Answer-key & Solution

SSC JE (Electrical)
MOCK -(103)
Date:- 24.6.2017

1. B	26. C	51. A	76. C	101. A	126. B	151. B	176. B
2. B	27. B	52. D	77. B	102. A	127. B	152. A	177. C
3. D	28. D	53. D	78. D	103. B	128. C	153. D	178. C
4. B	29. A	54. A	79. D	104. C	129. A	154. A	179. D
5. D	30. D	55. B	80. D	105. A	130. D	155. A	180. D
6. A	31. C	56. D	81. A	106. A	131. D	156. C	181. C
7. D	32. C	57. D	82. A	107. A	132. A	157. A	182. A
8. C	33. C	58. B	83. B	108. B	133. D	158. D	183. A
9. B	34. A	59. B	84. B	109. C	134. B	159. C	184. C
10. B	35. D	60. D	85. C	110. B	135. C	160. D	185. D
11. D	36. A	61. A	86. B	111. A	136. B	161. A	186. B
12. B	37. A	62. A	87. A	112. C	137. A	162. D	187. B
13. D	38. B	63. C	88. D	113. C	138. D	163. A	188. A
14. A	39. B	64. C	89. A	114. C	139. D	164. D	189. C
15. D	40. D	65. B	90. D	115. C	140. C	165. A	190. D
16. B	41. C	66. D	91. C	116. A	141. A	166. A	191. B
17. C	42. B	67. B	92. A	117. D	142. D	167. A	192. B
18. D	43. A	68. C	93. B	118. B	143. D	168. B	193. D
19. B	44. B	69. B	94. C	119. A	144. A	169. C	194. D
20. A	45. A	70. B	95. A	120. C	145. D	170. B	195. B
21. D	46. A	71. C	96. A	121. B	146. D	171. B	196. D
22. B	47. C	72. A	97. D	122. A	147. C	172. A	197. B
23. C	48. D	73. C	98. D	123. C	148. A	173. B	198. D
24. B	49. B	74. A	99. A	124. C	149. D	174. C	199. A
25. B	50. C	75. D	100. D	125. C	150. B	175. B	200. B

Note : *If your opinion differ regarding any answer, please message the mock test and Question number to 9560620353*

Note : *If you face any problem regarding result or marks scored, please contact : 9313111777*

SOLUTION SSC JE (Elecrtrical) MOCK TEST no. 103

1. (B) August = 3 Vowels and 3 Consonants.
   = 3 × 3 = 9
   January = 3 Vowels and 4 Consonants.
   = 3 × 4 = **12**

2. (B) $6 × 2 × 3 = 36 \Rightarrow \sqrt{36} = 6 \Rightarrow 6^3 = 216$
   $2 × 8 × 4 = 64 \Rightarrow \sqrt{64} = 8 \Rightarrow 8^3 = \textbf{512}$

3. (D) Geetanjali was written by Tagore and Godan by **Premchand.**

4. (B)
   R   S   T   Q   P   M   D   N
   -1 $+2$ -3 $+4$ -1 $+2$ -3 $+4$
   Q   U   Q   U   O   O   A   R

5. (D) $2 + 3 + 4 + 6 = 15 \Rightarrow 1 + 5 = 6$
   $7 + 8 + 3 + 5 = 23 \Rightarrow 2 + 3 = 5$
   $4 + 5 + 7 + 2 = 18 \Rightarrow 1 + 8 = 9$
   $1 + 5 + 6 + 7 = 19 \Rightarrow 1 + 9 = 10 \neq 4$

6. (A) Except **Kanpur**, other are capital of the indian states.

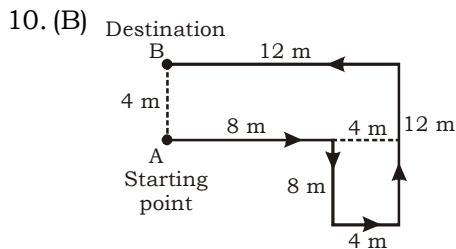7. (D) Except **Shakuntala** devi, other participated in Indian freedom struggle.

8. (C) Except **Heart**, other organs are in pair.

9. (B) From second and third die, we have
   concluded that
   4   6   5
   opp. opp. opp.
   2   1   **3**

   So, **3** on the face opposite to 5.

