$S_2 = v_2 \times 17$

~~23v~~ + $17v_2 = 23v_1 + 23v_2$

Subject Matter Test – Section -A

$S_1 + S_2 = 22v_1 + 17v_2$ $\quad 2v_1 = 3v_2$ $\quad \boxed{\frac{v_1}{v_2} = \frac{3}{2}}$

①

1. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is

1. 1 : 3
2. [✓ 3 : 2]
3. 3 : 4
4. None of these

27 Sec. → ← 17 Sec.

2. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, what is the length of the platform?

1. 120 m
2. [✓ 240 m]
3. 300 m
4. None of these

$S_1 + S = v_0 \times 36$

$S_1 = u \times 20$

$S_1 = \boxed{300}$

$15 \times \frac{5}{18}$ = (15)

$300 + S = 15 \times 36$

$S = 540 - 300$

3. What is the least square number of soldiers that can be drawn up in troops of 12, 15, 18 and 20 soldiers?

1. 900
2. 400
3. 1600
4. [✓ 2500]

2×2×3   3×5   3×3×2   2×2×5

$= 2\times2\times3\times3\times5$

$= 12 \times 15 =$ (180)

4. Find the remainder when 73*75*78*57*197*37 is divided by 34.

$\frac{73*75*78*57*197*37}{34}$

1. 32
2. [✓ 30]
3. 15
4. 28

5. The average weight of 8 persons increases by 2.5 kg when a new person comes in place of one of them, weighing 65 kg. What might be the weight of new person?

1. 76 kg
2. 76.5 kg
3. [✓ 85 kg]
4. None of these

6. The sum of the two digits of a number is 10. If the number is subtracted from the number obtained by reversing its digits, the result is 54. Find the number?

1. ~~34~~
2. [✓ 28]
3. ~~12~~
4. ~~17~~

$xy \qquad x + y = 10$

$yx - xy = 54$

7. As per the agreement with a bank, a businessman had to refund a loan in some equal installments without interest. After paying 18 installments he found that 60 percent of his loan was refunded. How many installments were there in the agreement?

1. 22
2. 24
3. [✓ 30]
4. 33

8. A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family?

1. $28\frac{4}{7}$ years
2. [✓ $31\frac{5}{7}$ years]
3. $32\frac{1}{7}$ years
4. None of these

$GP_1 \quad GP_2$

$P_1 \quad P_2$

$C_1 \quad C_2 \quad C_3$

9. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

1. 12 days
2. [✓ 15 days]
3. 16 days
4. 18 days

$\frac{1}{20} \quad \frac{1}{30} \quad \frac{1}{60}$

10. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

1. 360
2. 480
3. [✓ 720]
4. None of these

Vowel → (EAI)

Const → (LDNG)

11. Machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 A.M. while machine P is closed at 11A.M. and the remaining two machines complete work. Approximately at what time will the work (to print one lakh books) be finished?

1. 11:30 A.M.
2. 12 noon
3. 12:30 P.M.
4. [✓ 1:00 P.M.]

$8)\,120.8\,(2213$

16

18

12. A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 seconds, B in 308 seconds and c in 198 seconds, all starting at the same point. After what time will they again meet at the starting point ?

1. 26 minutes and 18 seconds
2. 42 minutes and 36 seconds
3. 45 minutes
4. [✓ 46 minutes and 12 seconds]

$5! \times 3!$

$= 120 \times 6$

$=$

A, B, C →

13. What will be the least number which, when doubled, will be exactly divisible by 12, 18, 21 and 30 ?

1. 196
2. [✓ 630]
3. 1260
4. 2520

2×2×3   2×3×3   3×7   3×2×5

$\boxed{2^2 \times 3^2 \times 5 \times 7}$

3 day

14. If $3\sqrt{5} + \sqrt{125} = 17.88$, then what will be the value of $\sqrt{80} + 6\sqrt{5}$?

1. 13.41
2. 20.46
3. 21.66
4. [✓ 22.35]

$3\sqrt{5} + 5\sqrt{5} = 17.88$

$8\sqrt{5} = 17.88$

$4\sqrt{5} + 6\sqrt{5} = 10\sqrt{5}$

$= 10 \times \frac{17.88}{8}$

$\frac{1}{20} + \frac{1}{20} + \left(\frac{1}{20} + \frac{1}{30} + \frac{1}{60}\right)$

$9 \times 9 \times 5 \times 7$

(5+1)

~~207~~ 400 + 360 + 360

1600(20×24 + 15×24 + 20×18)

15. A group of students decided to collect as many paise from each member of group as is the number of members. If the total collection amounts to Rs. 59.29, the number of the members in the group is

1. 57
2. 67
3. 77
4. 87

360

720 + 480

63

384

1200

20

10

16. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much (in fraction of vessel size) of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?

