gradeup

SSC JE 2019–20

Electrical Engineering

Mega Mock Challenge

(Mar 27- Mar 28 2020)

Questions & Solutions

1. In the following question, select the related word from the given alternatives.

    Rabies : Dog :: Ebola : ?

    A. Fish   B. Mosquito

    C. Cat   D. Bats

Ans. D

Sol. Here, Rabies is related to Dog and Ebola is related to Bats.

      Rabies virus is spread by infected Dogs, they are believed to the carrier in nature.

      Ebola virus is spread by infected Bats, fruits bats are believed to the carrier in nature.

      Hence, the correct option is D.

2. Select the word-pair in which the two words are related in the same way as the two words in the following word-pair.

    Author : Book ::

    A. Doctor : Hospital   B. Spider : Web

    C. Mother : Son   D. Reptile : Crawl

Ans. B

Sol. The specific work of an author is to write a book. Similarly, the specific work of a spider is to spin the web (web are structure created by spiders).

      Hence, the correct option is B.

3. In the following question, select the related word from the given alternatives.

    Mason : Plumb line :: ? : ?

    A. Surgeon : Scalpel   B. Sculptor : Spade

    C. Blacksmith : Forcep   D. Gardener : Saw

Ans. A

Sol. Plumb line is the reference line with plumb bob a kind of tool used by Manson for building purpose. Similarly, Scalpel is the tool or instrument used by a Surgeon for surgery. Thus the pair related to the given pair is Surgeon : Scalpel.

      Hence, the correct option is A.

4. In the following question, select the related group of letters from the given alternatives.

    ACED : AIYP :: BECA : ?

    A. AIDY   B. DIYA

    C. DYIA   D. YIAD

Ans. C

Sol. **Logic:** Each letter in the second letter cluster is the square of the first letter cluster.

      A(1) → A(1)

      C(3) → I(9)

      E(5) → Y(25)

      D(4) → P(16)

Similarly,

B(2) → D(4)

E(5) → Y(25)

C(3) → I(9)

A(1) → A(1)

So, (BECA : DYIA)

Hence, the correct option is C.

5.   In the following question, select the related group of letters from the given alternatives.

CD : PQ :: GH : ?

A. RS   B. TU

C. UV   D. WX

Ans. B

Sol. There are 26 alphabets in English and if we assign numbers to each and every alphabet
starting from 'A', 'B', 'C etc., it will appear to be:

A=1, B=2, C=3, D=4……. likewise, till Z=26

So,

(3)C + 13 = P

(4)D + 13 = Q

Likewise,

(7)G + 13 = T

(8)H + 13 = U

Hence, the correct option is B.

6.   In the following question, select the related group of letters from the given alternatives.

KOT : PJO :: FIR : ?

A. TMN   B. NKM

C. KDM   D. MNJ

Ans. C

Sol.

Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Position value	1	2	3	4	5	6	7	8	9	10	11	12	13
Alphabet	Z	Y	X	W	V	U	T	S	R	Q	P	O	N
Position value	26	25	24	23	22	21	20	19	18	17	16	15	14

Here,

K + 5 = P

O – 5 = J

T – 5 = O

Likewise,

F + 5 = K

I − 5 = D

R − 5 = M

Hence, the correct option is C.

7. In the following question, select the related number from the given alternatives.

16 : 27 :: 25 : ?

A. 56 B. 64

C. 46 D. 54

Ans. B

Sol. Here, 16 : 27 may be written as $(4)^2 : (4-1)^3$

Similarly, the second pair is $(5)^2 : (5-1)^3 \rightarrow 25 : 64$

So, 64 is the required answer.

Hence, the correct option is B.

8. In the following question, select the related number from the given alternatives.

$$\frac{5}{3} : \frac{26}{16} :: \frac{7}{4} : ?$$

A. $\frac{56}{16}$ B. $\frac{36}{22}$

C. $\frac{30}{21}$ D. $\frac{36}{21}$

Ans. D

Sol. Here, $\frac{5}{3} : \frac{26}{16}$ may be represented as follows:

$$\frac{5}{3} : \frac{5 \times 5+1}{3 \times 5+1} \Rightarrow \frac{5}{3} : \frac{26}{16}$$

Similarly,

$$\Rightarrow \frac{7}{4} : \frac{7 \times 5+1}{4 \times 5+1} \Rightarrow \frac{7}{4} : \frac{36}{21}$$

Thus, $\frac{36}{21}$ is the required answer.

Hence, the correct option is D.

9. In the following question, select the related number from the given alternatives.

24 : 4 :: 72 : ?

A. 8 B. 5

C. 6 D. 9

Ans. A

Sol. Here, 24 : 4 may be written as;

$$\Rightarrow 24 : \frac{24}{2+4} = \frac{24}{6} = 24 : 4$$

Similarly,

$$\Rightarrow 72 : \frac{72}{7+2} = \frac{72}{9} = 72 : 8$$

Thus, 8 is the required answer.

Hence, the correct option is A.

10. Three of the following four number-pairs are alike in a certain way and one is different. Find the odd one out.

A. 13 – 40   B. 18 – 55

C. 9 – 29   D. 17 – 52

Ans. C

Sol. The pattern is :

13 × 3 + 1 = 40

18 × 3 + 1= 55

9 × 3 + 1 = 27 and not 29

17 × 3 + 1= 52

Hence, the correct option is C.

11. In the following question, select the odd number pair from the given alternatives.

A. 58 : 29   B. 70 : 35

C. 86 : 43   D. 95 : 59

Ans. D

Sol. Except for option D that does not follow the above pattern, all other three follows the format of = (2x : x).

Like, (58 : 29) ⇐ (2 × 29 : 29)

Hence, the correct option is D.

12. In the following question, select the odd number from the given alternatives.

A. 953   B. 523

C. 312   D. 734

Ans. A

Sol. Except for option (A), all others follow the following logic: **First digit = sum of last two digits.**

A. 953; 9 = 5 + 3 = 8

B. 523; 5 = 2 + 3 = 5

C. 312; 3 = 1 + 2 = 3

D. 734; 7 = 3 + 4 = 7

Hence, option A is the correct answer.

13. In the following question, select the odd letters from the given alternatives.

    A. AD   B. HJ

    C. NP   D. OQ

Ans. A

Sol. Except for AD, in all other pairs, the second letter is 2 steps ahead of the first letter.

Hence, the correct option is A.

14. Three of the following four letter-clusters are alike in a certain way and one is different. Pick the odd one out.

    A. PXWQ   B. SKLV

    C. BKJC   D. FNMG

Ans. B

Sol. Except for SKLV, all other options have first and last letters in consecutive order according to the alphabetical order. Similarly, third and second letters in reverse order as per the alphabetical order.
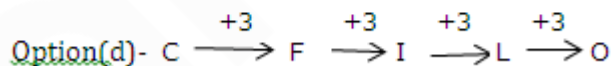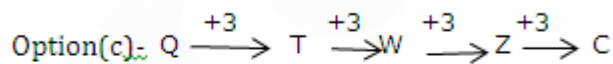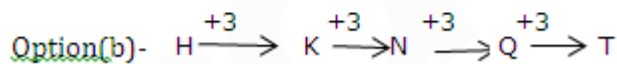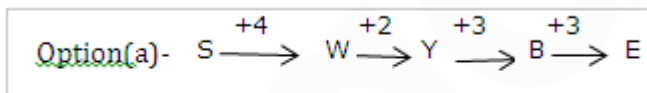
Hence, the correct option is B.

15. In the following four letter-group, three-letter group are related to one another in a certain way and one letter group is different from others. Find the different letter group.

    A. SWYBE   B. HKNQT

    C. QTWZC   D. CFILO

Ans. A

Sol.

Hence, the correct answer is option A.

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

    A. Earthworm   B. Mole

    C. Chipmunk   D. Monkey

Ans. D

Sol. All except 'Monkey' lives underground burrows. However, monkeys prefer to live on trees and some on grounds.

Hence, the correct option is D.

17. In the following question, select the odd word from the given alternatives.
    A. Lizard   B. Snake
    C. Octopus   D. Dog
Ans. D
Sol. Except for dog, all others are groups of animals that crawl.
    Hence, the correct option is D.

18. In the following question, select the odd word from the given alternatives.
    A. Berlin   B. Malé
    C. Kale   D. Lisbon
Ans. C
Sol. Except for Kale (leaf cabbage), all others are the capital of a country.
    Berlin is the capital of **Germany.**
    Malé is the capital of the **Maldives.**
    Lisbon is the capital of **Portugal.**
    Hence, the correct option is C.

19. Which of the following options represents the logical and meaningful combination of the given words?
    1. Karnataka   2. Banglore
    3. Asia   4. India
    5. World
    A. 1, 5, 4, 3, 2   B. 3, 4, 2, 1, 5
    C. 2, 1, 4, 3, 5   D. 2, 3, 4, 1, 5
Ans. C
Sol. The correct order is-
    2. Banglore
    1. Karnataka
    4. India
    3. Asia
    5. World
    Correct order is (2, 1, 4, 3, 5).
    Hence, the correct option is C.

20. Select the correct alternative to indicate the arrangement of the following words in a logical and meaningful order.
    1. Compose
    2. Content
    3. Subjects
    4. Gmail
    5. Send
    6. Recipients

A. 4, 1, 5, 3, 2, 6

B. 6, 1, 4, 3, 2, 5

C. 4, 2, 6, 3, 1, 5

D. 4, 1, 6, 3, 2, 5

Ans. D

Sol. The correct order to send a new email to someone by Gmail is-

4. Gmail

1. Compose

6. Recipients

3. Subjects

2. Content

5. Send

Correct order is (4, 1, 6, 3, 2, 5).

Hence, the correct option is D.

21. Arrange the following words in a logical and meaningful order.

1. Egypt

2. Africa

3. Great Pyramid

4. World

5. Giza

A. 3, 5, 2, 1, 4

B. 5, 3, 1, 2, 4

C. 3, 5, 1, 2, 4

D. 5, 3, 1, 4, 2

Ans. C

Sol. The Giza pyramid is the site on the Giza Plate in Egypt. Egypt is a country of Africa

Continent that is the world's second-largest continent.

So, the correct order will be;-

3. Great Pyramid

5. Giza

1. Egypt

2. Africa

4. World

Hence, the correct option is C.

22. In the following series, which letter-group will replace the question mark (?)

GXB, JVD, MTF, PRH, ?

A. SQJ

B. RPJ

C. RQI

D. SPJ

Ans. D

Sol. The pattern is :

$$G \xrightarrow{+3} J \xrightarrow{+3} M \xrightarrow{+3} P \xrightarrow{+3} S$$

$$X \xrightarrow{-2} V \xrightarrow{-2} T \xrightarrow{-2} R \xrightarrow{-2} P$$

$$B \xrightarrow{+2} D \xrightarrow{+2} F \xrightarrow{+2} H \xrightarrow{+2} J$$

Hence, the correct option is D.

23. Which letter will replace the question mark (?) in the following series?

W, Y, C, ?, I, K

A. E   B. B

C. F   D. O

Ans. A

Sol. Given series follows the pattern given below:

$$W \xrightarrow{+2} Y \xrightarrow{+4} C \xrightarrow{+2} E \xrightarrow{+4} I \xrightarrow{+2} K$$

Hence, the correct option is A.

24. Which letter-cluster will replace the question mark (?) in the following series.

PRT, TVX, ?, BDF, FHJ

A. XZB   B. YZB

C. XAB   D. XZC

Ans. A

Sol.

$$\overset{+2+2}{PRT}, \overset{+2+2}{TCX}, \overset{+2+2}{XZB}, \overset{+2+2}{BDF}, \overset{+2+2}{FHJ}$$

There is a gap of two places in each letter of every letter cluster, and the next letter cluster is starting with the last alphabet of the previous letter cluster.

Hence, the correct option is A.

25. Which number will replace the question mark (?) in the following series?

4, 10, 18, 38, ? , 150

A. 78   B. 74

C. 84   D. 70

Ans. B

Sol. Pattern is- (+2, -2, +2, -2, +2..)

⇒ 4 × 2 + 2 = 8 + 2 = 10

⇒ 10 × 2 - 2 = 20 - 2 = 18

⇒ 18 × 2 + 2 = 36 + 2 = 38

⇒ 38 × 2 - 2 = 76 - 2 = **74**

⇒ 74 × 2 + 2 = 148 + 2 = 150

Hence, the correct option is B.

26. Which option will replace the question mark (?) in the following series?

0.15, 0.20, 0.30, 0.45, 0.65, ?

A. 0.90   B. 0.85

C. 0.80   D. 0.95

Ans. A

Sol. Logic-

0.15 + 0.05 = 0.20

0.20 + 0.05 + 0.05 = 0.30

0.30 + 0.05 + 0.05 + 0.05 = 0.45

0.45 + 0.05 + 0.05 + 0.05 + 0.05 = 0.65

0.65 + 0.05 + 0.05 + 0.05 + 0.05 + 0.05 = 0.90

Hence, the correct option is A.

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

6, 22, 92,?, 2788

A. 454   B. 468

C. 472   D. 464

Ans. D

Sol. The pattern is :

$$6 \xrightarrow{\times 3 + 4} 22 \xrightarrow{\times 4 + 4} 92 \xrightarrow{\times 5 + 4} \boxed{464} \xrightarrow{\times 6 + 4} 2788$$

Hence, the correct option is D.

28. If 'A + B' means 'A is the father of B', 'A – B' means 'A is the mother of B', 'A * B' means 'A is the brother of B' and 'A % B' means 'A is the sister of B', then how is Q related to S in 'P + Q * R – S'?

A. Husband   B. Uncle
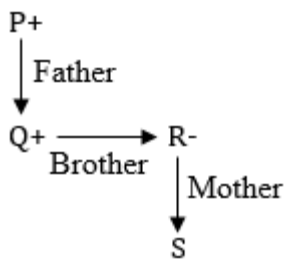
C. Brother   D. Father

Ans. B

Sol.

Symbol	Meaning
+	Father
–	Mother
*	Brother
%	Sister

Given Relation: 'P + Q * R – S'

⇒ P is the father of Q,

⇒ Q is the brother of R,

⇒ R is the mother of S.

So,

```
P+
 |
 | Father
 ↓
Q+ ────────→ R-
   Brother     |
              | Mother
              ↓
              S
```

Note: here (+) denotes male and (–) denotes female,

Clearly, Q is the maternal Uncle of S.

Hence, the correct option is B.

29. Among S, W, J, K and T each having different numbers of the books, K has more books than S and T and W has fewer books than T, S has more books than T and K has fewer books than J. Who among them is the second highest number of the books?

A. K   B. W

C. J   D. T

Ans. A

Sol. In this question, we show that – Among S, W, J, K and T each having different numbers of the books are given below,

(I). K has more books than S and T –K > S, T

(II). W has fewer books than T -T > W

(III). S has more books than T - S > T

(IV). K has fewer books than J - J > K

After observing I, II, III & IV statement we get: J > K > S > T > W

So, K has the second-highest number of books.

Hence, the correct option is A.

30. In the following question, select the word which cannot be formed using the letters of the given word.

    DELBRUGECKIAI

    A. RACING
    B. DUKE
    C. BRIDE
    D. CABLE

Ans. A

Sol. Letter 'N' is not present in the word 'DELBRUGECKIAI'. Therefore, we cannot form the word 'RACING'.

    Hence, the correct option is A.

31. In a code language, 'DEAR' is coded as '7465' and 'LIFE' is coded as '8394'. Then how 'IDEAL' will be coded in that language?

    A. 73648
    B. 37684
    C. 84673
    D. 37468

Ans. D

Sol. Take corresponding letter code-

D	E	A	R
7	4	6	5

and

L	I	F	E
8	3	9	4

Therefore,

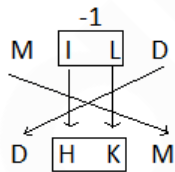| I	D	E	A	L
3	7	4	6	8

Hence, the correct option is D.