10. (B)
    Destination
    B — 12 m
    4 m
    8 m   4 m 12 m
    A
    Starting point
    8 m
    4 m

    Required distance = **4 m.**

11. (D) $9 + 6 + 8 = 23 \Rightarrow 2 + 3 = 5 \Rightarrow 5 × 5 = 25$
    $7 + 5 + 3 = 15 \Rightarrow 1 + 5 = 6 \Rightarrow 6 × 5 = 30$
    $9 + 4 + 5 = 18 \Rightarrow 1 + 8 = 9 \Rightarrow 9 × 5 = \textbf{45}$

12. (B) $27 + 32 + 18 + 23 = 35 + 18 + 47 = 72 + 28$
    = **100**

13. (D) LCM of 18, 12, 36 = 72
    LCM of 16, 56, 14 = **112**
    LCM of 16, 56, 14 = 144

14. (A)

15. (D) **3, 4, 1, 2**

16. (B) 12 × 1 + 2 = 14
    14 × 2 + 3 = 31
    31 × 3 + 4 = 97
    97 × 4 + 5 = **393**

17. (C)
    16   8   24   12   **36**   18   54
    ÷2   ×3   ÷2   ×3   ÷2   ×3

18. (D) Total number of digits
    = (Number of digits in 1–digit page nos. + Number of digits in 2–digit page nos. + Number of digits in 3–digit page nos.)
    = (1 × 9 + 2 × 90 + 3 × 246)
    = (9 + 180 + 738) = **927**

19. (B) Position of the letter from last to first.
    C = 24, G = 20, L = 15, D = 23
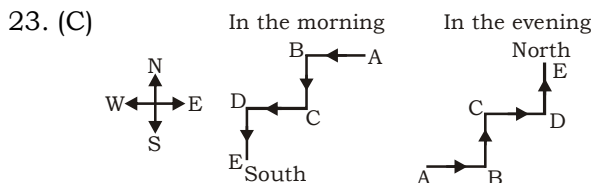   P = 11, O = 12, E = 22, R = 9
    K = 16
    Then we have,
    CGL $\Rightarrow$ C + G + L = 24 + 20 + 15 = 59 $\Rightarrow$ 59×10=590
    LDC $\Rightarrow$ L + D + C = 15 + 23 + 24 = 62 $\Rightarrow$ 62×10=620
    PO $\Rightarrow$ P + O = 11 + 12 = 23 $\Rightarrow$ 23 × 10 = 230
    CLERK $\Rightarrow$ C+L+E+R+K $\Rightarrow$ 24+15 + 22 + 9+ 16 = 86
    $\Rightarrow$ 86 × 10 = **860**

20. (A) a $\underline{b}$ b/c d $\underline{d}$/ $\underline{a}$ b b/ $\underline{c}$ d d/ a $\underline{b}$ b

21. (D) After Changing the signs, as per the given details, we have
    72 – 144 ÷ 18 × 12 + 24
    = 72 – 8 × 12 + 24
    = 72 – 96 + 24
    = 96 – 96
    = **0**

22. (B) Yash is 17th from the last and Ankit is 7 ranks ahead of Yash. So, Ankit is 24th from the last.
    Number of students ahead of Ankit in rank = (39 – 24) = 15.
    So, Ankit is 16th from the top.

23. (C)
    In the morning   In the evening
    B ← A   North
    N   E
    W ← → E   D   C
    S   C   D
    E   A → B
    South

    So, Saloni is going towards either North or South direction.

24. (B)

25. (B)

26. (C) A.R.Rahman is a Musician and Shakuntala devi is a **Mathematician**

27. (B) $324 \Rightarrow 3^2 \times 4 = 36$
    $623 \Rightarrow 6^2 \times 3 = \mathbf{108}$

28. (D)
    R V S M S H I T
    $-2\downarrow$ $+1\downarrow$ $+0\downarrow$ $+2\downarrow$ $-2\downarrow$ $+1\downarrow$ $+0\downarrow$ $+2\downarrow$
    P U S O **Q** **G** **I** **V**

29. (A) GOD = $7 \times 15 \times 4 = \mathbf{420}$
    DOG = $4 \times 15 \times 7 = 420$

30. (D) $1+ 8 + 3 - 2 = 10 \Rightarrow 10^2 = 100$
    $6+ 5 + 3 - 1 = 13 \Rightarrow 13^2 = 169$
    $3+ 2 + 7 - 3 = 9 \Rightarrow 9^2 = 81$
    $\mathbf{7+ 8 + 9 - 2 = 22} \Rightarrow \mathbf{22^2 = 484} \neq \mathbf{529}$

31. (C) Except **'F'**, others have same mirror image.