1. 1/3
2. 1/4
3. 1/5
4. 1/7

17. ① 3 pumps, working 8 hours a day, can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?

1. 9
2. 10
3. 11
4. [✓ 12]

$\frac{3\times 8}{2} = \frac{4\times x}{1}$

18. ① In a camp, there is a meal for 120 men or 200 children. If 150 children have taken the meal, how many men may be catered with the remaining meal?

1. 20
2. [✓ 30]
3. 40
4. 50

120 M = 200 C

150 C

$\frac{\cancel{120}^{6}}{\cancel{200}_{10}} \times 150 = 90$ M

19. A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?

1. 4 litres, 8 litres
2. 6 litres, 6 litres
3. 5 litres, 7 litres
4. 7 litres, 5 litre

$3\times\cancel{8}^{2}\times 2 = \cancel{4}\times x$

20. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is

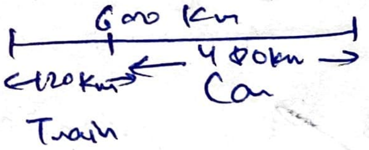
1. 100 km /hr
2. 110 km /hr
3. 120 km /hr
4. 130 km /hr

21. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is

1. 1 hour
2. 2 hours
3. 3 hours
4. 4 hours

22. → It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is

1. 2 : 3
2. 3 : 2
3. 3 : 4
4. 4 : 3



$t_1 = \frac{120}{u_T} + \frac{480}{u_C}$

$t_2 = \frac{200}{u_T} + \frac{400}{V_C}$

23. A, B and C jointly thought of engaging themselves in a business venture. It was agreed that A would invest Rs. 6500 for 6 months, B, Rs. 8400 for 5 months and C, Rs. 10,000 for 3 months. A wants to be the working member for which, he was to receive 5% of the profits. The profit earned was Rs. 7400. Calculate the share of B in the profit.

1. Rs. 1900
2. Rs. 2660
3. Rs. 2800
4. Rs. 2840

24. ① A and B started a business in partnership investing Rs. 20,000 and Rs. 15,000 respectively. After six months, C joined them with Rs. 20,000. What will be B's share in total profit of Rs. 25,000 earned at the end of 2 years from the starting of the business?

1. [✓ Rs. 7500]
2. Rs. 9000
3. Rs. 9500
4. Rs. 10,000

A → 20,000 × 24

B → 15000 × 24

C → 20,000 × 18

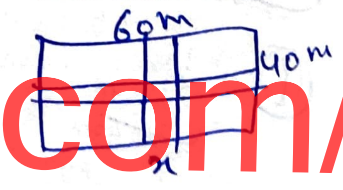
25. In a triangle PQR, the length of the side QR is less than twice the length of the side PQ by 2 cm. The length of the side PR exceeds the length of the side PQ by 10 cm. The perimeter is 40 cm. The length of the smallest side of the triangle PQR is

1. 6 cm
2. 8 cm
3. 7 cm
4. 10 cm

26. ~~①~~ ③ A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?

1. 2.91 m
2. 3 m
3. 5.82 m
4. [✓ None of these]

$2400 = x\times 40 + x\times 60 + 4\times\left(20-\frac{x}{2}\right)\times\left(30-\frac{x}{2}\right)$



27. A candidate attempted 12 questions and secured full marks in all of them. If he obtained 60% marks in the test and all questions carried equal marks, then what is the number of questions in the test?

1. 36
2. 30
3. 25
4. 20

28. A cuboid has six sides of different colours. The red side is opposite to black. The blue side is adjacent to white. The brown side is adjacent to blue. The red side is face down. Which one of the following would be the opposite to brown?

1. Red
2. Black
3. White
4. Blue

29. A man fills a basket with eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 24 days. After how many days the basket was ¼th filled?

1. 6
2. 12
3. 17
4. 22

30. A person traveled a distance of 50 km in 8 hours. He covered a part of the distance on foot at the rate of 4 km per hour and a part on a bicycle at the rate of 10 km per hour. How much distance (in km) did he travel on foot?

1. 10
2. 20
3. 30
4. 40

31. Six books labeled as A, B, C, D, E and F, are placed side by side. Books B, C, E and F have green covers while others have yellow covers. Books A, B and D are new while the rest are old volumes. Books A, B and C are law reports while the rest are medical extracts. Which two books are old medical extracts and have green covers?

1. B and C
2. E and F
3. C and E
4. C and F

32. Half of the villagers of a certain village have their own houses. One – fifth of the villagers cultivate paddy. One – third of the villagers are literate. Four – fifth of the villagers are below twenty five. Then, which one of the following is certainly true?

1. All the villagers who have their own houses are literate.
2. Some villagers under twenty five are literate.
3. A quarter of the villagers who have their own houses cultivate paddy.
4. Half of the villagers who cultivate paddy are literate.