32. In a certain code language, MILD is written as DHKM, then what will be the code of SHIP ?
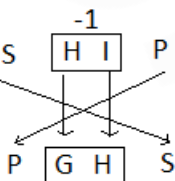
    A. HSRP
    B. HSPG
    C. PGHS
    D. PRHS

Ans. C

Sol. Pattern is:

Similarly,

So, the code for SHIP would be PGHS.

Hence, the correct option is C.

33. Which of the following two sings need to be interchanged to make the given equation correct?

    $20 \div 6 - 30 + 4 \times 24 = 80$

    A. + and ÷   B. × and —

    C. + and —   D. ÷ and ×

Ans. B

Sol. **By checking Option(A)-**

   $20 \div 6 - 30 + 4 \times 24 = 80$

   After interchanging-

   $20 + 6 - 30 \div 4 \times 24 = 80$

   Apply BODMAS,

   $20 + 6 - 30 \div 4 \times 24$

   $= 20 + 6 - 180$

   $= 26 - 180 = -154$

   Thus, $20 \div 6 - 30 + 4 \times 24 = 80$ is not the correct equation.

   By checking Option(B)-

   $20 \div 6 - 30 + 4 \times 24 = 80$

   After interchanging-

   $20 \div 6 \times 30 + 4 - 24 = 80$

   Apply BODMAS,

   $20 \div 6 \times 30 + 4 - 24$

   $= 100 + 4 - 24$

   $= 104 - 24$

   $= 80$

   Thus, $20 \div 6 - 30 + 4 \times 24 = 80$ is the correct equation.

   As, we found the correct answer, so no need to check more options.

   Hence, the correct answer is option B.

34. If 'ARUN' is coded as 54, then how will 'VARUN' be coded as?

    A. 87   B. 67

    C. 76   D. 78

Ans. C

Sol. As,

   $A + R + U + N = 1 + 18 + 21 + 14 = 54$

   Similarly,

   $V + A + R + U + N = 22 + 1 + 18 + 21 + 14 = 76$

   Hence, the correct option is C.

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35. Bablu is the brother of Dablu. Manu is the sister of Bablu. Kamya is the mother of Manu. Rahul is the husband of Kamya. How is Dablu related to Rahul?

   A. Daughter   B. Son

   C. Son or Daughter   D. Brother

Ans. C

Sol. In this question, we show that –

   Clearly, Dablu is the son or daughter of Rahul.

   Hence, the correct option is C.

36. In the following question, select the missing number from the given alternatives.

   A. 19   B. 10

   C. 14   D. 12

Ans. C

Sol. As,

   25 + 13 + 32 = (2 + 5) + (1 + 3) + (3 + 2) = 7 + 4 + 5 = 16

   Similarly,

   22 + 18 + 10 = (2 + 2) + (1 + 8) + (1 + 0) = 4 + 9 + 1 = 14

   Hence, the correct option is C.

37. Select the option which completes the following series:

   A.

   B.

   C.

   D.

Ans. D

Sol. After carefully observing the figures given in the question, it is very clear that the answer figure (D) will be the next figure.

Logic- no. of straight lines increasing by +1 with respect to the right end.

Hence, the correct option is D.

38. Abhishek started from a point. A and walked 15 meters towards the south. He turned left and walked 20 meters. He then turned left again and walked 15 meters. He again turned left and walked 35 meters and reached a point B. how far and in which direction is point B with respect to point 'A'?

A. 15 meters, West   B. 20 meters, North

C. 35 meters, South   D. 15 meters, East
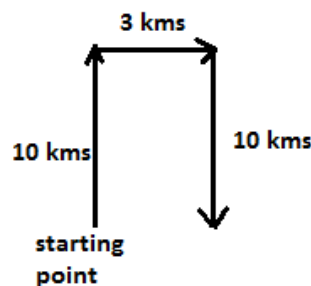
Ans. A

Sol.
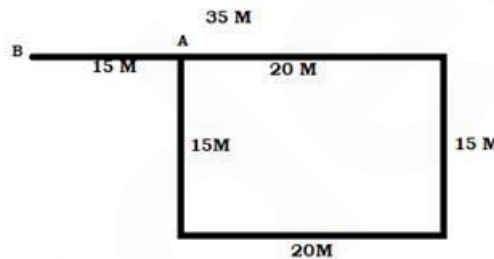
Here we can see that Abhishek is 15 meter for and in the west direction from point (A)

Hence, the correct option is A.

39. P starts from a point and walks 10 kms north and then turns right and walks 3 kms. Then again turns right and walks 10 kms. In which direction he is now from the starting point?

A. North   B. South

C. East   D. West

Ans. C

Sol.

Clearly, you can see that he is in east direction with respect to starting point.

Hence, the correct option is C.

40. Two statements are given, followed by three conclusions numbered I, II and III. Assuming the statements to be true even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

    Statements:

    All books are diaries.

    All diaries are laptop.

    Conclusions:

    I) All books are laptops.

    II) All laptops are books.

    III) Some laptops are books.
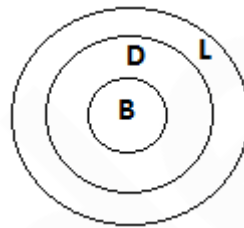
    A. Only I follow   B. All follows

    C. Only I and III follows   D. None follows

Ans. C

Sol. The least possible Venn-diagram is :

    Conclusions:

    I. All books are laptops – (true) it is a definite case.

    II. All laptops are books – (false) it is not a definite case.

    III. Some laptops are books – (true) it is a definite case.

    So, both I and III follow.

    Hence, option C is correct.

41. In the following question, some statements followed by some conclusions are given. Taking the given statements to be true even if they seem to be at variance from commonly known facts, read all the conclusions and then decide which of the given conclusions logically follows the given statements.

    Statements:

    Some boys are girls.

    Only a few girls are student.
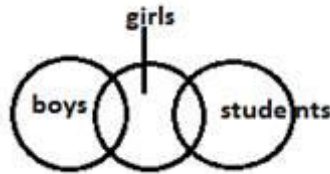
    Conclusion:

    I. Some boys are student.

    II. All boys are student is a possibility.

    III. All girls are boys.

A. Only conclusion I follow | B. Either I or II follow

C. Both I and II follows | D. Only II follow

Ans. D

Sol. The least possible Venn diagram will be,

Conclusion:

I. Some boys are student – (false) as there is no direct relation between them.

II. All boys are student is a possibility - (true) as the direct relation is not mentioned. So, it can be true.

III. All girls are boys. – (false) there may be a possibility but the given fact is definite.
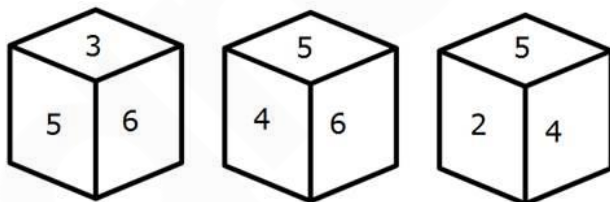
Hence, it is false

Hence, the correct option is D.

42. Three different positions of the same dice are shown. Which number will be at the top if 6 is at the bottom?
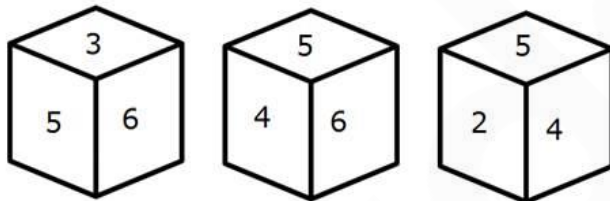
A. 1 | B. 2

C. 4 | D. 5

Ans. B

Sol.

From fig.(i) and fig.(iii), 5 is the common term.

Therefore, 3, 6, 4 and 2 will be the consecutive side face of 5, it means 1 will be the opposite of 5.
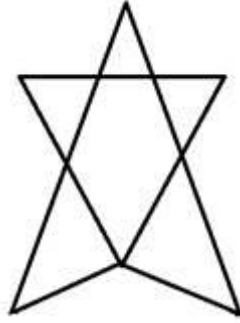
So, the opposite faces are:

5 is opposite of 1

3 is opposite of 4

6 is opposite of **2**

Hence, the correct option is B.

43. Find the number of the triangle from the given figure?

A. 12   B. 6

C. 8   D. 7

Ans. B

Sol.
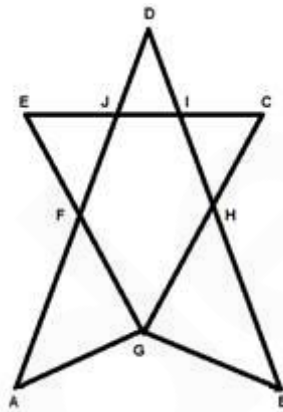
This figure shows that the number of the triangle is AFG, BGH, CHI, DJI, EFJ, and GEC.

The total number of 6 triangles is present.

Hence, the correct option is B.

44. In the following diagram, the rectangle represents Jokers, the triangle represents dancers and the circle represents singers. The number in different segments show the number of persons.
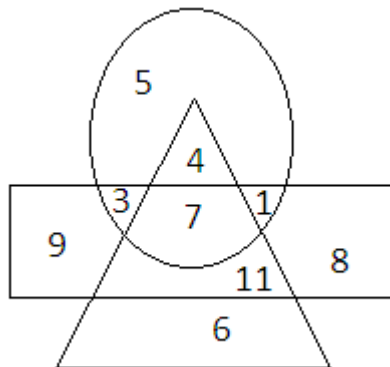
According to the given diagram, How many dancers are jokers but not singers?

A. 11   B. 15

C. 7   D. 4

Ans. A

Sol. The shaded part in the figure below represents the number of dancers who are jokers but not singers i.e. 11
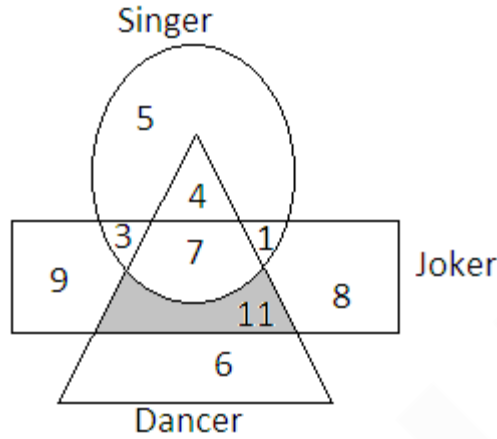
So, the number of dancers who are jokers but not singers = 11

Hence, the correct option is A.

45. Select the Venn diagram that best illustrates the relationship among the following.

Ankle, Body, Heart

A.   B.

C.   D.

Ans. B

Sol. Ankle and heart both are the parts of the body but are different from each other.
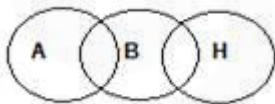
Hence, the correct option is B.

46. In the question below, two statements are given, followed by two conclusions that may or may not follow. From the options below, choose the one that reflects the correct choice of conclusions that follow:

Statements:

1. Company X provides a cab service to its employees, which is why they are punctual to work.

2. Company Y does not provide cab service to its employees.

Conclusions:

I. The employees of Company Y are not punctual to work.

II. If Company X did not provide cab service, its employees might have not been as punctual to work as they currently are.

A. Only I follows   B. Only II follows

C. Both I and II follow   D. Neither I nor II follow

Ans. B

Sol. Conclusion I cannot be deduced as it is possible that there may be different factors that account for the punctuality of employees to work, so if Y does not provide cab service, we cannot say for sure that the employees are not punctual.

Conclusion II can be deduced as statement 2 directly attributes the reason for punctuality to the provision of a cab service by company X, so we can infer that if this provision weren't there, the employees of X may not have been as punctual.

Hence, the correct option is B.

47. From the given answer figures, select the one in which the question figure is hidden/embedded.

A.
B.
C.
D.
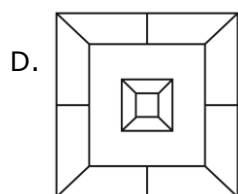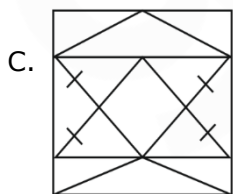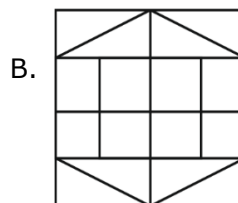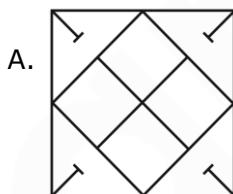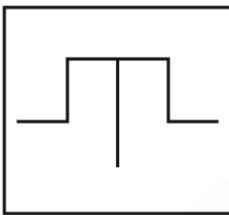
Ans. B

Sol. After carefully observing the figures given in the question, it is very clear that the question figure is embedded in the answer figure (B). It is shown as given below:

Hence, the correct option is B.

48. The sequence of folding a piece of square paper (figures X and Y) and the manner in which the folded paper has been cut (figure Z) are shown). How will the paper appear when unfolded?

A.   B.

C.   D.
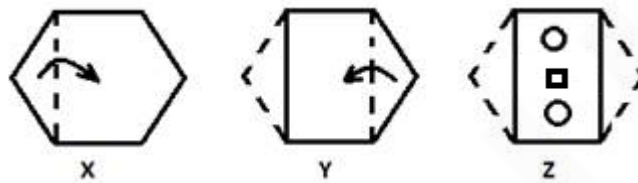
Ans. B

Sol. The paper is unfolded in two steps:-

Step 1 –

Step 2 –
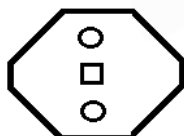
Hence, the correct option is B.

49. If a mirror is placed on the line AB, then which of the answer figures is the right image of the given figure?

A

EFRI95uh

B

A. du591ЯF3   B. Э7ЯIΘ2ᴜᴨ

C. du2ΘIЯF3   D. du2ΘIЯ73
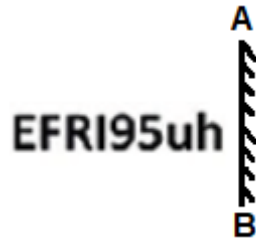
Ans. D

Sol. In a plane mirror, a mirror image is a reflected duplication of an object that appears almost identical, but it is reversed in the direction perpendicular to the mirror surface. As an optical effect, it results from the reflection of substances such as a mirror or water.

Mirror

EFRI95uh   du2ΘIЯ73
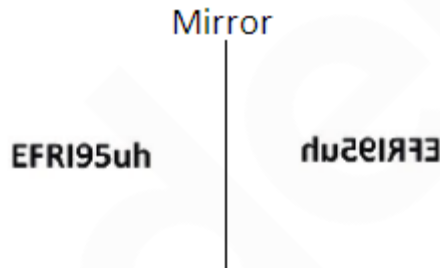
Hence, the correct option is D.

50. Which answer figure will complete the pattern in the question figure?

A.

B.

C.

D.
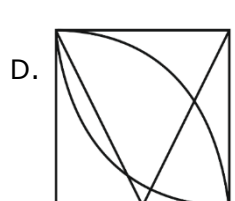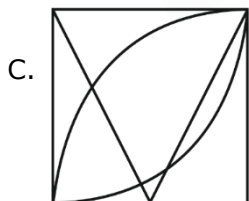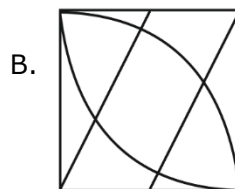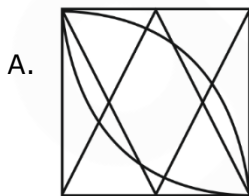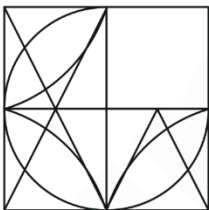
Ans. D

Sol.
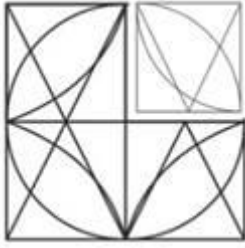
Figure in option D completes the pattern in the question figure.

Hence, the correct option is D.

51. Which layer of the earth has the lowest temperature?

A. Crust   B. Mental

C. Outer Core   D. Inner Core

Ans. A

Sol. **Among the layers of the Earth, Crust has the lowest temperature**.