32. (C) Except **Samudragupta**, other belongs to Maurya dynasty.

33. (C) Except **856**, others are divisible by 9..

34. (A) Only son of Reena's father-in-law (Rahul) → Reena's husband.
    So, Amit is Reena's husband. Also Indu and Meera are her daughters.
    Thus, Rahul is the **Grandfather** of Meera.

35. (D) From (ii) and (iii) we have

 | Sign on front face | × | ◆ | ▷ |
    |---|---|---|---|
    | Sign on opposite face | × | ○ | → |

    Here, ▷ is opposite to → .

36. (A) $\frac{6}{3} \times 18 = 36$, $\frac{8}{2} \times 12 = 48$, $\frac{12}{3} \times 2 = \mathbf{8}$

37. (A) $56= 24 + 32 = 18 + 24 + \mathbf{14} = 19 + 16+9 +12$

38. (B) $\frac{20 \times 18 \times 50}{100} = 180$

    $\frac{80 \times 20 \times 40}{100} = 640$

    $\frac{60 \times 24 \times 25}{100} = \mathbf{360}$

39. (B)

40. (D) $2 \to 4 \to 3 \to 1 \to 5$

41. (C) $4 \times 0.5 + 4 = 6$
    $6 \times 1 + 3 = 9$
    $9 \times 2 + 2 = 20$
    $20 \times 4 + 1 = \mathbf{81}$

42. (B)
    12   3   1.5   1.5   3   12   **96**
    ×0.25 ×0.5 ×1 ×2 ×4 ×8
    ×2   ×2   ×2   ×2   ×2

43. (A) A is the daughter of B means A is the sister of the son (say D) of B i.e. **A/D × B.**

44. (B)

45. (A) acbd/cbda/bdac/dacb

46. (A) $36 - 12 \times 2 + 18 \div 9$
    $= 36 - 12 \times 2 + 2$
    $= 36 - 24 + 2$
    $= \mathbf{14}$

47. (C) From (i) and (iii)
    Common word is 'Neenu' which means 'Hum'.
    From (ii) and (iii)
    Common word is 'Ante' which means 'be'
    So, **Amla** means Ghost..

48. (D) The figure may be labeled as shown.
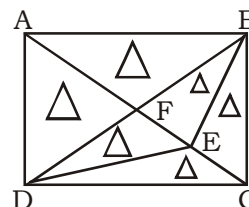
    Simplest triangles are AFB, FEB, EBC, DEC, DFE and AFD i.e. 6 in number.
    Triangles composed of two components each are AEB, FBC, DFC, ADE, DBE and ABD i.e. 6 in number.
    Triangles composed of three components each are ADC and ABC i.e. 2 in number.
    There is only one triangle i.e. DBC which is composed of four components.
   6 separate triangles has been shown.
    Thus, there are $6 + 6 + 2 + 1 + 6 = 21$ triangles in the figure.

49. (B) Each row contains 36 plants
    There are 35 gaps between the two corner trees i.e. ($35 \times 3 = 105$) meters and 4 metre is left on each side.
    ∴ Length of the garden = $105+4 \times 2 = \mathbf{113\ m}$.

50. (C) $1 \times 3 \times 1 = 3 \Rightarrow 3^3 - 3^2 = 27 - 9 = 18$
    $1 \times 2 \times 3 = 6 \Rightarrow 6^3 - 62 = 216 - 36 = 180$
    $2 \times 3 \times 2 = 12 \Rightarrow 12^3 - 12^2 = 1728 - 144 = 1584$
    $1 \times 2 \times 6 = 12 \Rightarrow 12^3 - 12^2 = 1728 - 144 = \mathbf{1584}$

52. (D) The area of Andhra Pradesh is 160,205 sq km, area of Gujarat is 196,024 sq km, the area of Karnataka is 191, 791 sq km and Tamil Nadu is 130, 058 sq km.

53. (D) According to Article 368, an amendment of the Constitution may be initiated only by the introduction of a Bill for the purpose in either House of Parliament, and when the Bill is passed in each House by a majority of the total membership of that House present it shall be presented to the President who shall give his assent to the Bill and thereupon the Constitution shall

stand amended in accordance with the terms of the Bill.

55. (B) Human body has different resistances. When dry, resistance is 100,000 ohms and when wet because of sweat or water, resistance is only 1,000 ohms.

56. (D) Ilmenite, Zircon and Sillimanite are found in Kollam district in Kerala.