33. Assume that the hour and minute hands of a clock move without jerking. The clock shows a time between 8 o'clock and 9 o'clock. The two hands of the clock are one above the other. After how many minutes (nearest integer) will the two hands be again lying one above the other?

1. 60
2. 62
3. 65
4. 67

$T_W + T_T + T_F = 40 \times 3$

$T_T + T_F + \cancel{T_S} = 41 \times 3 - 42$

34. "Price is not the same thing as value. Suppose that on a day the price of everything viz., coal, bread, postage stamps, a day's labour, the rent of houses, etc. were to double. Prices then would certainly rise, but values of all things except one would not." The writer wants to say that if prices of all things were doubled, then

1. The values of all things would remain constant.
2. The values of the things sold would be doubled.
3. The values of the things bought would be halved.
4. The value of money only would be halved.

35. ① The average temperature for Wednesday, Thursday and Friday was 40 ⁰C. The average for Thursday, Friday and Saturday was 41⁰C. If temperature on Saturday was 42⁰C, what was the temperature on Wednesday?

1. 39° C ✓
2. 44° C
3. 38° C
4. 41° C

$T_W = 40 \times 3 - 41 \times 3 + 42$

$= 3(-1) + 42$

$= 42 - 3$

$= \boxed{39}$

36. A person has 4 coins each of different denominations, say **Rupee 1,** 2 , 5 and 10. What is the number of different sums of money the person can form (using one or more coins at a time)?

1. 6
2. 15
3. 12
4. 11

37. ① Find the 15th term of the sequence 20, 15, 10....

1. -45
2. -55
3. -50 ✓
4. 0

$a = 20$

$d = -5$

$T_{15} = 20 + 14 \times (-5)$

$= 20 - 70 = -50$

38. On what dates of April, 2001 did Wednesday fall?

1. 1st, 8th, 15th, 22nd, 29th
2. 2nd, 9th, 16th, 23rd, 30th
3. 3rd, 10th, 17th, 24th
4. 4th, 11th, 18th, 25th

$\frac{80}{V_T} = \frac{1}{3} + \frac{80}{V_C} \Rightarrow$ [illegible]

A = L×B

A' = 0.8L × 0.9B = (0.72)A

(28)

39. A towel, when bleached, was found to have lost 20% of its length and 10% of its breadth. The percentage of decrease in area is ①

1. 10%
2. 10.08%
3. 20%
4. ~~28%~~

41. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is

1. $59\frac{7}{12}$ min. past 3
2. 4 pm
3. $58\frac{7}{11}$ min. past 3
4. $2\frac{3}{11}$ min. past 4

$\frac{10 \times 15 \times 14 \times 3}{2}$

$\frac{5\;25 \times 24 \times 23}{}$

43. Find out the wrong number in the given sequence of numbers. ①

582, 605, 588, 611, 634, 617, 600

1. 634
2. 611 − 17
3. 605
4. 600

23   23   23   −17

$\frac{21}{63}$ $2\,8 \times 23$

45. A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and speed of the water current respectively? ①

1. 2 : 1
2. 3 : 2
3. ~~8 : 3~~
4. Cannot be determined

$S = (v_b - v_w) \times (8 + \frac{48}{60})$

$S = (v_b + v_w) \times 4$

$\frac{v_b - v_w}{v_b + v_w}$

47. In a 500 m race, the ratio of the speeds of two contestants A and B is 3 : 4. A has a start of 140 m. Then, A wins by ①

1. 60 m
2. 40 m
3. ~~20 m~~
4. 10 m

$v_A \to 3v$

$v_B \to 4v$

500 m   B   A $t = \frac{360}{3v}$

$\frac{360}{3v}$

$= 4v \times \frac{360}{3v}$ ^120

$= (480)$

49. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes, and 10 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P,Q and R respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes? ①

$\frac{3/10}{3 \times \frac{1}{30} + 3 \times \frac{1}{20} + 3 \times \frac{1}{10}}$

1. 5/11
2. ~~6/11~~
3. 7/11
4. 8/11

$\frac{1}{\frac{1}{3} + \frac{1}{2} + 1}$

$\frac{1}{\frac{2+3+6}{6}}$

29 35 43

40. What is the unit digit in {(6374)^1793 × (625)^317 × (341)^491}? ①

1. ~~0~~
2. 2
3. 3
4. 5

4×1 = 4 — 40

4×2 = 8 — (3)