• Temperature rises with depth in the interior of earth.

• In the beginning, this rate of increase in temperature is at an average rate of 1^0C for every 32 m increase in depth. However, it is not uniform in later stages.

52. The division of Bengal was adopted in _____.

A. June, 1905   B. Oct, 1905

C. June, 1906   D. Oct, 1906

Ans. B

Sol. • **The Partition of Bengal was announced in July, 1905 and it was implemented in Oct, 1905.**

• It was done during the time of Lord Curzon.

• Later in 1911 the partition of Bengal was repealed by King George.

53. Which one of them is correct with regards to GST?

A. It is Direct tax.   B. It is Indirect tax.

C. GST was first implemented in China.   D. None of these

Ans. B

Sol. • Goods and Services Tax (GST) is an indirect tax or consumption tax.

• It is imposed on the supply of goods and services.

• Petroleum products, alcoholic drinks, and electricity are not taxed under GST and instead are taxed separately by the individual state governments, as per the previous tax regime.

France was the first country to introduce this system in 1954.

54. Which of the following shortcut is used to insert a hyperlink?

   A. Ctrl+Z   B. Ctrl+O

   C. Ctrl+K   D. Ctrl+Y

Ans. C

Sol. • **Ctrl+K is used to Insert a hyperlink.**

   • A hyperlink points to a whole document or to a specific element within a document.

   • Hypertext is text with hyperlinks.

   • The text that it is linked from, is called anchor text.

   • Ctrl+Y shortcut is used to redo the last action.

   • Ctrl+Z is a shortcut key most often used to undo.

   • Ctrl+O is a shortcut key most often used to open a new document, page, URL, or other files.

55. Which of the following is the largest religious monument in the world?

   A. Boudhanath   B. Mahabodhi Temple

   C. Angkor Wat   D. Pyramid of Giza

Ans. C

Sol. * **Angkor Wat** is the largest religious monument in the world, which is a Hindu temple complex in Cambodia.

   * It is dedicated to Lord Vishnu. It is example of the classical style of Khmer architecture.

   * It was built by the Khmer King Suryavarman II in the period 1113–50.

   * It encloses an area of 162.6 hectare.

56. Who recently wrote the book Magadhnama?

   A. Kalraj Mishra   B. Tamilsai Soundararajan

   C. Phagu Chauhan   D. Kumar Nirmalendu

Ans. D

Sol. The book Magadhnama is recently written by **Kumar Niemalendu** and released by Phagu Chauhan on 19th January, 2020.

   • Phagu Chauhan is presently **governor** of Bihar.

   • The 447-page research book gives interesting narrative presentation of the **glorious history of Magadha.**

   • This book contains information about the history of Magadha, Buddhist and Jain religions in Magadha, and the prosperity of development, arts and genres.

57. Which of the following Indo-Greek ruler invaded the Ganga-Yamuna doab?

   A. Antiochus II   B. Demetrius I

   C. Apollodotus I   D. Menander

Ans. D

Sol. • The most famous Indo-Greek ruler was **Menander** (Milinda).

   • He invaded the **Ganga Yamuna doab**.

   • He had his capital at **Sakala** (modern Sialkot in Punjab).

   • He was converted to **Buddhism by Nagasena**.

58. What is the capital of Laos?

   A. Hanoi   B. Vientiane

   C. Naypyitaw   D. Taipae

Ans. B

Sol. • **The capital and largest city of Laos is Vientiane.**

   • Laos is south Asians country and a member of ASEAN.

   • Luang Prabang, Savannakhet, and Pakse are some of its other major cities.

59. Cuttack city is located on the banks of which river?

   A. Damodar   B. Musi

   C. Hugli   D. Mahanadi

Ans. D

Sol. **Cuttack city is located on the banks of Mahanadi.**

   • Mahanadi is a 900 kms long river originating from **Dandakaranya hills in Raipur District.**

   • It is one of the **most-active silt-depositing** streams in the Indian subcontinent.

   • The famous Hindu Pilgrimage site 'Puri' is located on it's mouth.

   • It finally drains into Bay of Bengal.

60. Which union ministry will launch the new company incorporation form "Spice+"?

   A. Ministry of Corporate Affairs

   B. Ministry of Finance

   C. Ministry of Housing & Urban Affairs

   D. Ministry of Food Processing Industries

Ans. A

Sol. • The **Ministry of Corporate Affairs** will launch the new company incorporation form "**Spice+**".

   • This is a part of a comprehensive package to make life easier for someone starting a business.

   • It will be launched on 15 February 2020.

61. Kalinga Stadium is located in which state of India?

   A. Meghalaya   B. Mizoram

   C. Kerala   D. Odisha

Ans. D

Sol. * The Kalinga Stadium is located in **Bhubaneswar**, **Orissa**.

* It is a multi-purpose stadium.

* Its foundation stone was laid by former chief minister of Odisha **Late Biju** Patnaik in **1978**.

* It has facilities for athletics, soccer, field hockey, basketball, tennis, table tennis basketball, volleyball, Wall climbing and swimming.

* It has capacity of 15,000 people.

62. Which of the following government entity will launch a digital payments index (DPI) by July 2020?

A. SEBI
B. Income Tax Department

C. RBI
D. Finance Ministry

Ans. C

Sol. • **The Reserve Bank of India (RBI) will launch a digital payments index (DPI) by July 2020.**

• This index will indicate the level of digitalization prevailing in the country.

• Digital Payments Index (DPI) will help the regulator and government to understand the adoption of digital payments in the country.

63. In which state of India, the biggest rural technical festival Antahpragnya 2020 was inaugurated?

A. Andhra Pradesh
B. Telangana

C. Tamil Nadu
D. Karnataka

Ans. B

Sol. • India's Biggest Rural Technical Festival titled Antahpragnya 2020 was inaugurated in the state of **Telangana** at Rajiv Gandhi University of Knowledge Technologies-Basar (RGUKT-Basar).

• The three-day technical festival was organised from January 31 to February 2, 2020, with the theme 'Spot and encourage rural tech innovators'.

64. Who among the following was the first to offer Individual Satyagraha?

A. Jawahar Lal Nehru
B. Gandhi Ji

C. Vinobha Bhave
D. Sardar Patel

Ans. C

Sol. **Vinobha Bhave** is the first to offer Individual Satyagrah.

* The main aim behind launching individual satyagrah was to show the nationalist patience was not due to weakness and to enhance freedom of expression.

* The individual satyagrah started in 1940, and **JL Nehru was the second** person to offer the satyagrah.

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65. On mixing with water, Plaster of Paris sets to form _____.

   A. Calcium Carbonate

   B. Gypsum

   C. Carbon Monoxide

   D. Phosphorous and Sulphurous gasses

Ans. B

Sol. • **Plaster of Paris produces Gypsum on adding water to it.**

   • It is produced by heating gypsum at high temperature.

   • It is used to:

   A. make sculptures

   B. decorate houses

   C. protect broken bones

   D. dentists have long used it for casting patients' teeth.

   • Gypsum is raw material for Plaster of Paris, it is a soft sulphate material composed of Calcium Sulfate Dihydrate.

   • It is used as a fertilizer, chalk etc**.**

66. Which of the follwoing is a major pigment of bile?

   A. Rhodopsin

   B. Melanin

   C. Hemoglobin

   D. Bilirubin

Ans. D

Sol. • **Bilirubin is a brownish-yellow pigment found in bile.**

   • It is produced when the liver breaks down old red blood cells. Bilirubin is then removed from the body through the stool and gives stool its normal color.

   • Bile is a yellowish-brown fluid, produced by the liver, that aids the digestion of lipids in the small intestine. It is stored and concentrated in the gallbladder.

67. Who discovered Ozone layer?

   A. Louis Pasteur

   B. Charles Fabry

   C. William Faraday

   D. Robert Angus Smith

Ans. B

Sol. • The ozone layer was discovered in 1913 by the French physicists **Charles Fabry.**

   • Ozone layer presents in our atmosphere that absorbs most of the Sun's ultraviolet radiation.

   • The "Dobson unit" is a convenient measure of the amount of ozone.

68. Poonam Yadav received Arjun Award in 2019, she belongs to which sports?

   A. Cricket

   B. Badminton

   C. Boxing

   D. Para Athlete

Ans. A

Sol. **Poonam Yadav** belongs to Cricket.

   • She made her debut in 2013 in T20 against Bangladesh.

• In October 2018, she was named in India's squad for the 2018 ICC Women's World Twenty20 tournament in the West Indies.

• She was awarded **Arjun Award** by President Ramnath Kovind on the occasion of National Sports Day that is 29 August, **2019**.

69. The DNA fingerprinting was given by _____.

    A. Robert Brown   B. Alec Jeffrey

    C. Richard Altmann   D. Carl Benda

Ans. B

Sol. DNA Fingerprinting was invented in 1984 by **Sir Alec Jeffreys.**

• DNA fingerprinting is a molecular genetic method that enables the identification of individuals using hair, blood, or other biological fluids or samples.

• DNA fingerprinting is useful in criminal identification, resolve maternity disputes, forensic wildlife etc.

• DNA is the **basic building block** of life. This component in cells contains all the information about an organism and it also helps transfer the characteristics to the next generation.

70. Lord Dalhousie served as Governor general of India from 1848 to _____.

    A. 1853   B. 1854

    C. 1855   D. 1856

Ans. D

Sol. * Lord Dalhousie served as Governor General of India from **1848 to 1856.**

* His real name was James Andrew Ramsay.

* During his tenure, First railway line between Bombay and Thane was built first PWD was set up and Widow remarriage act was passed.

71. National Horticulture Fair 2020 was held in_____.

    A. Lucknow   B. Bhopal

    C. Bengaluru   D. Mumbai

Ans. C

Sol. • The National Horticultural Fair-2020 was held in Bengaluru, Karnataka from 5-7th February, 2020.

• It was inaugurated by Dr. Trilochan Mohapatra, Secretary (DARE) and Director General (ICAR) on 5 February 2020.

• The "ICAR-IIHR Seed Portal" was launched during the festival.

• Over 10,000 farmers and other stakeholders participated in the fair.

72. Where is the headquarters of Comprenensive Nuclear Test Ban Treaty Organisation located?

    A. Vienna, Austria   B. Rome, Italy

    C. Geneva, Switzerland   D. Washington DC, US

Ans. A

Sol. * The Comprehensive Nuclear-Test-Ban Treaty (CTBT) organisation is headquartered in **Vienna, Austria**.

* The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans nuclear explosions by everyone, everywhere: on the Earth's surface, in the atmosphere, underwater and underground.

* It was founded in **1996**.

73. The air bubble in water shines due to which of the following phenomena?

A. Dispersion   B. Total internal reflection

C. Reflection   D. Polarisation

Ans. B

Sol. • The air bubble in water shines due to **the phenomenon of total internal reflection.**

• In this phenomenon, the light travels from a medium of greater refractive index to the lesser one. While doing this, the light gets internally reflected.

• The phenomenon of total internal reflection of light is used in many optical instruments like telescopes, microscopes, binoculars, etc. The brilliance of a diamond is due to total internal reflection.

74. Khoya PayaWeb Portal is related to?

A. Exchange information about missing and found luggage in Railways

B. Exchange information about missing and found of Children

C. Exchange information about missing and found of Cell Phones

D. Exchange information about missing and found of NRIs

Ans. B

Sol. Khoya PayaWeb Portal is related to exchange **information about missing and found of Children.**

• It has been developed by the **Ministry of Women and Child Development** and the Department of Electronics and Information Technology (**DeitY**).

• There is also portal named **'Track Child**' that belongs to the Ministry of **Home Affairs**.

• It was launched by former union minister Maneka Gandhi and Ravi shaker Prasad jointly in 2015.

75. Which of the following is not a scalar quantity?

A. Distance   B. Mass

C. Temperature   D. Force

Ans. D

Sol. **Force** is a vector quantity as this has both magnitude and direction.

• A scalar quantity is a physical quantity that only has magnitude and not direction. For example- Distance, Mass, Temperature etc.

• A vector quantity has both direction and magnitude like force, Velocity, acceleration etc.

76. Which is sweetest artificial sugar?

    A. Glucose   B. Fructose

    C. Aspartame   D. Sucralose

Ans. C

Sol. • Aspartame is an *artificial sweetener*.

    • It is around 200 times sweeter than sucrose (table sugar).

    • It is a methyl ester of the dipeptide of the natural amino acids L-aspartic acid and L-phenylalanine.

77. Arrange the following in the chronological order of their tenure:

    1) Lord Curzon   2) Lord Harding

    3) Lord Chelmsford   4) Lord Irwin

    A. 1 2 3 4   B. 2 4 1 3

    C. 1 4 2 3   D. 2 3 1 4

Ans. A

Sol. • The time period of all the given four Governors-General is-

    1. Lord Curzon – 1899-1905

    2. Lord Harding – 1910-1916

    3. Lord Chelmsford- 1916-1921

    4. Lord Irwin- 1926-1931

78. Which country is the highest emitter of Carbon dioxide in the world?

    A. Inida   B. Usa

    C. China   D. Russia

Ans. C

Sol. • **China is the highest emitter of Carbon Dioxide in the world with an annual CO2 emission of 9.8 Billion metric tons as of 2017-18.**

    • About 70% of the total energy derived in China comes from coal alone which is the major source of carbon emission.

    • **USA** is the second highest CO2 emitter in the world with annual carbon emission of 5.3 billion tons of carbon dioxide.

    • **India** is the third largest carbon dioxide emitter with annual Carbon dioxide emission of 2.5 billion metric tons.

79. Who advises the Governor on matters pertaining to the welfare and advancement of the Scheduled Tribes in the State?

    A. Chief Minister

    B. Chief Justice of High Court

    C. National Commission for Scheduled Castes

    D. Tribal Advisory Council

Ans. D

Sol. • **Tribal Advisory Council (TAC)** advises the Governor on matters pertaining to the welfare and advancement of the Scheduled Tribes in the State.

To take care of the welfare of the scheduled tribes, a Tribal Advisory Council is constituted in each State with a Scheduled Area.

This Tribal Advisory Council will be made of maximum 20 members out of which the three-fourth will be Scheduled Tribes MLAs in the State.

80. What happens to the magnetic field if the compass is moved away from the copper wire but the current through the wire remains the same?

A. Decreases

B. Increases

C. First decreases than constant

D. First increase than constant

Ans. A

Sol. When the compass is moved away from the copper wire but the current through the wire remains the same, the **Magnetic field decreases**.

● It is **because the** magnetic field is stronger near the wire and it decreases with increases in distance from it.

● In a straight current carrying wire, the magnetic field lines formed as **concentric circles** around it.

81. Which cell organelle is the site of ribosome synthesis?

A. Golgi bodies

B. Mitochondria

C. Nucleolus

D. Endoplasmic Reticulum

Ans. C

Sol. **Nucleolus is the site of ribosome synthesis.**

• Nucleolus is a round body shaped organelle found **inside the nucleus.**

• Nucleolus makes ribosomal subunits from proteins and rRNA, and sends them to rest of the cell to form complete ribosomes.

• It is also involved in controlling cellular activities and cellular reproduction.

• Ribosomes make proteins; therefore, the nucleolus plays a vital role in making proteins in the cell.

82. When acid and base are mixed in a test tube, it's temperature..............?

A. Increases

B. Decrease

C. Remain constant

D. Increase or decrease depend upon on concentration of acid and base

Ans. A

Sol. When acid and base are mixed in a test tube, its **temperature increases**.

● It is because, when acid and base are mixed they form salts and this is an **exothermic** process releasing heat, hence increasing temperature.

● The heat released is sometimes known as **heat of neutralization**.

● Example of this type of reaction is – HCl + NaOH → NaCl + H2O + heat↑

83. The 1917 session of congress is presided by which of the following leaders?

A. Sarojini Naidu　　　　　　　　B. Annie Besant

C. Motilal Nehru　　　　　　　　　D. CR Das

Ans. B

Sol. * In August 1917, **Annie Besant was made the President of the Calcutta Session** of the Indian National Congress.

