $(MVA)_{B\text{-}old}$ = 80 MVA & $(KV)_{old}$ = 11

On new base

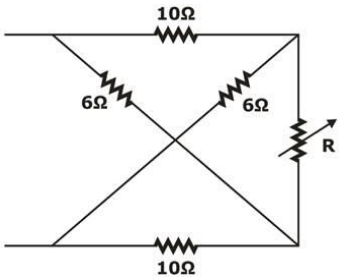
$(MVA)_{B\text{-}new}$ = 120 & $KV_{B\text{-}new}$ = 22

$Z_{pu}(new) = Z_{pu}\ (old\ ) \times [(MVA)_{B\text{-}new} \times (KV)_{B\text{-}old}^2]/[(MVA)_{B\text{-}old} \times (KV)_{B\text{-}new}^2]$

$Z_{pu}(new) = 0.5 \times 120/80 \times (11/22)^2$

= 0.1875 pu

60. In the lattice Network. Find the value of R for the maximum power transfer to the load.



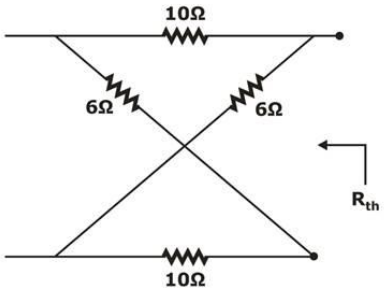
A. 8Ω B. 6Ω

C. 4Ω D. 7Ω

Ans. A

Sol. For maximum power transfer to the load, we will calculate R_{th} across R.

After opening the load resistance.



R_{th} = (10 + 6) || (10 + 6)

= 16 || 16

= 8 Ω

****

Classroom

JE Foundation

An Electrical Engineering Course

Crack All JE Exams with this Comprehensive Course

Why take this course?

- Full Coverage of Technical Subjects & Concepts
- Expert Faculty from Delhi
- Study Notes & Daily Tests
- Subject Tests & Full-Length Mock Tests

Vijay Bansal,
Manoj Kumar,
Naveen Gollapally

Prep Smart. Score Better. Go gradeup

gradeup.co