57. (D) Recombinant DNA is DNA sequences, which result from bringing genetic material from different sources. The genes can be transferred between any species that is across differents species of plants, from animals to plants and from micro organisms to higher organisms.

58. (B) The book "Band, Bajaa, Boys!" has been authored by Rachna Singh, an HR and marketing consultant. This book explores the many hilarious shades of small town life, with an underlying theme of rejection.

59. (B) The International Day of Zero Tolerance for Female Genital Mutilation (FGM) is observed every year across the world on February 6 to promote the UN's campaign to raise awareness and educate people about the dangers of Female Genital Mutilation (FGM) and to stop genital mutilation of girls and women. Basically, this day is an awareness campaign to end a harmful practice that violates girls' and women's rights. The 2017 theme is "Building a solid and interactive bridge between Africa and the world to accelerate ending FGM by 2030"

60. (D) The executive in a Parliamentary system is responsible to the legislature for all its actions. The ministers are answerable to the Parliament and responsible to the Lok Sabha. The Council of Ministers remains in office as long as they enjoy the support and confidence of the Lok Sabha.

62. (A) Organic farming is a production system of crops which avoids the use of synthetic and chemical inputs like fertilizers, pesticides, growth regulators and livestock feed additives.

63. (C) The 4th Rollball World Cup will be held in Dhaka, Bangladesh from February 17 to 23, 2017. Approx. 700 competitors from 45 countries are expected to participate in the tournament. It is the largest-ever event in any field where such a huge number of countries will be participating in any Asian Country. The International Rollball Federation (IRBF) is a body which is associated with International Rollball. This game was created by Raju Dabhade of Pune City and is also the Secretary of the IRBF. Rollball is a game played between two teams of 12 players. Out of 12, only 6 players are allowed to play on court at a time. This game is played on skates.

64. (C) Distribution of power between the Centre and the States in the Indian Constitution is based on the Government of India Act. 1935.

65. (B) A simple machine is a mechanical device that changes the direction or magnitude of a force. In general, they can be defined as the simplest mechanisms that use mechanical advantage to multiply force. Thus, simple machine helps us in doing same amount of work with lesser force. Few examples of simple machines are pulley, lever, wheel, screw, etc.

66. (D) Ethylene glycol solutions are marketed as "permanent anti-freeze", and is used as anti-freeze agent for the automobile engine in cold countries where temperature is below zero degree centigrade.

67. (B) Body piercing or getting one's body tattooed may cost one a huge price-Infection of Hepatitis B and C virus is absolutely possible. The needle used in the act may just be infected with the said virus causing liver disease, which in its ultimate stage often turns cancerous. This is deemed to happen if the needle is not properly sterilized.

68. (C) Rajeev Singh, Member (Finance) in Prasar Bharati Board, has taken charge as acting Chief Executive Officer (CEO) of the public service broadcaster Prasar Bharti. He succeeded Suresh Panda, who retires on February 4, 2017. Panda has been serving as interim CEO since November 2016, after full time chief Jawhar Sircar resigned in October 2016. Prasar Bharati looks after the functioning of Doordarshan and All India Radio (AIR).

70 (B) Kolleru lake, one of the largest shallow fresh water lakes in Asia, is located between Krishna delta and the Godavari in Andhra Pradesh

72. (A) International Development Association (IDA), is that part of the World Bank that helps the world's poorest countries. It complements the World Bank's other lending arm— the International Bank for Reconstruction and Development (IBRD) which serves middle-income countries with capital investment and advisory services. IDA was created in 1960.

73. (C) Chlorofluorocarbons are used in the production of plastic foams, in cleaning electronic components and as pressurizing agents in aerosol cans.

74. (A) Ticks and mites are categorized under Arachnids of phylum Arthopoda of animal kingdom.

75. (D) Anish Kapoor, the well-known Indian-origin British sculptor, has won the prestigious $1 million Genesis Prize 2017 by Israel for his commitment to Jewish values. Kapoor's work include 'Turning the World Upside Down' at the Israel Museum in Jerusalem, 'Cloud Gate' in Chicago's Millennium Park and the 'Orbit' in London. The Genesis Prize is also regarded as Jewish Nobel Prize and is given annually to those who have attained excellence and international renown in their chosen professional fields, and who inspire others through their engagement and dedication to the Jewish community and/or the State of Israel.