* Annie besant became the **first woman president of INC.**

* Sarojini naidu became first Indian woman to become president of INC in 1925 at Kanpur Session.

84. Which is the highest peak in the state of Sikkim?

A. Mt. Kanchenjunga　　　　　　　B. Mt. Nanda Devi

C. Mt. Abu　　　　　　　　　　　　D. Mt. Everest

Ans. A

Sol. **Mt. Kanchenjunga is the highest peak in Sikkim.**

• Kanchenjunga peak is 8586 meters high. It is the **highest peak of India** and third highest peak of the world.

• K2 or Godwin Austen is the second highest peak of the world and is in Karakoram range in Pak-ccupied Kashmir region.

• Kanchenjunga is also known as the '**five treasures of snow'**.

85. Ease of living index (EoLI) and Municipal Performance Index (MPI) 2019 was launched by_____.

A. Ministry of Corporate Affairs

B. Ministry of Women and Child Development

C. Ministry of Food Processing Industries

D. Ministry of Housing & Urban Affairs

Ans. D

Sol. • Ease of living index (EoLI) and Municipal Performance Index (MPI) 2019 was launched by the **Ministry of Housing & Urban Affairs**.

• These indices are designed to assess quality of life of citizens in 100 Smart Cities and 14 other Million Plus Cities.

86. Who is the present chairman of SBI Bank?

A. Rajnish Kumar
B. Rajeev Kumar
C. Ajay Tyagi
D. Shaktikanta Das

Ans. A

Sol. * **Rajnish Kumar** is the present chairman of **State Bank of India.**

* **Shaktikanta Das** the present chairman of **RBI.**

* **Ajay Tyagi** is the present chairman of **SEBI.**

* The Headquaters of all SBI, RBI and SEBI are present in **Mumbai**.

87. Ashok kumar Mehta Committee was related to which field?

A. Sports
B. Panchayati Raj
C. Health
D. Sanitation

Ans. B

Sol. • Ashok Mehta Committee was related to Panchayati Raj System in India & it was formed in 1977 by Janata Government and it submitted its report in August 1978.

• It recommended two Tier Panchayati Raj System. It also recommended that a district should be the first point for decentralisation under popular supervision below the state level. Zila Parishad should be the executive body, there should be an official participation of political parties etc.

88. Which of the following layer of earth's surface reflects Long radio waves ?

A. Stratosphere
B. Ionosphere
C. Tropopause
D. Troposphere

Ans. B

Sol. • Ionosphere reflects long radio waves.

• The ionosphere is a region of earth's upper atmosphere from about 65 km to 400 km altitude.

• It is ionized by solar radiation.

• It influences radio propagation to distant places on earth.

89. Which is the smallest state in India in terms of area?

A. Sikkim
B. Goa
C. Manipur
D. Mizoram

Ans. B

Sol. **Goa is the smallest state of India in terms of area.**

• Rajasthan is the largest state of India in terms of area.

• Goa has an area of 3702 km sq. and contributes to .11% of total area of country.

• Rajasthan has an area of 342239 sq. kms and contributes to 10.41% of total area of country.

• India is the 7th largest country of the world by area. India accounts for 2.4 percent of total world surface area.

90. RESIDEX is released by_____.

    A. Reserve Bank of India

    B. National Housing Bank

    C. Ministry of urban planning

    D. Ministry of Finance

Ans. B

Sol. **National Housing Bank** releases the RESIDEX Index.

    • This Index aims to track housing price indicators across Indian cities.

    • National Housing Bank is a subsidiary of Reserve Bank of India established in **1988**.

    • NHB registers, regulates and supervises Housing Finance Companies.

    • RESIDEX was **first** started in **2007 and** currently offers two sets of quarterly Housing Price Indices across the cities it tracks.

91. Who won the Oscar award for best director in 2020?

    A. Alejandro

    B. Damien Chazelle

    C. Alfonso Cuaron

    D. Boon Joon Ho

Ans. D

Sol. • **Boon Joon Ho** won the **Best director** Oscar award 2020 for the movie **Parasite**.

    • Alfonso Cuaron won the best director Oscar award in 2019.

    • The first Best director was awarded in 1929.

92. The World Patient Safety Day is observed on_____.

    A. 15th September

    B. 29th August

    C. 21st September

    D. 17th September

Ans. D

Sol. • The World Health Organization (WHO) has declared **September 17th** (2019), as the first World Patient Safety Day.

    • Globally, 134 million adverse events contribute to 2.6 million deaths each year due to unsafe care.

    • The purpose of World Patient Safety Day is to promote patient safety by increasing public awareness and engagement, enhancing global understanding and working towards global solidarity and action.

    • The World Health Organization is a specialized agency of the United Nations that is concerned with international public health.

    • It was established on **7 April 1948**.

    • It is headquartered in **Geneva, Switzerland**.

93. Which acid is present in Coconut oil?

    A. Tamric Acid

    B. Formic Acid

    C. Lauric acid

    D. Citric acid

Ans. C

Sol. • **Lauric acid is present in coconut oil.**

• It is also present in human breast milk.

• Coconut oil is made up of a mixture of saturated, monounsaturated and polyunsaturated fats.

• Lauric acid is a saturated fatty acid of 12 carbon atom chain.

94. Soorya festival is celebrated in which state of India?

A. Maharastra   B. Karnataka

C. Jharkhand   D. Kerala

Ans. D

Sol. * Soorya festival is one of the biggest art and cultural event **in Kerala.** From 1977, it is annualy celebrated in Thiruvananthapuram city.

* It features film festivals, theater festivals, dance, music, painting and photography exhibitions etc.

95. Which of the following is a video capturing device?

A. Webcam   B. Monitor

C. Scanner   D. Microphone

Ans. A

Sol. * **A webcam** is a small digital video camera directly or indirectly connected to a computer or a computer network.

* Webcams are capable of taking pictures as well as high-definition videos.

* It is a video capturing device.

* It is an input device because it captures a video image of the scene in front of it.

96. What is the name of ancient Hindu tradition in which a widow is allowed to have child with the husband's brother?

A. Niyoga   B. Sethi

C. Shaka   D. Vyapti

Ans. A

Sol. **Niyoga** was the ancient Hindu tradition in which a widow is allowed to have child with the husband's brother.

• As per the tradition the child so born is solely taken by widow and the male counterpart has no right on child.

• For practising Niyoga, either a female is a widow or the couple is incapable of having any child.

• Examples of Niyoga found in **Mahabharata**.

97. In February 2020, Who was appointed as MD and CEO of Dhanlaxmi Bank?

A. Mahesh Kant   B. Ravindra Rastogi

C. Sunil Gurbaxani   D. S. Lakshmikant

Ans. C

Sol. • In February 2020, **Sunil Gurbaxani** was appointed as Managing Director and CEO of Dhanlaxmi Bank.

• Prior to this appointment, he was working with **Axis Bank**.

• He will serve for a period of **three years** from the date of taking charge.

• Dhanlaxmi Bank was established in **1927**.

• It is headquartered in **Thrissur**, **Kerala**.

98. Which country will help India in Gaganyaan Mission?

A. USA   B. Canada

C. Russia   D. China

Ans. C

Sol. • Russia is the country which will help India in Gaganyaan Mission.

• Russia is today a world leader in space program and technology.

• The name of the Russian Space Agency is **ROSCOSMOS ,** headquarters are in Moscow and The current director is Dmitry Rogozin.

99. Formation of new states and alteration of areas & boundaries comes under which article of the Constitution of India?

A. Article 4   B. Article 2

C. Article 3   D. Article 5

Ans. C

Sol. • **Under Article 3,** the Constitution empowers Parliament to form a new State by separation of territory from any State or by uniting two or more States or parts of States or by uniting any territory to a part of any State.

• The Constitution further states that Parliament has the power to increase or diminish the area of any State or to alter the boundaries or names of any State.

• For example State of Bombay was bifurcated in Gujarat and Maharashtra on May 1, 1960. In January 2007 Uttaranchal was renamed to Uttarakhand.

100. Which of the following is not included in Executive power of President?

A. Appointment of CAG

B. Appointment of chairman of UPSC

C. Making rules for more convenient transactions of business of Union government

D. Disqualification based on Anti Defection Law

Ans. D

Sol. • **The executive power of President include-**

a) Appointment of CAG.

b) Appointment of UTs administrators.

c) Appointment of chairman of UPSC, appoint a commission to investigate into the conditions of ST, SCs and other backward classes.

d) Making rules for more convenient transactions of business of Union government.

• **While power to disqualify a member of Parliament or State Legislature under Anti Defection Law is inherited in chairperson of that house. So, Option D is correct Answer**.

101. For an n-type semiconductor, which one of the following statement is correct for different energy level?

n-type Semiconductor
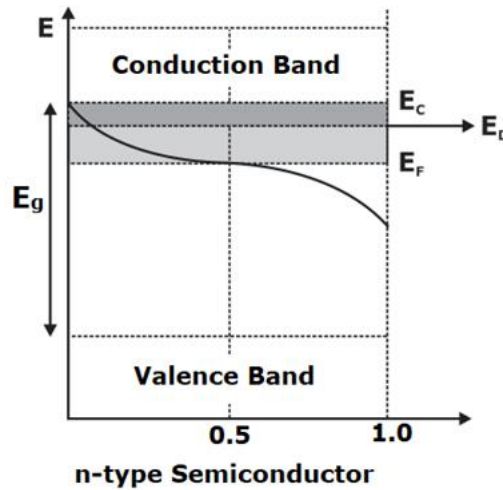
Where, E_C represents conduction energy level, E_D represents donor energy level & E_F denotes fermi energy level.

A. Fermi Energy Level is Greater than Donor Energy level

B. Donor Energy Level is Greater than Fermi Energy level

C. Fermi Energy Level is Greater than Conduction Energy level

D. Donor Energy Level is Greater than Conduction Energy level

Ans. B

Sol. In N-type semiconductor generally Fermi Energy level lies just below the donor energy level but as the temperature rises or say at high temperature when the concentration of electron becomes equal to the concentration of hole then Fermi Energy level returned to just middle of the Forbidden Energy Gap E_g.

102. What is the main benefit of using the electric furnaces for melting the metals?

A. High productivity   B. Better quality of materials

C. High strength of metals   D. Less maintenance

Ans. A

Sol. The primary benefit of using the electric furnaces is the large reduction in the specific energy required to produce the metal. The ratio, energy per weight of the metal is reduced by using the electric furnaces for melting the metals, which directly hikes the productivity. So this method has high productivity.

103. Below there are some characteristic given for a machine. For which machine we obtain the following characteristic?
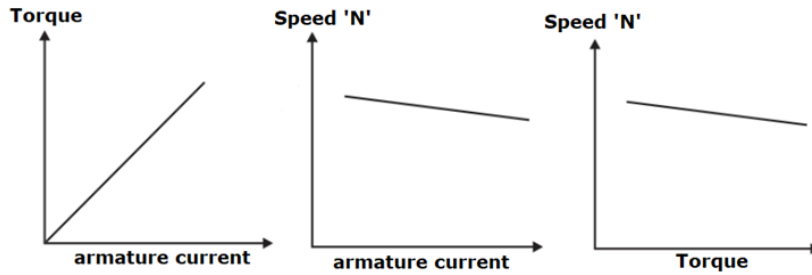
A. DC Series Motor
B. DC Shunt Motor
C. Separately Excited DC Motor
D. Cumulatively Compound Motor

Ans. B

Sol. The above charactoristic is given for DC Shunt Motor.

104. If there is no delay for backup protection when the primary protection is failed, it is a kind of protection scheme named as?
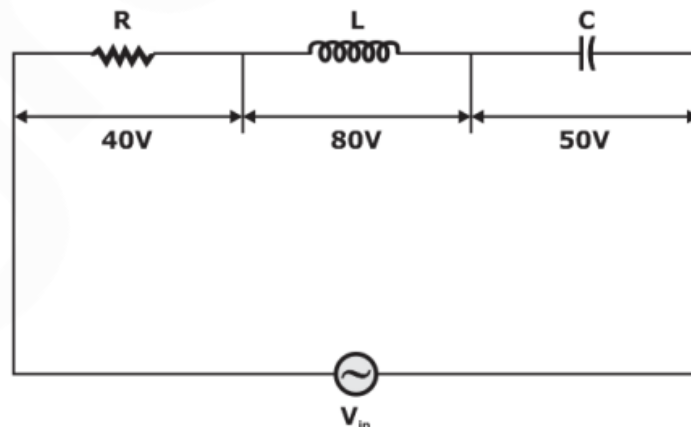
A. Remote Back up
B. Relay Back up
C. Breaker Back up
D. None of the Above

Ans. B

Sol. **Relay Back up:** In this type of backup protection scheme, relay is operated without any delay of time if the primary protection scheme fails. It is a kind of local back scheme & is supplied from a separate CT & PT. It is costlier scheme of back up protection, therefore it is only employed where the remote backup is not possible.

105. In a single-phase series R-L-C circuit the instantaneous voltage across the Inductor & Capacitor are 80 V & 50 V respectively. If the voltage across the resistor is 40 V, then what is the voltage applied at its input?

A. 170 V
B. 120 V
C. 70 V
D. 50 V

Ans. D

Sol.

$V_{in} = (V_R)^2 + (V_L - V_C)^2 = (40)^2 + (80 - 50)^2 = 1600 + 900 = 2500$

Therefore $V_{in} = \sqrt{2500} = 50$ V

106. A consumer has 5 A each rated at 70 W, 3 room heater of 1.5 kW. On an average the consumer uses 4 A for 10 hour per day & two heater for 4 hour per day, calculate the average load of the consumer?

 A. 486.24 W   B. 542.42 W

 C. 616.66 W   D. 686.54 W

Ans. C

Sol. Average load = Actual Energy Consumed/time duration

Actual Energy Consumed = 4 x 10 x 70 + 2 x 1500 x 4 = 14,800

Therefore, average load = 14800/24 = 616.66 W

107. A single-phase transformer has per unit resistance $R_e(p.u) = 0.025$ & reactance $X_e(p.u) = 0.04$, Calculate the voltage regulation of transformer in percentage at 0.8 lagging power factor?

 A. 3.4 %   B. 4.4 %

 C. 5.8 %   D. 6.4 %

Ans. B

Sol. Voltage regulation, $V.R = R_e(p.u) \cos\varphi + X_e(p.u) \sin\varphi$

Since $\cos\varphi = 0.8$ therefore $\sin\varphi = \sqrt{1 - 0.8 \times 0.8} = \sqrt{0.36} = 0.6$

Therefore, V.R in % = [0.025 x 0.8 + 0.04 x 0.6] x 100

= 4.4 %

108. The following equation, $\oint H.dl = I_{enclosed}$ defines which law

 A. Biot-savart's law   B. Gauss's law

 C. Modified ampere's circuital law   D. Ampere's circuital law

Ans. D

Sol. Ampere's circuital law relates current to the magnetic field associated with the current. In the magneto static regime, the law is:

$\oint H.dl = I_{enclosed}$

That is, the integral of the magnetic field intensity H over a closed path C is equal to the current enclosed by that path, $I_{enclosed}$.

109. Which one of the following heating method is most inefficient method of electrical heating?

 A. Infrared Heating   B. Resistance Heating

 C. Dielectric Heating   D. Induction Heating

Ans. A

Sol. Infrared Heating is the most inefficient method of electric heating. It is also the simplest form of electric heating. Here the electromagnetic radiation coming out from an incandescent light bulb is focused to the surface to be heated. It is mostly used for drying out the wed painted surface of an object.

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110. Which one of the following transducer convert Linear motion into electrical signal?

    A. Tachometer   B. Strain Gauge

    C. RTD   D. LVDT

Ans. D

Sol. 1) The most widey used Inductive tranducer to translate the inear motion into eectrical signal is LVDT.

    2) In LVDT the output voltage is practically linear for displacement upto 5mm.

    3) Linearity of 0.05% available in commercial LVDT.

111. In a salient Pole synchronous machines if the field current reduces to zero. Then which one of the following statement I true?