4×3 = 2

4×4 = 6

4×5 = 0

5×1 = 5

5×2 = 0

5×3 = 5

5×4 = 0

42. A man has Rs. 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ?

1. 45
2. 60
3. 75
4. 90

$\frac{{}^{10}C_1 \times {}^{15}C_2}{{}^{25}C_3}$

44. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected is ①

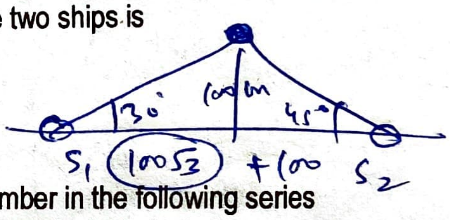
1. ~~21/46~~
2. 25/117
3. 1/50
4. ~~3/25~~

$\frac{x-1}{x+1} = \frac{205}{11}$

$11x - 11 = 5x + 5$

46. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 100 m high, the distance between the two ships is ①

1. 173 m
2. 200 m
3. ~~273 m~~
4. 300 m



$(100\sqrt{3}) + 100$

48. Insert the missing number in the following series

7, 26, 63, 124, 215, 342, (....)

1. 481
2. 511
3. 391
4. 421

7×3 + 5

26×

100 + 173.2

LAC

KKA

$\frac{100}{x_2} = \frac{1}{1}$

50. Study the table carefully to answer the question that follows ①

Number of Pass and Fail Students, of five different classes, in a year from various schools

Schools	CLASSES									
	VI		VII		VIII		IX		X	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
A	64	12	58	12	82	8	80	14	86	10
B	55	18	64	18	88	7	64	11	73	12
C	53	16	80	10	58	12	83	9	63	18
D	62	11	62	14	64	13	61	7	53	17
E	70	15	76	17	78	10	52	13	79	9
F	58	8	72	13	72	14	45	12	75	11

What is the average number of fail students from class IX from all the schools together?

1. 19
2. 17
3. 13
4. ~~11~~

25   16   25

50   16   (66)

$\frac{}{6}$

2)317(158
30
17

$P_c = P_h + P_e = f\,B_{max} + f^2 B_m$

$1050 = P_c = K_h \times 50 \times (\frac{23}{5})^n + (50)^2 \times K_e \times (\frac{23}{5})$

$500 = K_h \times 30 \times (\frac{23}{5})^n + (30)^2 \times K_e \times (\frac{23}{5})$

SECTION- B

51. In relation to the synchronous machine, which are of the following statements is false :
1. In salient pole machine, the direct axis synchronous reactance is greater than the quadrature axis synchronous reactance
2. The damper bars help the synchronous motor self start
3. Short circuit ratio (SCR) is ratio of the field current required to produce the rated voltage on open circuit to the rated armature current
4. The V-curve of a synchronous motor represents the variation in the armature current with field current, at a given output power

(1) T T $X_d > X_q$

52. The core loss of single phase, 230/115 V, 50 Hz power transformer is measured from 230 V side by feeding the primary (230 V side) from a variable voltage and variable frequency source while keeping the secondary open circuited. The core loss is measured to be 1050 W for 230 V, 50 Hz input. The core lsos is again measured to be 500 W for 138 V, 30 Hz input. The hysterias and eddy current losses of the transformer for 230 V, 50 Hz input are, respectively.
1. 508 W and 542 W
2. 468 W and 582 W
3. 498 W and 552 W
4. 488 W and 562 W

(1) $\frac{230}{50}$ $\frac{69}{138}$ 23 $\frac{30}{15}$ 5 = $\frac{23}{5}$

53. A two stage amplifier with negative feedback has an overshoot when damping factor K is :
1. Less than unity
2. Greater than unity
3. Zero
4. Negative

54. How many FFs are required to build a binary counter circuit to count from 0 to 1023?
1. 1
2. 6
3. 10
4. 24

(1) (1024) 16 8 4 2 1 / 1 0 1 0 1

$30 \times 1050 = K_h \times 50 + (50)^2 \times K_e$

$50 \times 500 = K_h \times 30 + (30)^2 \times K_e$

55. Dual of the Boolean expression A. (B+C) =A.B + A.C
1. A+(B+C) = A.B + A.C
2. A.(B+C) = (A+B). (A.C)
3. A+B.C = (A+B).(A+C)
4. None of the above

(1) A+(B.C) = (A+B).(A+C)

56. The binary code of $(21.125)_{10}$ is :
1. 10100.001
2. 10101.001
3. 10101.010
4. 10100.111

$100(3\times 105 - 5 \times 50) = K_e(50 - 3$

~~315 - 250~~ $= 15(K_e(20)$

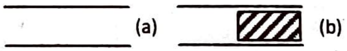
$\frac{65}{13}$ $\frac{13}{60} = K_e$

57. A 15 KW, 230 V dc shunt motor has armature circuit resistance of 0.4Ω and field circuit resistance of 230Ω. At no load and rated voltage, the motor runs at 1440 rpm and the line current drawn by the motor is 5A. At full load, the motor draws a line current of 70A. Neglect armature reaction. The full load speed of the motor in rpm
1. 1000
2. 1080
3. 1240
4. 1340