76 (C) Ghiyasuddin Tughlaq had founded Tughlaq dynasty in 1320 AD. Nasiruddin Mahmud was the last ruler of Tughlaq dynasty (1395-1412 AD).

77. (B) The Palk Strait separates India and Srilanka. It lies between the Gulf of Mannar and the Bay of Bengal. It is bounded on the south by Pamban Island (India), Adam's (Rama's) Bridge (a chain of shoals), the Gulf of Mannar, and Mannar Island (Sri Lanka). The southwestern portion of the strait is also called Palk Bay. The strait is 40 to 85 miles (64 to 137 km) wide, 85 miles long, and less than 330 feet (100 metres) deep.

78. (D) The purpose of Directive Principles of State Policy is to establish social and economic democracy. Political democracy is established by the Fundamental Rights.

79 (D) MAT or Minimum Alternative Tax was introduced in the budget of 1996-97. Under MAT a company is required to pay a minimum tax of 7% profit, in case the tax on the total income computed under the normal provisions of law works out to less than this amount.

80. (D) Because the density of the clouds is less than that of the air. Same phenomena is behind the floating of a ship in a sea.

81. (A) A dry cell has the electrolyte immobilized as a paste, with only enough moisture in the paste to allow current to flow. The electrolyte is Ammonium Chloride in the form of a paste next to the Zinc anode. In some more modern types of so called 'high power' batteries, Ammonium Chloride has been replaced by Zinc Chloride.

83. (B) India has won the 2017 T20 Blind World Cup by defeating Pakistan in the final by 9 wickets at Bengaluru's M Chinnaswamy Stadium. Indian player Prakash Jayaramaiah was adjudged as man of the match for his outstanding innings in the match while Badar Munir from Pakistan was given the man of the series award for his 570 runs in the tournament.

84. (B) The Indian Space Research Organisation (ISRO) has successfully launched a record of 104 satellites from the Satish Dhawan Space Centre (SDSC) in Sriharikota, Andhra Pradesh through PSLV C-37 launch vehicle. The PSLV-C37 first launched the 714 kg Cartosat-2 Series satellite for earth observation and then inject 103 co-passenger satellites, together weighing about 664 kg at lift-off into polar Sun Synchronous Orbit, about 520 km from Earth. With the successful launch, India scripted history by becoming the first country in the world to launch 104 satellites in a single rocket.

85. (C) The Kala Ghoda festival is a most prominent cultural event in Mumbai. The nine-day long festival is the center of attraction for thousands of visitors from all over the country as well as from the world. Kala Ghoda festival is held annually in the months of January or February.

86 (B) Nehru drafted the resolution on Fundamental Rights. The Karachi Session was presided over by Sardar Vallabh Bhai Patel.

87. (A) If the stars are seen raised perpendicular to the horizon by an observer then the observer will be at the equator because celestical equator is an imaginary circle around the sky directly above the earth's equator. It is always 90° from the pole. All the stars rotate in a path that is parallel to the celestical equator.

89. (A) The Twelfth Five-Year Plan of the Government of India has been decided to achieve a growth rate of 8.2% but the National Development Council (NDC) on 27

December 2012 approved a growth rate of 8% for the Twelfth Five-Year Plan.

90. (D) Initially at start of heating from 0°C to 4°C there will be a contraction as a result of which volume decreases. On further heating beyond 4°C to 10°C the molecules gain kinetic energy and start moving more randomly.Thus, intermolecular distance increases as a result of which its volume increases.

93. (B) The world's longest elevated cycle path "the winding viaduct"has been opened in the city of Xiamen, China which can handle about 2,023 cyclists with a speed limit of 15 miles per hour. The five-mile long and 16-feet wide bicycle pathway can carry 2,023 cyclists per hour, while 300 hire bikes are available for people who do not have bicycles. The architecture firm responsible is Copenhagen-based firm Dissing+ Weitling, known for the creation of the Danish Bicycle Snake cycle route.

94. (C) The Radcliffe Line is a boundary demarcation line between India and Pakistan upon the Partition of India. The Radcliffe Line was named after its architect, Sir Cyril Radcliffe.

95. (A) The Ravva offshore block is in Krishna–Godavari basin of Andhra Pradesh. It is the area of a great reserve of petroleum and natural gas.The field is operated by Cairn India which holds a 22.5% stake in it. Its partners in the field include ONGC (40%), Videocon Petroleum (25%) and Ravva Oil (12.5%).