    A. Electromagnetic Power as well as the Reluctant Power is Zero

    B. Electromagnetic Power is Non-Zero while the Reluctant Power is Zero

    C. Electromagnetic Power as well as Reluctant Power both are Non-Zero.

    D. Electromagnetic Power is zero Reluctant Power is Non-Zero.

Ans. D

Sol. Output power for synchronous motor,

$$P = \frac{VE_f}{X_s} \sin\delta + \frac{1}{2} V^2 \left(\frac{1}{X_d} - \frac{1}{X_q} \right) \sin 2\delta$$

Where the first term shows the electromagnetic power of fundamental component. The second term is of Reluctant power of double the frequency of fundamental component.

As we observe from the second term even if the field excitation is reduced to zero, the machine continues to run because of reluctant power.

112. A load R_L is connected across the terminal A & B. Find out the value of load Resistance R_L so that maximum power can be transferred to load R_L.
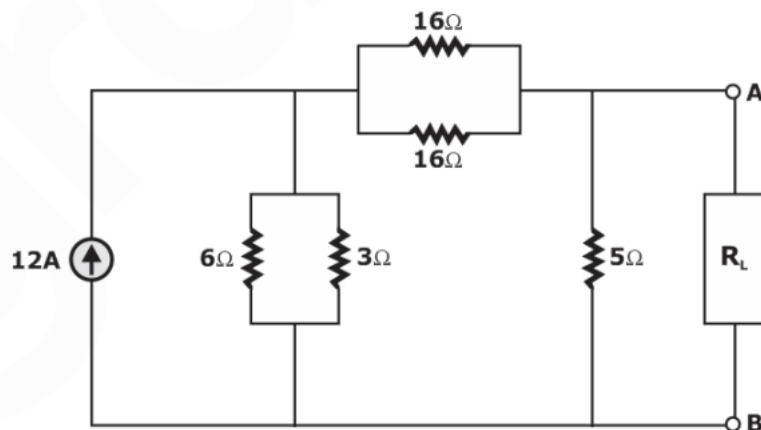
    A. 6.66 Ω   B. 5.55 Ω

    C. 4.44 Ω   D. 3.33 Ω

Ans. D

Sol. For the load to transfer maximum power, load resistance must equal to network resistance, when the land is open circuited and independent source replaced by their internal resistance then circuit reduces to

$$\because 6 \parallel 3 = \frac{6 \times 3}{6 + 3} = 2\Omega$$

For $6 \parallel 6 = R = 8\Omega$

$\therefore RAB = (2 + 8) \parallel 5 = 10 \parallel 5$

$$R_{AB} = \frac{10}{3\Omega} = 3.33\Omega$$
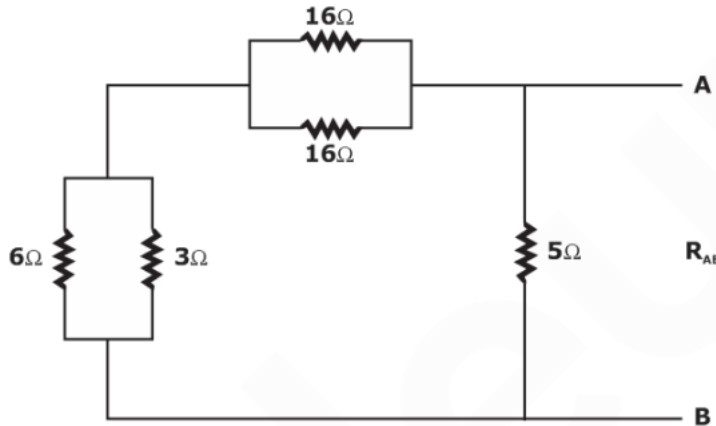
113. If the Supply voltage in an induction motor is reduced by 5%, by what percentage the maximum torque is increased or decreased?

    A. Decreased nearly by 5%   B. Increased nearly by 5%

    C. Decreased nearly by 10%   D. Increased nearly by 10%

Ans. C

Sol. From the relation, $(T_{em})_1 \alpha\ V^2$ …..(1)

    If supply voltage is reduced by 5%, then $V' = 0.95\ V$

    Then New $(T_{em})_2 \alpha\ (0.95V)^2$ ….(2)

    $(T_{em})_2/(T_{em})_1 = (0.95)^2$

    $(T_{em})_2 = 0.9025\ (T_{em})_1$ Therefore we can say the maximum torque can be reduced nearly 10 % of its previous value.

114. In a circuit, Inductance L = 8 mH & Resistance R = 4 Ω, having a time constant T_1 , If in place of one inductor four inductor of same value are connected in parallel & their combination in series with resistor of 4 ohm, then the new time constant of circuit is T_2. Find the ratio of two-time constant T_2/T_1?

    A. 2   B. 4

    C. 8   D. 16

Ans. B

Sol. When one inductor & resistor are connected in series then time constant,

$T_1 = L/R = (8 \times 10^{-3})/4 = 2$ msec

When four inductor of 8mH are connected in parallel then $L_{eq} = L/4 = 2$ mH

Then the new time constant,

$T_2 = L_{eq}/R = (2 \times 10^{-3})/4 = 0.5$ msec

Therefore the ration of two Time constant $T_2/T_1 = 2/0.5 = 4$

115. When the soil favors the corrosion then which electrode should be preferred?

A. Copper Clad Electrode

B. Zinc Coated Iron Electrode

C. Any one from Copper Clad Electrode or Zinc Coated Iron Electrode

D. Cadmium Electrode

Ans. C

Sol. When the soil conditions are such as are likely to cause excessive corrosion of the electrode & the connection. Then it is recommended to use only one the given below:

a) Copper Electrode

b) Copper Clad Electrode

c) Zinc Coated (Galvanized) Iron Electrode.

116. The windings of a 20 kVA, 200 V/2 kV, single phase two winding transformer is reconnected as autotransformer, then what will be the ratio of output kVA of autotransformer to two winding transformer?

A. 11   B. 22

C. 6   D. 9

Ans. A

Sol. Rating of two winding transformer = 200/2000 V/V

Therefore, transformation ration, k = 20/2000 = 0.1

$$\frac{\text{output KVA of autotransformer}}{\text{output KVA of two winding transformer}} = 1 + \frac{1}{k}$$

$= 1 + 1/0.1 = 11$

117. In a single-phase Induction Machine, if P_{cr} is the total rotor copper loss, P_{gf} & P_{gb} loss component of power in forward & backward field, and forward slip is s, then which relation is correct for the total rotor copper loss?

A. $P_{cr} = s.P_{gf} + (2-s)P_{gb}$ B. $P_{cr} = (2-s) [P_{gf} - P_{gb}]$

C. $P_{cr} = (1-s) [P_{gf} - P_{gb}]$ D. $P_{cr} = s.P_{gf} + (1-s)P_{gb}$

Ans. A

Sol. Rotor Copper Loss due to forward field, $P_{rcf} = s.P_{gf}$

Rotor Copper Loss due to Bacward field, $P_{rcb} = (2-s).P_{gb}$

total rotor copper loss, $P_{cr} = P_{rcf} + P_{rcb} = s.P_{gf} + (2-s)P_{gb}$

118. Which one of the following statement is correct for a three-phase induction motor?

A. Starting torque cannot be varied using rotor resistance r_2 in WRIM.

B. Generating mode in 3 phase induction motor is obtain at slip greater than 1.

C. Maximum torque T_{em} which occur at a slip s_{mt} is dependent of r_2.

D. Maximum Power P_{mm} which occur at a slip s_{mp} is dependent of r_2

Ans. D

Sol. Starting torque can be increased by inserting external resistance in rotor circuit in WRIM. Generating mode in 3 phase induction machine is occur at slip, s <0. Maximum torque which occur at a slip is independent of rotor resistance r_2, while the slip at which maximum torque is occur is dependent on r_2.

The last statement is only correct, since the maximum power in 3 phase induction motor is P_{mm} which occur at a slip s_{mp} is dependent of r_2.

119. In DC machines which one of the following neutralizes the armature cross flux underbrush axis to improve commutation process in DC machines.

A. Compensating Winding

B. Pole Shoe

C. Dummy Coil

D. Interpole

Ans. D

Sol. During the voltage commutation, Interpole serve two purposes

1) Neutralizes the armature cross flux underbrush axis.

2) Produces extra flux in the interpolar zone, in turn rotational voltage in coil in such a direction to nullify the effect of reactance voltage.

120. A single-phase energy meter having a meter constant of 150 rev/kWh, is operated at 220 V, 50 Hz supply with a load current of 8 A at power factor of 0.8 lagging for 5 hour continuously. The energy meter shows the number of revolution during this speed.

A. 1248

B. 1024

C. 1286

D. 1056

Ans. D

Sol. Meter Constant = Number of revolution/kWh

Therefore , Number of revolution = Meter Constant x kWh

= 150 x 220 x 8 x 0.8 x 5 x10^{-3}

= 1056

121. In a 4-pole wave wound DC motor there are 400 armature conductor which are rum at a constant speed of 1200 rpm. If the back EMF developed is 240 V, then what will be the operating flux in DC motor?

A. 0.01 Wb

B. 0.02 Wb

C. 0.03 Wb

D. 0.04 Wb

Ans. C

Sol. As we know that.

$$E = \frac{NP\phi Z}{60A}$$

Where,

E- developed back emf

P- Number of Pole = 4

Z – total number of conductor, A = 2 since wave wound

N- speed in rpm

Therefore,

$$\phi = \frac{60AE}{NPZ} = \frac{60 \times 2 \times 240}{1200 \times 2 \times 400} = 0.03 \text{ weber}$$

122. If the full load copper loss & iron loss for a transformer are 10000 W & 3500 W respectively. Calculate the total loss i.e. copper loss & iron loss at three-fourth of the load?

A. 9250 W   B. 9125 W

C. 8850 W   D. 8650 W

Ans. D

Sol. copper loss(¾)^2 x 10000 = 5625 Watt, while Iron loss will remain same.

Total Losses = 5625 + 3500 = 9125 W

123. By using bundling of conductor, which of the following result are correct:

(I) Corona loss reduced

(II) X_L Reduced

(III) X_C Increases

(IV) Surge Impedance loading Increased

(V) Cost of transmission is reducing

A. (I),(II),(III) & (IV) are true

B. only (II) & (III) are true

C. Only surge impedance loading I increased

D. all are true

Ans. D

Sol. Surge Impedance Loading, SIL = $(V_s)^2$ [$\sqrt{C/L}$]

Advantage of Bundled Conductor:

1) Corona Power Loss is reduced

2) Inductance of the line reduces & Capacitance of the line increases, in turn X_L reduces & X_C increases.

3) Surge impedance is reduced in turn the surge impedance loading is increased

4) Size of the conductor is reduced so that the number of tower required is reduced, in turn cost of transmission reduces.

5) Electrical Field stresses & voltage gradient on the conductor is reduces.

6) Radio interference on the other conductor is also reduces.

124. Find the rms value of a signal, v(t) = 2 + 3sin(4t) + 4 sin(3t) V?

    A. 3.24 V   B. 3.68 V

    C. 4.06 V   D. 5.06 V

Ans. D

Sol. RMS value of a signal is given as,

v(t) = 2 + 3sin (4t) + 4sin (3t)

$$= \sqrt{(2)^2 + \frac{1}{2}\left[(3)^2 + (4)^2\right]}$$

$$= \sqrt{16.50}$$

$$= 4.06 \text{ V}$$

125. A 20 kVA, 2500/250 V, 50 Hz, single phase transformer has the following data when the test performed at full load:

Short Circuit Test: 50 V, 4 A, 160 W

Open Circuit Test: 250 V, 0.8 A, 80 W

Calculate the efficiency of transformer at half load and 0.8 lagging power factor?

    A. 91.62 %   B. 94.68 %

    C. 98.52 %   D. 87.68 %

Ans. C

Sol. Efficiency of transformer,

$$\eta = \frac{VI\cos\phi \times 0.5}{VI\cos\phi \times 0.5 + 80 + (0.5)^2 \times 160} \times 100$$

$$= \frac{20 \times 1000 \times 0.8 \times 0.5}{20 \times 1000 \times 0.8 \times 0.5 + 80 + (0.5)^2 \times 160} \times 100$$

= 98.52%

126. In the following two figure if L₁ = 5 mH, L₂ = 3 mH and the mutual inductance between them is 2 mH respectively. Then what will be the equivalent inductance L_A & L_B respectively?
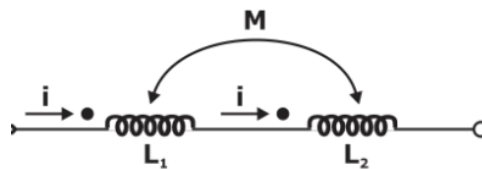
(A)
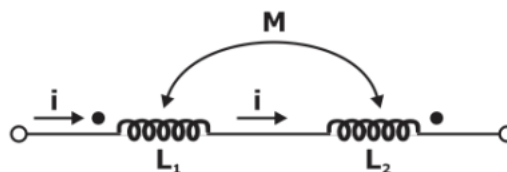
(B)

A. L_A = 12 H & L_B = 4 H

B. L_A = 10 mH & L_B = 8 mH

C. L_A = 4 mH & L_B = 12 mH

D. L_A = 8mH & L_B = 10 mH

Ans. B

Sol. In figure A, L_1 & L_2 are Connected in series and in phase with respect to flux addition

Therefore, $L_A = L_1 + L_2 + 2M$ = 5+3 + 4 = 12 mH

In figure B, L_1 & L_2 are Connected in series but in phase opposition therefore,

Therefore $L_B = L_1 + L_2 - 2M$ = 5+3 - 4 = 4 mH

127. Which Device is used to measure Electric Charge?

A. D'Arsonval Galvanometer

B. Strain Gauge

C. Ballastic Galvanometer

D. Thermo-Couple

Ans. C

Sol. Ballastic Galvanometer is used to measure charge. In ballastic galvanometer, when a small amount of Electricity is passed through it in a time that is short compared with the period of oscillation of the needle, the needle will jerk from its rest position, and then swing to and fro in lightly damped harmonic motion.Also the amplitude of the first swing, depends on the quantity of electricity that was passed through the galvanometer.

128. If the input voltage, v(t) = 4 + 3sin(4t) + 2sin(5t) + 15sin(10t) & the current supplied by the source is i(t)= 7 + 2sin(4t) + 4sin(6t) + 10sin(15t). Calculate the average power delivered by the source?

A. 30 W

B. 35 W

C. 40 W

D. 45 W

Ans. B

Sol. v(t) = 4 + 3sin4t + 2sin5t + 15sin10t & i(t)= 7 + 2sin4t + 4sin5t + 10sin15t

Total average power delivered by the source,

$$= (4 \times 7) + \left(\frac{1}{2} \times (6 + 8 + 0 + 0)\right) = 28 + 7 = 35W$$

129. The load duration curve is given for a system in the below figure, determine the load factor of the system?
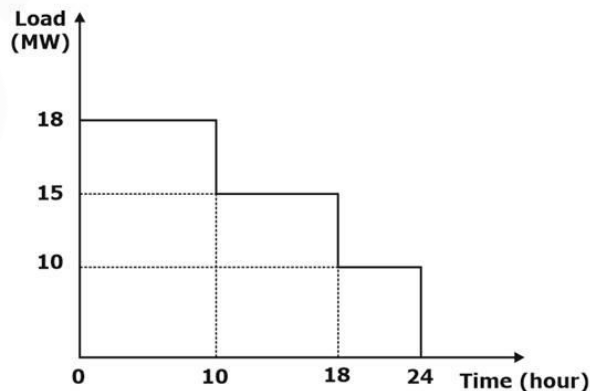
A. 0.833   B. 0.753

C. 0.684   D. 0.583

Ans. A

Sol. From the load duration curve, actual energy consumed = 18 x 10 + 15 x 8 + 10x6 = 360 MWh

Average load = 360/24 = 15 MW

Maximum demand = 18 MW

Load Factor = average load / maximum demand = 15/18 = 0.833

130. The Split Phase Motor is also called?

A. Capacitor start Motor   B. Resistance Start Motor

C. Universal Motor   D. None of these

Ans. B

Sol. Split Phase Motor is also Called Resistance start motor; it has a single cage rotor. Stator has two windings, Main winding & Auxiliary winding which are displaced 90° in space like the winding in a Two-Phase Induction Motor.