(D) 1A 70A 69A Ra=0.4 230Ω 15000W 230V

$E_{b0} = 230 - 69 \times 0.4 = 230 - 1.6 = 220.4$

58. C_0 is the capacitance of parallel plate capacitor with air as dielectric (as in fig(a)). If half of the entire gap as shown in fig (b) is filled with a dielectric of permittivity ε_r, The expression for the modified capacitance is :



1. $\frac{C_0}{2}(1+\varepsilon_r)$
2. $C_0+\varepsilon_r$
3. $\frac{C_0}{2}\varepsilon_r$
4. $C_0(1+\varepsilon_r)$

(1) $C_0 = \frac{\epsilon A}{d}$ $\frac{C_0}{2}$ $\varepsilon_r C_0$ $\frac{13}{23}$ $\times \frac{25}{56} \times 50$ $= \frac{41.6}{125 \times 13}$ = 54 0.8

59. If differential amplifier has a differential gain of 20000. CMRR = 80 dB, then common mode gain is :
1. 2
2. 1
3. 1/2
4. 0

(1) $80 = 20 \log_{10} \frac{20000}{A_C}$ $10^4 = \frac{20000}{A_C}$

60. The minimum number of NAND gates required to implement A + [illegible] + A.$\bar{B}$.C is equal to
1. 0
2. 1
3. 4
4. 7

(1) A B $C_0(\varepsilon_r + \frac{1}{2})$ A

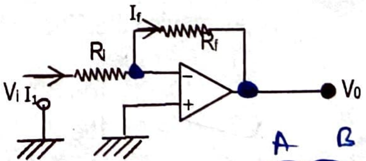
61. Let X(s) = $\frac{3s^2+5s}{s^2+10s+21}$ be the Laplace Transform of a signal X(t).Then X(0⁺) is
1. 0
2. 3
3. 5
4. 21

(1)

	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
$\bar{A}$				
A	1	1	1	1

~~228~~ $\frac{220.4}{68} = \frac{1440}{N}$ 202.4

62. A circuit using an OP - AMP shown in figure, has.........



1. Voltage series feedback
2. Voltage shunt feedback
3. Current shunt feedback
4. Current series feedback

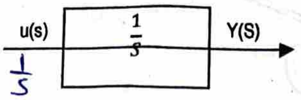
(1) A B C 65 ×5 325

$N = \frac{1440 \times 2024}{2204}$

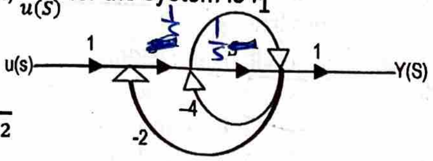
$1050 = K_h \times 50 + (50)^2 \times \frac{13}{60}$

$50 \times 50 \times 13$

63. Assuming zero initial condition, the response Y(t) of the system given below to a unit step input u(t) is : ...
①
1. u(t)
2. tu(t)
3. $t^2/2$ u(t)
4. e^{-t} u(t)



65. The signal flow graph for a system is given below. The transfer function, $\frac{Y(S)}{u(S)}$ for the system is :
①



1. $\frac{S+1}{5S^2+6S+2}$
2. $\frac{S+1}{S^2+6S+2}$
3. $\frac{S+1}{S^2+4S+2}$
4. $\frac{1}{5S^2+6S+2}$

$$\frac{\frac{1}{s^2}(1\quad)+\frac{1}{s}(1}{1+(+\frac{4}{s}+\frac{2}{s^2}+4)}$$

67. $\bar{V}_a = 1\angle 0°$, $\bar{V}b = 1\angle 120°$, $\bar{V}_c = 1\angle 240°$ constitute a balanced set of three phase voltages. The magnitude and angle of voltage $\bar{V}$bc are
①
1. 1/√3, –90°
2. √3, +90°
3. √3, –30°
4. 1/√3, +30°

$0'+1\angle 120'+1\angle 240'$

$$=\frac{1+s}{s+\frac{4}{3}+\frac{2}{s^2}}$$

$5s^2+4s+2$

69. Corona loss is less when shape of conductor is
①
1. Circular
2. Oval
3. Flat
4. Independent of shape

71. Setting time of a 2nd order system with 2% tolerance band for damping ratio ξ and frequency ω_n is given by:
①
1. $4\xi\omega_n$
2. $4\xi/\omega_n$
3. $4/\xi\omega_n$
4. $\xi\omega_n$

$t_s = \frac{4}{\xi\omega_n}$

73. The work done in moving a charge on an equipotential surface is :
①
1. Finite and positive
2. Infinite
3. Finite and negative
4. Zero