96 (A) Article 24 of the constitution states that, No child below the age of fourteen years shall be employed to work in any factory or mine or engaged in any other hazardous employment. It is provided that nothing in this sub clause shall authorise the detention of any person beyond the maximum period prescribed by any law made by Parliament under sub clause (b) of clause (7); or such person is detained in accordance with the provisions of any law made by Parliament under sub clauses (a) and (b) of clause.

97. (D) Art. 269 says that taxes on income other than agricultural income shall be levied and collected by the Government of India and distributed between the Union and States. Entry 46 in the state list of Seventh Schedule gives power to the state governments to impose agricultural income tax.

98 (D)The study of birds is called ornithology. Salim Ali of India, whose work set the standard for surveys of birds all over the world, can rightly be called the father of ornithology.

• Cardiology: The branch of medicine that deals with the diagnosis and treatment of diseases and disorders of the heart.

• Hematology: The study of the nature, function, and diseases of the blood and of blood-forming organs.

• Odontology :The branch of science concerned with the anatomy, development, and diseases of teeth and related structures

100. (D) The book "Army and Nation: The Military and Indian Democracy since Independence" has been authored by Steven Wilkinson, a professor of political science and International relations at Yale University. It is about Indian Army's relationship with the civilian government after Independence. It is in news because Pakistan Army Chief General Qamar Javed Bajwa has advised his officers to read the book "Army and Nation" to understand how India succeeded in keeping the military out of politics.

101. (A) The circuit is as shown in figure below
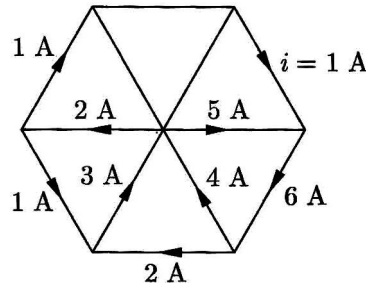
Hence (A) is correct option.

102. (A) Going from 10 V to 0 V
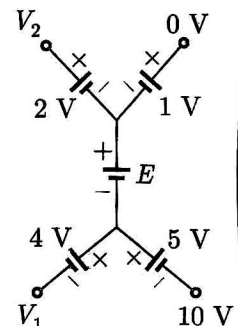
$10 + 5 + E + 1 = 0$ or $E = -16$ V

Hence (A) is correct option.

103. (B) Voltage is constant because of 15 V source.

Hence (B) is correct option.

104. (C) Voltage at previous circuit will remain same. So i will remain constant.

Hence (C) is correct option.

105. (A) Let v_o be the voltage across dependent

source

$$\frac{v_o - 20}{5} + \frac{v_o}{5} = \frac{20}{5}$$

$$\Rightarrow \qquad v_o = 20\ V$$

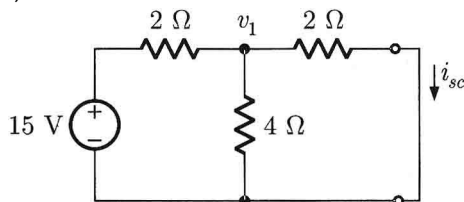Power is $P = v_o \times \dfrac{v_1}{5} = 20 \times \dfrac{20}{5} = 80\ W$

Hence (A) is correct option.

106. (A) $200i_1 + 50\ (i_1 + 10m) + 100\ (i_1 - 40m) = 0$

$$350i_1 + 0.5 - 4 = 0 \Rightarrow i_1 = \frac{3.5}{350} = 10\ mA$$

Hence (A) is correct option.

107. (A) The circuit is as shown below

$$R_N = 2 \parallel 4 + 2 = \frac{10}{3}\ \Omega,$$

$$v_1 = \frac{\dfrac{15}{2}}{\dfrac{1}{2} + \dfrac{1}{2} + \dfrac{1}{4}} = 6\ V$$

$$i_{sc} = i_N = \frac{v_i}{2} = 3\ A$$

Hence (A) is correct option.

108. (B) $v_s = 4 \times \dfrac{3i}{4} \Rightarrow \dfrac{v_s}{i} = 3\ \Omega$

Hence (B) is correct option.

109. (C) $L_{eq} = \dfrac{L_1 L_2 - M^2}{L_1 + L_2 - 2M} = \dfrac{24 - 16}{6 + 4 - 8} = 4\ H$

Hence (C) is correct option.

110. (B) $Q = R\sqrt{\dfrac{C}{L}} = 8 \times 10^3 \sqrt{\dfrac{0.25 \times 10^{-6}}{40 \times 10^{-3}}} = 20$

Hence (B) is correct option.