131. Which of the following is the main disadvantage of conduit wiring?

A. Very tough to install   B. It is not long lasting

C. Very difficult to detect fault   D. Appearance is not good.

Ans. C

Sol. **The main advantages of conduit wiring are as follows:**

1) The safest wiring, Appearance is better, Long lasting.

2) No risk of shock, fire or mechanical wear and tear.

3) No risk of damage of cable insulation, Safe from humidity, smoke, steam etc.

Disadvantages of Conduit Wiring are as follows:

1) Very expensive.

2) Installation is not easy.

3) Not easy to customize for future.

4) Hard to detect the faults.

132. Which one of the following statement is true regarding the diverter used in field flux control?

A. Diverter should be highly Resistive

B. Diverter should be highly Inductive

C. Diverter should be connected in series with series field winding

D. Diverter should be connected in series with shunt field winding

Ans. B

Sol.
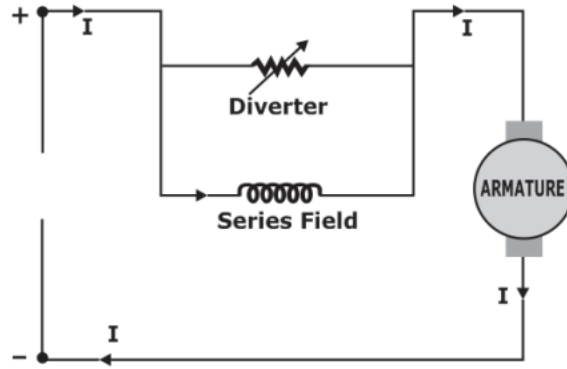
The diverter used to control the field flux should be highly inductive in nature. If by any external means the contact of the diverter is break, then after a short duration when the contact is re-establishing it behave as open. Therefore field flux establishes again in series coil.

133. If the below figure defines the property of Voltage Follower, then what will be the values of Resistance R_g & R_f respectively:
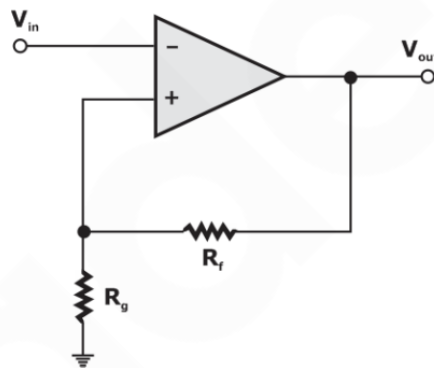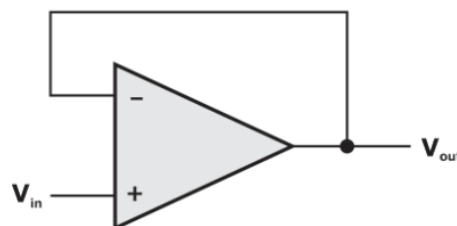

A. $R_g = \infty$ and $R_f = 0$

B. $R_g = 0$ and $R_f = 0$

C. $R_g = 0$ and $R_f = \infty$

D. $R_g = \infty$ and $R_f = \infty$

Ans. A

Sol. For the resistive feedback Op-Amp Feedback gain is defined as $\beta = R_g / (R_g + R_f) = 1/ (1+ [R_f/R_g])$.

Now if R_g tends to infinity and R_f tends to zero then its results Feedback gain $\beta = 1$, which is the required condition for voltage follower model.

Therefore the above circuit model reduces to,

134. Which scheme is employed for the Bus Zone Protection?

    A. Over-current Protection Scheme

    B. Differential Current Protection Scheme

    C. Carrier Current Protection Scheme

    D. Time Graded Protection scheme

Ans. B

Sol. In a normal situation the algebraic sum of all the current at the bus bar zone is zero. In case bus fault occur then the algebraic sum is not equal to zero, then relay operate.

For the bus zone protection we employed the scheme differential current protection scheme. The drawback of this scheme is that there may be false operation for external fault, due to the saturation of one of the C.T (Current Transformer) of the feeder.

135. Which one of the following cable is best suited for underground transmission at a voltage of 132 kV?

    A. Belted Cable   B. Screened Cable

    C. Oil Filled Cable   D. Gas Insulated Cable

Ans. D

Sol. High pressure SF_6 gas field the small space in oil impregnated paper insulation which suppresses the ionization.

Advantage of Gas Insulated Cable at high voltage:

1) Manufacturing is Easy.

2) Wire drawing, Paper taping, stranding, Polythene extrusion lead sheathing is not required for GIC cable.

3) Termination of GIC cable is simpler & cheaper.

4) More efficient heat transfer.

5) Low Capacitance & low dielectric losses.

6) SF_6 is nontoxic, chemically stable & nonflammable.

136. In a 3 phase, 4 pole induction motor the input power to the rotor circuit is 5 kW, the rotor is running at 1440 rpm. Calculate the copper loss in rotor circuit?

    A. 200 W   B. 240 W

    C. 250 W   D. 300 W

Ans. A

Sol. Synchronous speed $N_s = 120f/P = 120 \times 50/4 = 1500$

Slip, $s = (N_s - N_r)/N_s = (1500 - 1440)/1500 = 6/150 = 0.04$

Rotor copper loss, $sP_g = 0.04 \times 5000 = 200$ W

137. A single-phase AC circuit having resistance R = 6 Ω & Inductance L = 26 mH. Find the maximum current supplied by source voltage of 220 sin(50t)?

   A. 11 A   B. 22 A

   C. 10 A   D. 20 A

Ans. B

Sol. Inductive reactance X_L = 2πfL = 2x 3.14x50x26x10^{-3} = 8.16 Ω

   Therefore Impedance Z^2 = R^2 + X_L^2 = 36 + 66 = 102 → Z ≈ 10 Ω

   Maximum supply current i_m = V_m/Z = 220/10 = 22 A

138. The conductor which connects the distributor line to consumer terminal is called?

   A. Service Mains   B. Distributor

   C. Feeders   D. Tie Line

Ans. B

Sol. **Service Mains:** The service mains conductors form connecting links between distributors and metering points at the consumer terminal. The area of connection of a sub-main conductor is greater than the service mains.

139. In a two-wattmeter method which is used to measure power in a 3-phase circuit. If the true power is 2000 W, while the meter measure it 2050 watt. Calculate the percentage error in reading of wattmeter?

   A. 1%   B. 2%

   C. 2.5%   D. 5%

Ans. C

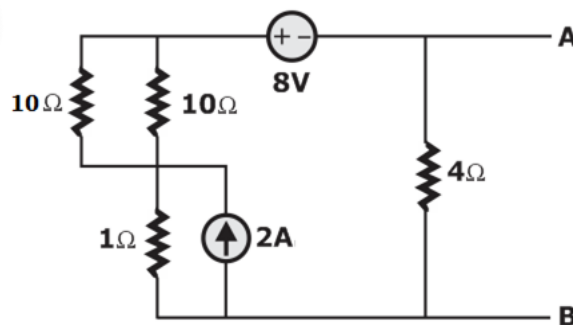Sol. Measured value of Power = 2050 W

   True Power = 2000 W

   Percentage Error in reading,

   $$= \frac{P_m - P_T}{P_T} \times 100$$

   $$= \frac{2050 - 2000}{2000} \times 100$$

   = 2.5%
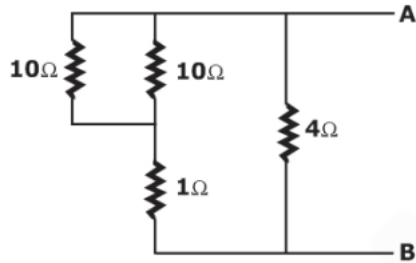
140. Calculate the R_{Th} between the terminal A & B.

A. 2 Ω
B. 2.2 Ω

C. 2.4 Ω
D. 2.5 Ω

Ans. C

Sol. To find R_{Th} across A & B

Voltage & current source are replaced by their internal resistance, i.e., voltage source is short circuited & current source is open circuited.

∴ The circuit reduces to

$$R_{AB} = \left[\left(10\Omega \parallel 10\Omega \right) + 1\Omega \right] \Big\|_{4\Omega}$$

$$= \left(5 + 1 \right) \Big\|_4 \Rightarrow 6 \parallel 4$$

$$= \frac{6 \times 4}{6 + 4} = 2.4\Omega$$

141. For the given circuit when the load is not connected it is found that the voltage across the load is 50 V. In second case when the load R_L is shorted then the current flowing through the Load is 2 A . Find out the current flowing if R_L is replaced by 5 Ω.

A. 4.16 A
B. 3.52 A

C. 2.23 A
D. 1.67 A

Ans. D

Sol. When R_L is not connected then, V_{th} = 50 V

When R_L is replaced by short circuit then I_{sc} = 2 A

Therefore R_{th} = 50/2 = 25 Ω

When a 5 Ω resistor is connected at load side then current I,

$I = V_{th} / (R_{th} + R_L) = 50 /(25+5) = 50/30 = 1.67$ A

142. In case of extra high voltage lines, the minimum clearance required above ground should be.

A. 3.8 m

B. 4.5 m

C. 6.1 m

D. 6.8 m

Ans. C

Sol. No conductor of an overhead line including service erected elsewhere along or across any street shall be at height less than 6.1 m ("5.8 m + 0.3m" for every kV or part thereof by which voltage of the Lines exceeds 33kV" which provided that the minimum clearance along or across any street shall not be less than 6.1 m in case of EHV lines.

143. Two resistors $R_1 = (150 \pm 8\%)$ Ω, $R_2 = (250 \pm 4\%)$, are connected in series. What will be the resulting limiting error of series combination of these two resistors?

A. 12 Ω

B. 10 Ω

C. 8 Ω

D. 6 Ω

Ans. A

Sol. $R = R_1 + R_2 = 150 + 250 = 400$

Limiting error $= \dfrac{\delta R}{R} = \dfrac{\delta R_1}{R_1} \times \dfrac{R_1}{R} + \dfrac{\delta R_2}{R_2} \times \dfrac{R_2}{R}$

$\dfrac{\delta R}{R} = \dfrac{8}{150} \times \dfrac{150}{400} + \dfrac{4}{250} \times \dfrac{250}{400}$

$\delta R = 400 \times (0.02 + 0.01) = 12\Omega$

144. The device which is used for maintaining a uniform voltage in the disc to improve the string efficiency is?

A. Vibration Damper

B. Arcing Horn

C. Guard Ring

D. Counter Poise

Ans. C

Sol. Guard ring are used for maintaining uniform voltage in the disc so that string efficiency is increased. Arcing Horn are used for protecting the insulating disc from the back-flashover voltage produced due to lightning surges. Vibration Damper are used for reducing the vibrations which are produces due to non-uniform loading. Counter Poise are used at the bottom of the tower for discharging of lightning surges.

145. In which year important rule "INDIAN ELECTRICITY RULES" for safety & earthing practice is launched?

A. IE Rule 1952

B. IE Rule 1956

C. IE Rule 1960

D. IE Rue 1966

Ans. B

Sol. These rules may be called the Indian Electricity Rules,1956. They shall come into force at once.

146. Which of the following below option properly defines the definition of "The number of nearest and equidistant atom with respect to any other atom in a unit cell"?

A. Avogadro Number

B. Co-ordination Number

C. Atomic Number

D. Total number of atoms in a unit cell

Ans. B

Sol. Co-ordination Number is defined as the number of nearest and equidistant atom with respect to any other atom in a unit cell or in other words, co-ordination number, also referred as ligancy, of a central atom in a molecule or crystal is the number of atoms, molecules or ions bonded to it.

Ex: Co-Ordination Number of Simple Cubic Cell Since is 6.

147. Calculate the power transformed by inductive action for a 10 kVA, 1.2 kV/120 V, 50 Hz step down autotransformer?

A. 4 kVA

B. 5 kVA

C. 6 kVA

D. 9 kVA

Ans. D

Sol. Transformation ration, k = 120/1200 = 0.1

power transformed by inductive action = (1-K)Total kVA

= (1-0.1) x 10 kVA = 9 kVA

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148. What is the unit of Transmission parameter B?

    A. Ω^{-1}.

    B. Ω

    C. It is unless because it is the ratio of two voltage.

    D. It is unless because it is the ratio of two Current.

Ans. B

Sol. Transmission Line equation in term of ABCD parameter,

    $V_s = AV_r + BI_r$

    $I_s = CV_r + DI_r$

    Where the parameter B, $= V_s / I_r = Z\ \Omega$, when $V_r = 0$.

    Parameter B defines its unit is Ω.

149. Match the rating of different types of load which are listed as in Table (A) & table (B)?

Table (A)	Table (B)
(i) Incandescent Lamp	(a) 100 Watt
(ii) Ceiling & Table Fan	(b) 60 Watt
(iii) Power Shocked Outlet Point	(c) 1000 Watt

    A. i-a, ii-b, iii-c   B. i-b, ii-a, iii-c

    C. i-c, ii-b, iii-a   D. i-c, ii-a, iii-b

Ans. B

Sol. Rating of load

    Incandescent Lamp → 60 W

    Ceiling & Table Fan → 100 W

    Power Socket Outlet Point → 1000 W

150. In a stepper motor the number of teeth on stator are 12 while the number of teeth on rotor are 8 what would be the step angle for stepper motor?

    A. 7.5°   B. 10°

    C. 12.5°   D. 15°

Ans. D

Sol. Step angle for stepper motor, $\alpha = \dfrac{N_s - N_r}{N_s N_r} \times (360°)$

    Where N_s are the number of teeth on stator = 12

    & N_r are the number of teeth on rotor = 8

    Therefore, $\alpha = \dfrac{12 - 8}{12 \times 8} \times (360°) = 15°$

151. Hysteresis loss in transformer depends on.

    A. Volume of the Core V   B. Maximum Flux Density B_m

    C. Frequency of Supply f   D. All of the above

Ans. D

Sol. Hysteresis Loss in transformer, $P_h = V_{core} * W_h * f = K_h * f * B_m^k$

Where V_{core} is the volume of core.

W_h is the energy per unit volume which is equal to the area of the hysteresis loop & f is supply frequency.

152. In the layout of sub-circuit wiring connection, of which cross sectional area of copper conductor is preferred?

A. 0.8 mm^2

B. 1.0 mm^2

C. 1.2 mm^2

D. 1.5 mm^2

Ans. B

Sol. In the layout of wiring connection only the Cu & Al is used a conducting wire. In the sub circuit wiring connection the cross-sectional area of Cu & Al are 1.0 mm^2 & 1.5 mm^2 respectively. While in the power wiring connection the cross-sectional area of Cu & Al are 1.5 mm^2 & 2.5 mm^2 respectively.

153. A three-phase star connected alternator deliver a power of 5 kW to the load, an input voltage 440 V. The circuit is operated at 0.8 lagging power factor, determine the line current?

A. 8.2 A

B. 10.6 A

C. 14.4 A

D. 22.6 A

Ans. A

Sol. P = 5 kW, V_L = 440 V

Phase voltage, V_{Ph} = 440/ $\sqrt{3}$ = 254 V

Since in star connected system Power, $P = 3 V_P I_P Cos\varphi$

Therefore I_P = (5 x 1000) / (3 x 254 x 0.8) = 8.2 A

As we already know that in star connected system the line current is equal to phase current therefore line current = 8.2 A.

154. What is the SI unit of permittivity of free space?

A. unitless quantity

B. F/m

C. F-m

D. F/m^2

Ans. B

Sol. The SI unit for permittivity is farad per meter (F/m or F.m^{-1}). The lowest possible permittivity is that of a vacuum. Vacuum permittivity, sometimes called the electric constant, is represented by ε_0 and has a value of approximately 8.85×10^{-12} F/m.