$V = \frac{W}{Q}$

$W = QV$

$\int dW = Q\int dV$

75. Consider a system with the closed loop transfer function $\frac{C(S)}{\text{[illegible]}} = \frac{20(S+4)}{S^2+8S+15}$ with input R(s) and output C(s). When all initial conditions are zero and the input is an impulse then the output c(t) is :
①
1. $e^{-8t}+10e^{-t}$
2. $10e^{-3t} - 10e^{-5t}$
3. $10e^{-3t} + 10e^{-5t}$
4. $20e^{-8t} + 5e^{-15t}$

~~$s^2+5s+3s+$~~

$s^2+(5+3)s+5\times 3=0$

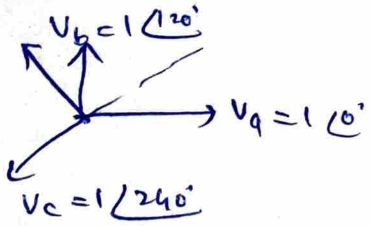
77. In an auto-transformer, power is transferred through:
①
1. Conduction process only
2. Induction process only
3. Both conduction and induction processes
4. None of the above

$\frac{(-5+4)}{-5+3}$

$\frac{10}{(s+3)}+\frac{10}{(s+5)}$

64. The bridge method commonly used for finding mutual inductance is :
①
1. Heaviside compbell bridge
2. Schearing bridge
3. De Sauty bridge
4. Wien bridge

66. A half controlled single phase bridge rectifier is supplying an R-L load. It is operated at a firing angle α and the load current is continuous. The fraction of cycle that the freewheeling diode conducts is :
①
1. 1/2
2. $\left(1-\frac{\alpha}{\pi}\right)$
3. $\frac{\alpha}{2\pi}$
4. $\frac{\alpha}{\pi}$



68. The sum of instantaneous powers in a balanced three phase system is
①
1. Constant
2. Constant plus a second harmonic oscillating component
3. Constant plus a fundamental oscillating component
4. Constant plus a third harmonic oscillating component

70. The critical clearing time is related to :
①
1. Steady state stability limit
2. Transient stability limit
3. Short circuit current limit
4. None of the above

72. The surge impedance of 100 km long underground cable is 50 Ω. The surge impedance for 50 km length of similar cable would be :
①
1. 50Ω
2. 100Ω
3. 25Ω
4. 80Ω

74. If the voltage applied across a capacitance is triangular in waveform then waveform of the current is:
①
1. Triangular
2. Trapezodiol
3. Sinusodial
4. Rectangular

$I = C\frac{dV}{dt}$

76. The 8085 assembly language instruction that stores the content of H and L registers into memory locations 2051_H and 2050_H, respectively, is
①
1. SPHL 2050_H
2. SPHL2051_H
3. SHLD 2050_H
4. STAX2050_H

78. The restriking voltage is measured in :
①
1. ~~RMS value~~
2. Peak value
3. Average value
4. None of the above

$V_R = V_m\left(1-\cos\frac{t}{\sqrt{LC}}\right)$

$s = \frac{-8\pm\sqrt{64-60}}{2} = \frac{-8\pm 2}{2} = \frac{-8+2}{2}, \frac{-8-2}{2}$

79. Leakage flux in an induction motor is

①

1. Flux that leaks through the machine
2. Flux that links both stator and rotor windings
3. Flux that links none of the winding
4. [✓ Flux that links the stator winding or the rotor winding but not both]

81. A current I = 5 + 14.14 sin(314t+45°) is passed through a centre zero PMMC, hot wire and moving - iron instrument, the respective reading are :

①

1. –5, 15, √125
2. [✓ 5, √125, √125]
3. –5, √125, 19.14
4. 5, 10, 10

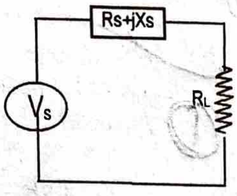
$$\sqrt{(5)^2+\left(\frac{14.14}{1.414}\right)^2}$$

$$= \sqrt{25+100}$$

83. A non ideal ac voltage source V_s has an internal impedance of Z_s.If a purely resistive load is to be chosen that maximized the power transferred to the load, its value must be :

①

1. 0
2. Real part of Z_s
3. [✓ Magnitude of Z_s]
4. Complex conjugats of Z_s



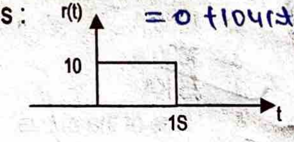
①

85. The steady state error of a unity feedback linear system for a unit step input is 0.1. The steady state error of the same system, for a pulse input r(t) having a magnitude of 10 and a duration of one second as shown in the figure is :

$$e_{ss} = \lim_{s\to 0}\frac{sR(s)}{1+G(s)}$$

$$= \lim_{s\to 0} G(s)$$

$$= 0 + 10u(t) - 10u(t-1)$$



1. 0
2. 0.1
3. 1
4. [✓ 10]