111. (A) $\qquad BW = \dfrac{R}{L}$

$$\Rightarrow \quad \frac{R}{1 \times 10^{-3}} = 15.9 \times 2\pi = 0.1\ \Omega$$

Hence (A) is correct option.

112. (C) In two-wattmeter methods

$$\tan\phi = \sqrt{3}\left(\frac{P_1 - P_2}{P_1 + P_2}\right)$$

$$P_1 = 8\ kW,\ \ P_2 = 4\ kW$$

So $\tan\phi = \sqrt{3}\dfrac{(8-4)}{(8+4)} = \sqrt{3}\left(\dfrac{4}{12}\right) = \dfrac{1}{\sqrt{3}} \Rightarrow \phi = 30°$

Power factor $\cos\phi = \cos 30° = 0.866$

Hence (C) is correct option.

113. (C) Inductance of the Solenoid is given as

$$L = \frac{\mu_0 N^2 A}{l}$$

Where A $\rightarrow$ are of Solenoid

$l \rightarrow$ length

$$L = \frac{4\pi \times 10^{-7} \times (3000)^2 \times \pi\ (30 \times 10^{-3})^2}{(1000 \times 10^{-3})}$$

$$= 31.94 \times 10^{-3}\ H = 32\ mH$$

Hence (C) is correct option.

114. (C) The reflected impedance when referred to the primary side will be

$$Z_s = \left(\frac{N_1}{N_2}\right)^2 (Z_s') = (5)^2(1 + j4) = 25 + j100\ \Omega$$

Hence (C) is correct option.

115. (C) Turns ratio $\quad n = \dfrac{1000}{200} = 5$

Effective resistance on the secondary side

$$R_{02} = R_2 + \frac{R_1}{a^2} \qquad \begin{cases} R_1 = 0.25\ \Omega \\ R_2 = 0.014\ \Omega \end{cases}$$

$$= 0.014 + \frac{0.25}{5^2} = 0.024\ \Omega$$

Since at maximum efficiency, copper loss and iron-loss are equal. We may write

So $\qquad I_2^2 R_{02} = 240$

$$\therefore \qquad I_2 = \sqrt{\frac{240}{0.024}} = 100\ A$$

Hence (C) is correct option.

147. (C)

$$\because \qquad N_1 = \frac{120 f_1}{P_1}$$

$$\because \qquad f_1 = 50\ Hz, \quad P_1 = 4, \quad f_2 = \frac{f_1}{2}$$

$$P_2 = \frac{P_1}{2}$$

$$N_2 = \frac{120 f_2}{P_2} = \frac{120.f_1}{2.P_1/2}$$

$$= \frac{120 f_1}{P_1} = \frac{120 \times 50}{4} = 1500\ rpm$$

148. (A) $\because$ At maximum efficiency Iron loss = copper loss = 1000 W

$\because$ It occurs at full load, So, full load Copper loss $= I_{fl}^2.R = 1000$ watt

At half load,

Copper loss $= \left(\dfrac{I_{fl}^2}{2}\right)^2 \times R = \dfrac{1}{4}I_{fl}^2 \times R$

$= \dfrac{1000}{4} = 250$ watt

150. (B) N_r = 750 rpm

s = 0.04

P = 4

$N_s = \dfrac{120f}{P}$

$\because$ $N_r = N_s(1-s)$

$N_s = \dfrac{N_r}{1-s} = \dfrac{750}{1-0.04} = 781.25$ rpm

Putting the value of N_s in equation (1)

$781.25 = \dfrac{120f}{4}$

$f = 26.04$ Hz $\cong 25$Hz

151. (B) $\because$ Angle between V and I is 60°

Power factor angle = θ = 60°

As we know, for series R-L-C circuit

$\tan\theta = \dfrac{X_L - X_C}{R}$

If $X_L > X_C$

$\tan 60° = \dfrac{X_L - X_C}{R}$

$\Rightarrow$ $X_L - X_C = \sqrt{3}R$

152. (A) Loss angle = 0.01 radian

or, $\theta_L = 0.01 \times \dfrac{180}{\pi}$

= 0.572958

P.F. angle = 90 – 0.572958

= 89.42

Active power consumed = VI cos θ

= 1000 × 0.5 × cos (89.427)