155. In a two-wattmeter method, at a power factor angle of 60° lagging, what will be the reading of both the wattmeter respectively

A. $W_1 = 0$, $W_2 = 0$

B. $W_1 = 0$, $W_2 = -W$

C. $W_1 = W_2 = W$

D. $W_1 = 0$, $W_2 = W$

Ans. D

Sol. $W_1 = V_L I_L cos(30+φ)$

$W_2 = V_L I_L cos(30-φ)$

Where φ = 60°

Therefore , $W_1 = V_L I_L cos(30+60) = 0$

$W_2 = V_L I_L cos(30-60) = V_L I_L cos(30) = W$

156. Calculate the zero-sequence current in a three-phase system whose line current are given below:

$I_a = 4 + j6$ A,

$I_b = -3 + j8$ A,

$I_c = 2 - j5$ A

A. 1 + j3   B. 2 + j3
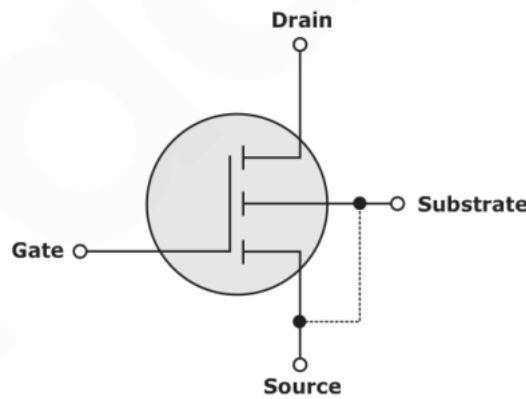
C. -1 + j2   D. 3 + j9

Ans. A

Sol. Zero sequence current,

$$I_{a0} = \frac{1}{3}(I_a + I_b + I_c)$$

$$I_{a0} = \frac{1}{3}(4 + j6 - 3 + j8 + 2 - j5)$$

$$I_{a0} = \frac{1}{3}(3 + j9) = 1 + j3$$

157. The given figure is of which type of MOSFET?

A. N-Channel Enhancement Type   B. P-Channel Enhancement Type

C. N-Channel Depletion Type   D. P-Channel Depletion Type

Ans. A

Sol. The above model is of N-Channel Enhancement Type. In N-Channel Enhancement type MOSFET as much V_{GS} greater than Vt, the channel formed for the conduction of Field Effect Transistor is more enhanced o called enhancement type.

158. Which one of the following A.C. bridge is preferred to measure self-Inductance from known mutual inductance?

    A. Maxwell Inductance Capacitance Bridge

    B. Anderson's Bridge

    C. Heaviside Bridge

    D. Heaviside Compbell Bridge

Ans. D

Sol. Heaviside Compbell Bridge is preferred to measure Self Inductance L from known mutual inductance M.

159. Which one of the following statement is incorrect regarding flat demand rate tariff?

    A. It is expressed in the form, C = Ax

    B. Electricity Bill depends only on the maximum demand

    C. It is independent of the energy consumed

    D. It is dependent on the energy consumed.

Ans. D

Sol. **Flat Demand Rate Tariff:** It is expressed in the form, C= Ax. The Electricity Bill depends only on the maximum demand not on the energy consumed. It is used in street lightning, sign lightning, signal system & in irrigation tube wells. Metering is not required in this system of tariff.

160. In a 132 kV, three phase system, the natural frequency of oscillation is 20 kHz, calculate maximum rate of rise of restriking voltage?

    A. 18.54 kV/μ-sec   B. 23.24 kV/μ-sec

    C. 11.68 kV/μ-sec   D. 13.54 kV/μ-sec

Ans. D

Sol. Maximum rate of restriking voltage $(RRRV)_{max} = \omega_n * E_{peak}$

    $= [2 \times \pi \times 20 \times 1000 \times (132\sqrt{2})/ \sqrt{3}] \times 1000$

    $= 13536.86 \times 10^6$ V/sec

    $= 13.54$ kV/μ-sec

161. V curve for synchronous motor is a graph between?

    A. Field Current I_f on X-axis and Terminal Voltage V_t on Y–axis

    B. Terminal Voltage V_t on X-axis and Field Current I_f on Y–axis

    C. Field Current I_f on X-axis and Armature Current I_a on Y–axis

    D. Armature Current I_a on X-axis and Field Current I_f on Y–axis

Ans. C

Sol.
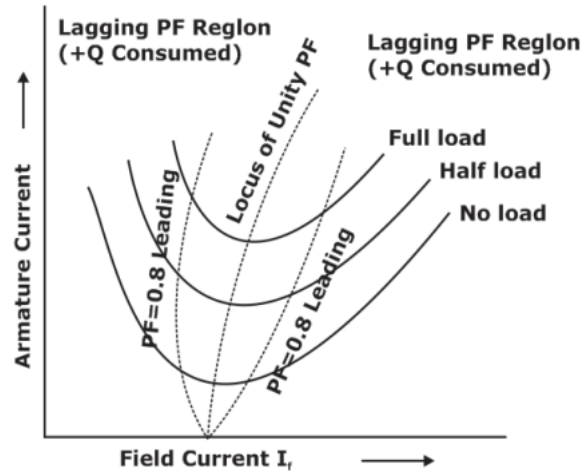
Synchronous motor V-curve shows the variation in armature current with the change in field current for different fixed power. Synchronous motor V-curve shows that the armature current is minimum at unity power factor.

162. Determine the resolution in percentage of a 4-bit Digital to Analog Converter?

    A. 12.50%   B. 66.7%

    C. 1.25%   D. 6.67%

Ans. D

Sol. Percentage Resolution of an DAC = $[\ 1/(2^n-1)] \times 100$

    Where n is the number of bit.

    Therefore, Percentage Resolution of a 4-bit DAC = $[\ 1/(2^4-1)] \times 100$

    = 6.67%

163. In parallel operation of transformer which one the following is a desirable condition?

    A. Equivalent leakage impedance in ohm should be directly proportional to their own kVA rating.

    B. Phase displacement between primary & secondary line voltage must be same for all transformer.

    C. Equivalent leakage impedance in ohm should be inversely proportional to their own kVA rating.

    D. Per unit impedance based on same kVA rating.

Ans. C

Sol. **Desirable Condition for Parallel Operation of transformer:**

    (i) Equivalent leakage impedance in ohm should be inversely proportional to their own kVA rating.

    (ii) Ratio of equivalent leakage reactance to equivalent resistance should be same for all transformer

Necessary Condition for Parallel Operation of transformer:

(i) Phase displacement between primary & secondary line voltage must be same for all transformer.

(ii) Primary must have same magnitude of line voltage.

(iii) Secondary must have same phase sequence.

164. Calculate the total kW and kVAR for an industrial load which consist of two separate load:

    Load A: 250 kVA at 0.8 power factor lagging

    Load B: 40 kW at unity power factor

    A. Total kW = 250 & Total kVAR = 150

    B. Total kW = 200 & Total kVAR = 200

    C. Total kW = 150 & Total kVAR = 250

    D. None of the above

Ans. A

Sol. **For Load A:** $\text{Cos}\varphi_a = 0.8$ therefore $\text{Sin}\varphi_a = 0.8$

    Therefore, $S_a = 250(0.8 + j0.6) = (200 + j150)$ kVA

    For Load B: $\text{Cos}\varphi_a =$ unity therefore $\rightarrow \text{Sin}\varphi_a = 0$

    Therefore, $S_b = P_b = 50$ kW

    So, total kW = 200 + 50 = 250 & total kVAR = 150

165. Maximum value of torque which a synchronous motor can develop at rated voltage and frequency without losing synchronism is defined as?

    A. Electromagnetic torque   B. detent torque

    C. Pull-Out torque   D. Pull-in torque

Ans. C

Sol. **Pull Out Torque:** The pull-out torque in synchronous machine can be defined as the maximum value of torque which a synchronous motor can develop at rated voltage and frequency without losing synchronism.

166. If the symmetrical braking capacity of a circuit breaker is 200 A, calculate the making capacity of circuit breaker?

    A. 320 A   B. 510 A

    C. 346 A   D. 448 A

Ans. B

Sol. Making Capacity of Circuit breaker = 2.55 x symmetrical braking capacity = 2.55 x 200 = 510 A

167. Two voltmeter P & Q measures voltage between 0 - 120 V. They both have voltage sensitivity of 2 kΩ/V & 5 kΩ/V respectively. Calculate maximum voltage measured by the series combination of Voltmeter P & Q?

A. 128 V

B. 148 V

C. 168 V

D. 188 V

Ans. C

Sol. For Voltmeter P, I_{FS} = 1/S_{V1} = 1/2k = 0.5 mA. Therefore R_P = 2k x 120 = 240 kΩ

For Voltmeter Q, I_{FS} = 1/S_{V2} = 1/5k = 0.2 mA. Therefore R_P = 5k x 120 = 600 kΩ

When voltmeter is connected in series, least current flow through both the voltmeter. Therefore maximum voltage measured by combination of series voltmeter will be,

V_{max} = 0.2 x 10^{-3} x 240 x 10^3 + 0.2 x 10^{-3} x600 x 10^3 = 48+120 = 168 V

168. For a three-phase short circuit fault the fault MVA (Short Circuit Capacity) is defined as: Short circuit capacity = VI, where V & I are respectively

A. V is the Prefault voltage in volts & I is the Prefault current in Ampere

B. V is the Postfault voltage in volts & I is the Postfault current in Ampere

C. V is the Prefault voltage in volts & I is the Postfault current in Ampere

D. V is the Postfault voltage in volts & I is the Prefault current in Ampere

Ans. C

Sol. The short circuit capacity or short circuit MVA of a bus of a network is defined as the product of the magnitude of the Prefault voltage & the post fault current. It is also known as fault level.

169. Which one the following speed control method of is not a speed control method using slip Control of induction machines?

A. Pole Changing method

B. Rotor resistance Control

C. Emf Injection method

D. Voltage Control

Ans. A

Sol. Speed Control Method of Induction machines :

	Using Slip control	Using N_5 Control
1	Stator Voltage Control	Pole Changing Method
2	Rotor resistance Control	V/f Control
3	Emf Injection method	Cascading of Induction Machine

170. In an 8 pole, 3-phase machine there are total 600 conductor and 200 slots. Then calculate the angular slot pitch in electrical degree.

A. 7.2 degree in electrical

B. 3.6 degree in electrical

C. 4.8 degree in electrical

D. 9.6 degree in electrical

Ans. A

Sol. angular slot pitch of machine, $\gamma = \dfrac{360 \times P}{2N}$

Where N is the number of slot and P is the Pole.

Therefore,

$\gamma = \dfrac{360 \times 8}{2 \times 200} = 7.2°\text{electrical}$

171. Among the following which material is used in PMDC Motors to make permanent magnet?

    (I) Alnicos

    (II) Ferrites

    (III) Rare Earth Material (samarium Cobalt & NIB)

    A. Only I

    B. (II) & (III)

    C. (I) & (III)

    D. All (I), (II) & (III) are used

Ans. D

Sol. Three types of permanent magnet material are used for PMDC motors:

    (I) **Alnicos:** Used in low current & high voltage application because of low coercive magnetization intensity & high residual flux density.

    (II) **Ferrites:** Used in Cost sensitive application like AC, Compressor, Refrigerators.

    (III) **Rare Earth Material:** These are made up of samarium Cobalt & Neodymium-Iron-Boron (NIB).

    They have high coercive magnetization intensity & high residual flux density.

172. Which one the following instrument is used at frequency of zero Hz?

    A. D'Arsonval Galvanometer

    B. Vibrational Galvanometer

    C. Head Phone

    D. Tunable Detector

Ans. A

Sol. D'Arsonval Galvanometer is used at Frequency of Zero Hz.

    Vibrational Galvanometer → 5 Hz – 200 Hz

    Head Phone → 200 Hz - 1000 Hz

    Tunable Detector → 1000 Hz

173. In plate type earthing system what is the dimension of cast iron plate, which is used as earth plate?

    A. (350 mm x 350 mm x 6.3 mm)

    B. (550 mm x 550 mm x 7.2 mm)

    C. (600 mm x 600 mm x 6.3 mm)

    D. (600 mm x 600 mm x 7.2 mm)

Ans. C

Sol. In plate type earthing system cast iron plate is used as earth plate, which having dimensions of (600 mm x 600 mm x 6.3 mm). It is connected with a hot dip GI main earth strip by means of nut, bolt and washers of required size.

    The earth plate is back filled & covered with earthing material (mixture of charcoal & salt) by 150 mm from all sides.

174. Potential difference between two points on the earth surface separated by a horizontal reach of one meter is named as?

A. Touch voltage
B. Step voltage
C. Supply voltage
D. None of the above

Ans. B

Sol. The Potential difference between two points on the earth surface separated by a horizontal reach of one pace or one step assumed to be one meter is defined as step voltage.

175. A material which is defined by its characteristic as the temperature decreases, then after a certain temperature its resistance abruptly down to zero is defined as?

A. superconductor
B. Conductor
C. Ferroelectric Material
D. Ferromagnetic Material

Ans. A

Sol. Unlike an ordinary metallic conductor, whose resistance decreases gradually as its temperature is lowered even down to near absolute zero, a superconductor has a characteristic critical temperature below which the resistance drops abruptly to zero.

176. By adding nearly 1% of cadmium to the copper conductor, we get cadmium copper conductor, which of the following result is obtained?

A. Resistance Increases.

B. Resistance would remain same.

C. Tensile strength increases to 50%.

D. Variation in sag due to change in load increases.

Ans. C

Sol. With the addition of 0.7% to 1% of cadmium to the copper conductor, The following result is obtained.

1) Tensile strength increases to 50 %.

2) Resistivity decreases around 15%-18%.

3) Easily Jointing.

4) More resistance to atmospheric corrosion.

5) Better resistance to wear.

6) Easy machinability.

7) The temperature at which copper annealed is also increases.

8) Temperature effect on stress is also reduces.

177. In hot wire instrument, hot wire made up of which material?

A. Platinum Iridium
B. Aluminium
C. Manganin
D. Copper

Ans. A

Sol. Hot wire instrument is used to measure RMS value of current in AC and also measure DC current. It is used in communication application. The wire of Hot wire instrument is made up of Platinum Iridium.

178. Suppose an infinite long wire carrying a current of 50 A, then the magnetic flux density at a distance of 2 cm will be nearly equal to?

A. 0.5 mT

B. 0.25 mT

C. 0.20 mT

D. 0.10 mT

Ans. A

Sol. For an infinite long wire carrying a current of I amp the magnetic flux density at a distance r,

$$B = \frac{\mu_0 i}{2\pi r}$$

where, $\mu_0 = 4\pi \times 10^{-7}$ N/A^2

$$B = \frac{4\pi \times 10^{-7} \times 50}{2\pi \times 0.02} = 0.5 \text{ mT}$$

179. For a three-phase induction motor in direct online starting if short circuit current is 10 times the full load current, and the full load slip is 0.05. Then which one of the following statement is correct.

A. T_{est} is 5 times the full load torque

B. T_{est} is 4 times the full load torque

C. T_{est} is 2 times the full load torque

D. T_{est} and is T_{efl} same

Ans. A

Sol. In Direct online starting method of speed control,

$$\frac{T_{est}}{T_{efl}} = s_{fl} \left(\frac{I_{SC}}{I_{fl}} \right)^2 \text{ where } I_{sc} = 10 \ I_{fl} \text{ and } s_{fl} = 0.05$$

$$\frac{T_{est}}{T_{efl}} = 0.05 (100)$$

Therefore $T_{est} = 5$ times T_{efl}

180. Which one of the following is condition is not necessary for the parallel operation of transformer?

A. Terminal voltage of incoming machines & the running alternator on the must be same.

B. The frequency of two voltage source nearly same.

C. The phase sequence of two alternators must be same.

D. none of the above.

Ans. D

Sol. For the parallel operation of transformer three condition are necessary to meet:

1) Terminal voltage of incoming machines & the already running alternator on the must be same.

2) The frequency of two voltage source nearly same.

3) The two voltages must be in the same phase sequence with respect to external load, or we can say the phase sequence of two alternators must be same.

181. Which of the following relation is exist in between the reflection coefficient of voltage & reflection coefficient of current?