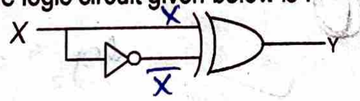
87. A negative sequence relay is commonly used to protect

①

1. [✓ an alternator]
2. a transformer
3. a transmission line
4. a bus bar

89. The output Y of the logic circuit given below is :

①



1. [✓ 1]
2. 0
3. X
4. $\bar{X}$

0	0	0
0	1	1
1	0	1
1	1	0

91. A bulb in staircase has to switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also can be turned OFF by any one of the switches, irrespective of the state of the other switch. The logic of switching of the bulb resembles

①

1. an AND gate
2. an OR gate
3. [✓ an XOR gate]
4. a NAND gate

①

80. A long straight wire carries a current I=10A, the magnetic field at a distance of 1.59 m is :

1. 0.1 Am^{-1}
2. [✓ 1.0 Am^{-1}]
3. 10 Am^{-1}
4. 100 Am^{-1}

$$H = \frac{I}{2\pi r} = \frac{\frac{\cancel{50}\ 25}{\cancel{100}}}{\cancel{2}\pi \times \cancel{1.59}}$$

$$= \frac{25}{8\times 3.1}$$

$$= \frac{25}{24.8}$$

82. For the signal f(t) = 2 Sin 9πt + 6 Sin 12 πt, + Sin 14 πt, the minimum sampling frequency (in Hz) satisfying the Nyquist criterion is :

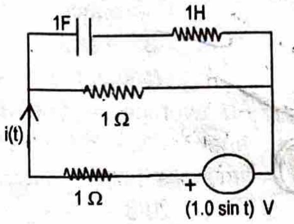
①

1. [✓ 14 sample/ sec]
2. 8 sample/ sec
3. 12 sample/sec
4. None of the above

$$\omega = 2\pi f = 14\pi$$

$$\boxed{f = 7\text{Hz}}$$

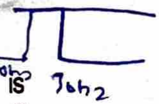
84. The rms value of the current i(t) I the circuit shown is :



1. 1/2 A
2. 1/√2 A
3. 1A
4. √2A

①

86. A low pass filter with a cut-off frequency of 30 Hz is cascaded with a high pass filter with a cut-off frequency of 20 Hz. The resultant system of filters will function as :



$$= \lim_{s\to 0}\frac{s\left(\frac{10}{s}-\frac{10}{s}e^{-s}\right)}{1+G(s)}$$

$$= \lim_{s\to 0}$$

1. An all pass filter
2. An all stop filter
3. A band stop (band-reject) filter
4. [✓ A band-pass filter]

88. A open loop system represented by a transfer function

①

$$G(s) = \frac{S-1}{(S+2)(S+3)}$$

1. Stable and of the minimum phase type
2. [✓ Stable and of the non-minimum phase type]
3. Unstable and of the minimum phase type
4. Unstable and of the non-minimum phase type

90. The flux density of a point in space is given by $B = 4xa_x + 2kya_y + 8a_z$ Wb/m^2. The value of constant 'k' is equal to :

①

1. [✓ –2]
2. –0.5
3. +0.5
4. +2

$$\vec{\nabla}\cdot\vec{B} = 0$$

$$4 + 2k = 0$$

$$k = -2$$

92. A single phase transformer has no load loss of 64 W, as obtained from an open circuit test. When a short circuit test is performed on it with 90% of the rated currents flowing in its both LV and HV winding. The measured loss is 81 W. The transformer has maximum efficiency when operated at :

①

1. 50.0% of the rated current
2. 64.0% of the rated current
3. [✓ 80.0% of the rated current]
4. 88.8% of the rated current

$$P_i = 64W$$

$$P_{cu} = 81\times\left(\frac{1}{0.9}\right)^2$$

$$=$$

$$P_i = x^2 \times P_{cu}$$

$$64 = x^2 \times 81 \times \left(\frac{1}{0.9}\right)^2$$

$$0.81 \times 8 = x^2 \times 9$$

$$\Rightarrow x = 0.8$$

1101
8421

A→10
B→11
C→12
D→13

93. ① The hexadecimal equivalent of binary number 11101101 is

1. BC
2. DC
3. [✓ ED]
4. EA

14 13
C D

95. ① In the s-domain circuit analysis, the circuit natural response is contributed by :

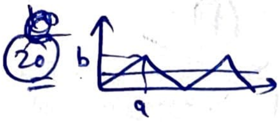
1. [✓ System function poles only]
2. Forcing function poles only
3. Both system and forcing function poles
4. Both poles and zeros of the system only

97. ① Damper bars placed in the motor pole faces of an alternator help to reduce hunting