= 4.999 $\cong$ 5 watt

153. (D) I_{ms} = rms value of current

$= \sqrt{\dfrac{(20)^2(10+0) + (-10)^2(30-10)}{(10+20)}}$

= 14.14 A

162. (D) It is defined as,

Discharge factor $= \dfrac{\text{Discharge voltage (crest value)}}{\text{Rated voltage (rms value)}}$

$= \dfrac{373\sqrt{2}}{211} = 2.5$

164. (D) $V_a = i_a\sqrt{\dfrac{L}{C}}$

$\Rightarrow V_a = 10\sqrt{\dfrac{1}{(0.01\times10^{-6})}}$

= 100 KV

165. (A) $Q_C = P(\tan\varphi_1 - \tan\varphi_2)$

$\because \cos\varphi_1 = 0.707$

$\Rightarrow \varphi_1 = 45°$

and $\cos\varphi_2 = 0.866$

$\Rightarrow \varphi_2 = 30°$

So, Qc = 17.32 (tan45°–tan30°)

= 7.32 KVAR

166. (A) Forward field slip

$S_f = \dfrac{N_s - N_t}{N_s}$

$= \dfrac{1500-1300}{1500} = 0.133$ Hz

Rotor frequency due to forward field = S_f

=0.133 × 50 = 6.67 Hz

and due to backward field = (2–S)f

=(2–0.133) × 50

= 93.33 Hz

169. (C)

$\because M_A = K\sqrt{(L_1 L_2)} = 1H$

$L_1 = \dfrac{L_1}{2}$ and $L_2 = 2L_2$
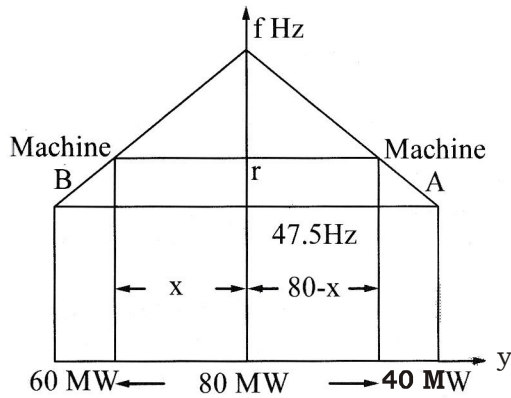
Now, $M_B = K\sqrt{\left(\dfrac{L_1}{2}\right)(2L_2)}$

$= K\sqrt{(L_1 L_2)}$

$\Rightarrow M_B = M_A$

170. (B) Change in frequency from no load to full load

$\because f_1 = 50 \times 0.05 = 2.5$ Hz

i.e., $f_{1fl} = 50 - 2.5 = 47.5$ Hz

Since both have same speed regulation then,

$$f_{1_d} = f_{fl_2}$$

For machine A,

$$\frac{50 - f}{80 - x} = \frac{50 - 47.5}{40}$$

$$\Rightarrow x - 16f = 80 - 16 \times 50$$

$$\Rightarrow x - 16f = -720 \qquad ...(1)$$

For machine B,

$$\frac{50 - f}{x} = \frac{50 - 47.5}{60}$$

$$\Rightarrow x + 24f = 24 \times 50 \qquad ...(2)$$

From equation (1) and (2)

$$x = 48 \text{ MW}$$
$$f = 60 \text{ Hz}$$

So, machine A operates at a load of 48 MW
While machine B will operate at a load of 80 − 48 = 32 MW

182. (A) Magnetising force,

$$H = \frac{NI}{L}$$

$$= \frac{10 \times 750}{2 \times 10^{-2}}$$

$$= 375 \frac{AT}{m}$$

186. (B) For symmetrical fault,

$$I_f = \frac{E}{Z_1 + Z_n}$$

E = 1 p.u.
and Z_1 = 0.5 j
or Z_n = 0.1 j

$$I_f = \frac{1}{0.5j + o.1j}$$

$$\Rightarrow I_f = j1.67 \text{ p.u}$$

189. (C) $R_x = \dfrac{R_2 R_3}{R_4} = \dfrac{2000 \times 750}{4000} = 375\Omega$

$L = R_2R_3C_4 = 2000 \times 750 \times 0.5 \times 10^{-6}$
= 75 mH

190. (D) $P_{max} = \dfrac{V_s^2}{4R} = \dfrac{10 \times 10}{4 \times 10} = 2.5 \text{ W}$

200. (B) $\dfrac{f_V}{f_H} = \dfrac{5}{2}$

$$f_v = \frac{5}{2} \times 100 = 250 \text{ Hz}$$