A. $R_V = R_I$

B. $R_V = - R_I$

C. $R_V = 1 + R_I$

D. $R_V = 1- R_I$

Ans. B

Sol.
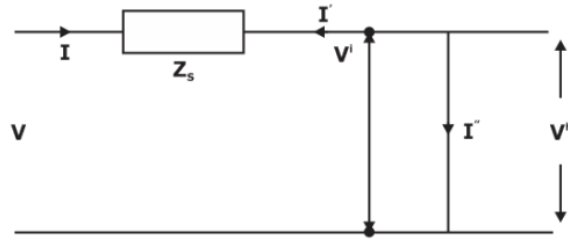
182. Domains which is defined for Ferromagnetic materials, are separated by grain boundary. Which of the following statement is correct regarding domain?

A. All the domain are align in same direction even if the magnetic field is not applied.

B. The Atoms within a domain are align in same direction

C. About 50% of atoms in a domain get completely magnetize before the appllied magnetic field

D. None of the Above

Ans. B

Sol.
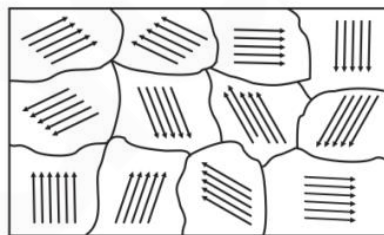
Applied Field=0
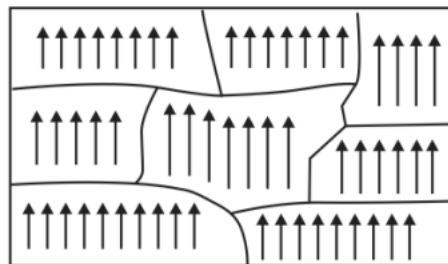
Applied Field≠0

In a ferromagnetic material there are number of domain exist for a Ferromagnetic Materials. These all domain are not aligned in same direction before the applied magnetic field, but all the atoms of an individual domain are aigned in same direction. Therefore Option B is correct.

183. For the case of Alternator, what will be the output power at Zero power factor lead and at zero power factor lag respectively?

A. P_{out} at ZPF lead = finite and P_{out} at ZPF lag = finite

B. P_{out} at ZPF lead = 0 and P_{out} at ZPF lag = finite

C. P_{out} at ZPF lead = finite and P_{out} at ZPF lag = 0

D. P_{out} at ZPF lead = 0 and P_{out} at ZPF lag = 0

Ans. D

Sol. In zero power factor lead or zero power factor lag the field mmf wave are collinear whether in same direction or 180° out of phase in turn electromagnetic torque does not produce, so that the P_{out} in both the cases Zero power factor lead and at zero power factor lag will be zero.

184. Which gas is commonly used in gas welding?

A. Biogas
B. Methane

C. Acetylene
D. Coal Gas

Ans. C

Sol. Gas welding is usually referred as oxy welding or oxy-fuel welding which is a process of joining metallic materials by application of heat produced by the gas flame. In gas welding, acetylene is commonly used as fuel gas which mixed with proper proportion of oxygen in a mixing chamber of welding torch. Gas welding can produce a hot flame of temperature about 3000°C-3500°C.

185. If the terminal voltage in a DC shunt generator is 200 V. The armature resistance and the shunt resistance are 0.5 Ω and 250 Ω respectively. If the load current is 5 A, Calculate the I^2R loss in armature part?

A. 6.48 W
B. 7.42 W

C. 8.82 W
D. 12.46 W

Ans. C

Sol. Since terminal voltage V_t = 200 V

Therefore shunt current = 200/250 = 0.8 A

Since Load Current, $I_L = I_{SH} + I_a$

I_a = 5 - 0.8 = 4.2 A

Armature I^2R loss = $I_a^2 R = (4.2)^2 \times 0.5 = 8.82$ W

186. What is the unit of luminous intensity?

    A. candela

    B. lumen/m^2

    C. candela/m^2

    D. lumen

Ans. A

Sol. **Luminous Intensity:** Intensity in a given direction, the luminous flux emitted by the source per unit solid angle.

I = F/ω , Unit- Candela or Lumen/ Steradian

187. As per the given below circuit diagram, which one of the following diode is in conducting mode?
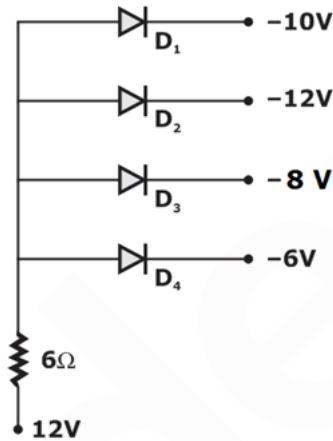
    A. D$_1$

    B. D$_2$

    C. D$_3$

    D. D$_4$

Ans. B

Sol. In Common Anode Configuration, the diode which has lowest voltage on its cathode will be in conducting mode therefore as per the circuit diagram diode D$_2$ will Conduct.

188. A 1200-watt lamp has a mean spherical candle power (MSCP) of 1600 watt, is suspended over the working floor. Then calculate the Lamp Efficiency.

    A. 16.75 %

    B. 22.50 %

    C. 25.75 %

    D. 28.75 %

Ans. A

Sol. Lamp efficiency $= \dfrac{\text{Luminous flux}}{\text{Input power}}$

$\eta = \dfrac{4\pi \times 1600}{1200} = 16.75\%$

189. Which one of the following given waveform best depicts the variation in resistivity for metal on y-axis, with the variation in light intensity on x-axis?

A. ρ

Light Intensity

B. ρ

Light Intensity

C. ρ

Light Intensity

D. ρ

Light Intensity
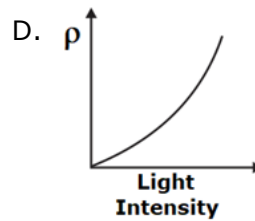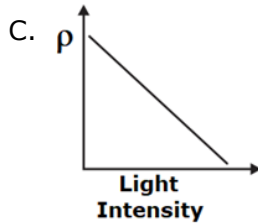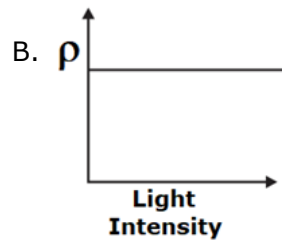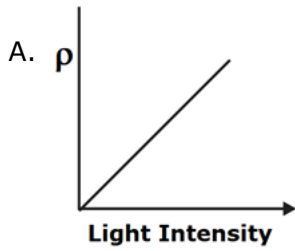
Ans. B

Sol. There is no significant or no change in the resistivity as the Light falls on metals.

190. In a synchronous machine, 50 A of field current require to give rated voltage on open circuit while the field current of 100 A is required to give rated current at short circuit, Calculate the short circuit ratio of synchronous machine?

A. 5   B. 0.5

C. 2   D. 0.2

Ans. B

Sol. As we have already known that the Short circuit ration is equals to the short circuit current in per unit.

SCR = $(I_{SC})_{PU}$ = I_{sc}/I_{rated} = 50/100 = 0.5

Note: High value of short circuit ratio require large size machine, but the machine is more stable, as large hydro set has the range of SCR from 1.1 to 1.6 in practice.

191. In a R-C series circuit if C= 40 μF and the initial voltage across capacitor was $V_C(0^-)$ = -20 V. If the rate of change of voltage through the capacitor $dv(0^-)/dt$ = 400 V/sec, then calculate the value of resistance R?

A. 1 kΩ   B. 1.25 kΩ

C. 2 kΩ   D. 2.5 kΩ

Ans. B

Sol. V = IR = (C dV/dt) R, where I = C dv/dt

Here dv/dt will be negative since in the capacitor current is always decreasing.

Therefore,

-20 = 40 x 10^{-6} x (-400) x R

R = 1.25 kΩ

192. Which motor is used in electric traction system?

    A. DC Series Motor   B. DC Shunt Motor

    C. Universal Motor   D. Reluctance Motor

Ans. C

Sol. In electric traction system DC series motor is used. A series-wound DC motor has a low resistance field and armature circuit. Because of this, when voltage is applied to it, the current is high, the advantage of high current is that the magnetic fields inside the motor are strong, producing high torque (turning force), so it is ideal for starting a heavy object like a train.

193. In a synchronous machine if the field MMF is decreased by any mean then what will the effect on reactive power?

    A. Reactive Power Increases   B. Reactive Decreases

    C. Remain Constant   D. First increase then decrease

Ans. A

Sol. In synchronous machines active power, $V_t I_a \cos\theta = \dfrac{V_t E_f}{C} \sin(\delta_{rf})$ ...(i)

      In synchronous machines reactive power, $V_t I_a \cos\theta = \dfrac{V_t E_f}{C} - \dfrac{V_t E_f}{C} \cos(\delta_{rf})$ ...(ii)

      If field mmf F_f is decreased, to keep the active power would remain constant δ_{rf} must be increases as seen from equation (1), as the terminal voltage V_t is constant.
      Now from equation (2), as δ_{rf} increased, Cos δ_{rf} decreased in turn the second

      term $\dfrac{V_t F_f}{C} \cos(\delta_{rf})$ also decreases, Therefore if the field MMF is decreased by any mean

      then the Reactive power will increases.

194. In an Oscilloscope the Lissajous pattern is observed as below. What will be the vertical input signal frequency if horizontal input frequency is 20 Hz?
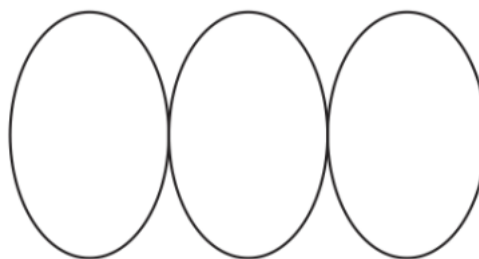
    A. 10 Hz   B. 50 Hz
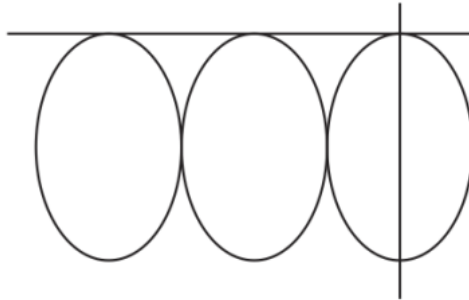
    C. 30 Hz   D. 25 Hz

Ans. C

Sol. $\dfrac{f_y}{f_x} = \dfrac{\text{Horizontal tangent}}{\text{Vertical tangent}}$

Where f_y & f_x are the frequency of Vertical input signal and horizontal input signal respectively.

Horizontal tangent = 2, Vertical tangent = 3 also f_x = 20 Hz given,

$f_y = 20 \times \dfrac{3}{2} = 30 \text{ Hz}$

195. If the frequency of supply increased, then which effect can be observed?

   A. Skin Effect Increases.

   B. Skin Effect decreases.

   C. Skin Effect does not depend on supply frequency.

   D. skin depth increases.

Ans. A

Sol. **Sin Depth:** The depth of the conductor at which the surface current (Imax) drops to "1/e" times, is defined as skin depth.

Skin depth, $\delta = \dfrac{1}{\sqrt{\pi f \mu \sigma}}$

Skin Effect is inversely proportional to sin depth.

Therefore, skin effect $\propto \dfrac{1}{\text{skin depth}}$

So, now if the frequency of supply is increased then the skin depth decreases in turn the skin effect increases.

196. Which one of the following is the correct statement for the synchronizing Power coefficient?

   A. $P_{syn} = \dfrac{E_f V_t}{X_s} \sin\delta$

   B. $P_{syn} = \dfrac{E_f V_t}{X_s} \cos\delta$

   C. $P_{syn} = \dfrac{E_f V_t}{X_s}$

   D. $P_{syn} = -\dfrac{E_f V_t}{X_s} \cos\delta$

Ans. B

Sol. As we know the power transfer for cylindrical rotor is, $P_{syn} = \dfrac{E_f V_t}{X_s} \sin \delta$

The rate of synchronous machine at which synchronous power varies with δ, is defined as synchronizing power coefficient P_{syn}.

It is also defined as the stiffness of coupling, rigidity factor or stability factor.
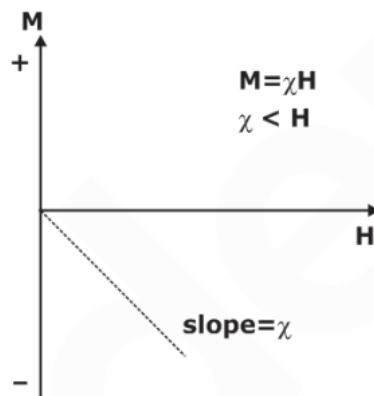
Therefore, Synchronizing power coefficient, $P_{syn} = \dfrac{dP}{d\delta} = \dfrac{E_f V_t}{X_s} \cos \delta$

197. Which one of the following material possess negative Susceptibility?

A. Anti-ferromagnetic materials   B. Ferromagnetic materials

C. Paramagnetic materials   D. Diamagnetic materials

Ans. D

Sol. Curve between Magnetization and magnetic field intensity for diamagnetic material

Diamagnetic substances have negative susceptibilities ($\chi < 0$); Since it is defined as the ratio of "M/H" .paramagnetic, super paramagnetic, and ferromagnetic substances have positive susceptibilities ($\chi > 0$). Nearly all biological tissues are weakly diamagnetic.

198. In a circuit given below if R = 20 Ω, L =16 mH and the capacitance C = 160 µF, then calculate the supply current if the input voltage is 200 V, 50 Hz of supply?
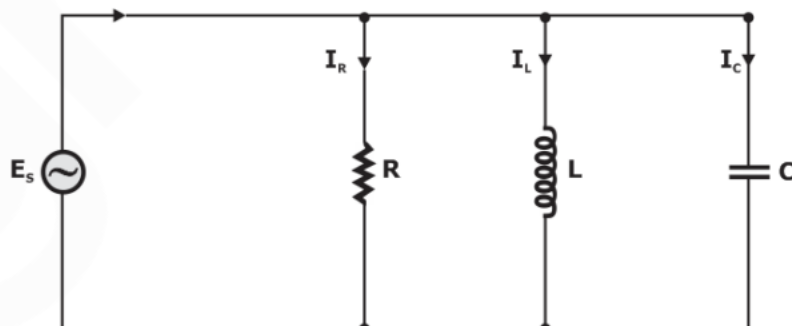
A. 22.82 A   B. 27.56 A

C. 31.62 A   D. 42.62 A

Ans. C

Sol. $X_L = 2\pi fL = 2 \times 3.14 \times 50 \times 16 \times 10^{-3} \approx 5\ \Omega$

$X_C = 1/\ 2\pi fC = 1/\ (2 \times 3.14 \times 50 \times 160 \times 10^{-6}) = 20\ \Omega$

Therefore, $I_R = 200/20 = 10$ A

$I_L = 200\ /\ 5 = 40$ A

$I_C = 200/\ 20 = 10$ A

Supply Current, $(I_S)^2 = (I_R)^2 + (I_L - I_C)^2$

$= 10^2 + (40-10)^2 = 100 + 900 = 1000$

Therefore, supply current $I_S = \sqrt{1000} = 31.62$ A

199. What will be the reading of centre zero PMMC if the given signal is passed through it

$I(t) = -4 + 2 \sin4t + 3 \sin5t$ A

A. 0 A

B. -4 A

C. 1 A

D. None of the above

Ans. B

Sol. As we have already knows that PMMC reads only average value. Here in the given question averege of sinusoidal over a period is zero. If PMMC is centre zero PMMC then it will read the -4 Amp, while if the given PMMC was normal PMMC then the reading of PMMC will be zero.

200. In case of immersion type water heater heat is transferred by?

A. Conduction heating

B. Radiation heating

C. Convection heating

D. Induction Heating

Ans. C

Sol. Heat is transferred by convection in case of immersion type water heater or in case of low temperature heating equipment for buildings. The air in contact with a heated radiator element in a room receives heat from contact with the element. The heated air expands and rises, cold air flowing into take its place. Thus there is a constant flow of air upwards across the heating element.

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