1. Above synchronous speed only
2. Below synchronous speed only
3. [✓ Above and below synchronous speed both]
4. None of the above

99. ① An average reading digital multimeter reads 10 V when fed with a triangular wave, symmetric above the time axis. For the same input a rms, reading will read

1. 20/3
2. 10/√3
3. [✓ 20/√3]
4. None of the above



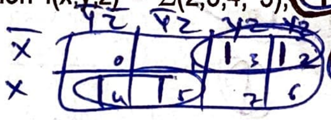
101. ① The p.u. synchronous impedance of a synchronous machine is 2.0 p.u., its SCR is

1. 2
2. 1.414
3. [✓ 0.5]
4. None of the above

$\frac{1}{2} \times a \times b$ $\frac{ab}{2a}$

103. ① In sum of the product function f(x,y,z) = Σ(2,3,4, 5), the prime implicants are

1. [✓ $\bar{X}Y, X\bar{Y}$]
2. $\bar{X}Y, X\bar{Y}\bar{Z}, X\bar{Y}Z$
3. $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}$
4. $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}\bar{Z}, X\bar{Y}Z$

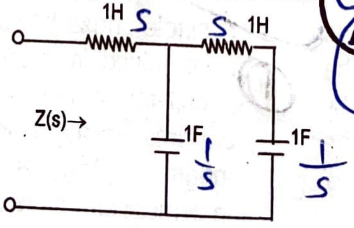


$X\bar{Y} + \bar{X}Y$

105. ① In a D.C generators the critical resistance refers to the resistance of :

1. Brushes
2. [✓ Field]
3. Armature
4. None of the above

107. ① The driving point impendence Z(s) for the circuit below is :



1. [✓ $\frac{s^4+3s^2+1}{s^3+2s}$]
2. $\frac{s^4+2s^2+4}{s^2+2}$
3. $\frac{s^2+1}{s^4+s^2+1}$
4. $\frac{s^3+1}{s^4+s^2+1}$

$$\frac{\frac{1}{s} \times \left(s + \frac{1}{s}\right)}{\frac{1}{s} + s + \frac{1}{s}}$$

$$= \frac{\frac{1}{s^2}\left(s^2 + 1\right)}{\frac{s^2+2}{s}}$$

94. ① In balanced three phase star connected sources, the angle are $\angle(\bar{V}a, \bar{V}ab), \angle(\bar{V}b, \bar{V}bc), \angle(\bar{V}c, \bar{V}ca)$

1. [✓ All equal to –30°]
2. All equal to +30°
3. All equal to +90°
4. All equal to –90°

96. ① The inverse Laplace transform of $\frac{\omega_0}{(S+\alpha)^2+\omega_0{}^2}$ is given by :

1. $e^{-\alpha t}$ cos (ω₀t) u(t)
2. [✓ $e^{-\alpha t}$ sin (ω₀t) u(t)]
3. $e^{\alpha t}$sin (ω₀t) u(t)
4. $e^{\alpha t}$ cos (ω₀t) u(t)

$e^{-at} \times \sin w_0 t$

98. ① At lagging loads, armature reaction in an alternator is

1. Cross magnetizing
2. [✓ Demagnetizing]
3. Magnetizing
4. None of the above

100. ① An ammeter of range 0-25 Amp has an accuracy of 1% of full scale reading. The current measured by the ammeter is 5 Amp. The limiting error in the reading is :

1. 2%
2. 2.5%
3. 4%
4. [✓ 5%]

$\frac{1\% \times 25}{5}$

102. ① A three phase, 33 kV oil circuit breaker is rated 1200 A, 2000 MVA, 3s. The symmetrical breaking current is:

1. 1200 A
2. 3600 A
3. [✓ 35 KA]
4. None of the above

$$I_B = \frac{2000 \times 10^6}{\sqrt{3} \times 33 \times 10^3} = \frac{2000 \times 10^3}{33\sqrt{3}}$$

104. ① A 4 point starter is used to start and control the speed of a

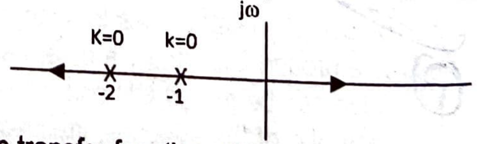
1. DC shunt motor with armature resistance control
2. [✓ DC shunt motor with field weakening control]
3. DC series motor
4. DC compound motor

106. ① If the probability of a message is 1/4, then the information in bits is :

1. 8 bit
2. 4 bit
3. [✓ 2 bit]
4. 1 bit

$\log_2 4 = 2$ 33×1.7 = 56.1

108. ① 2 The root locus of a unity feedback system is shown in the figure :



The closed loop transfer function of the system is :

1. $\frac{C(S)}{R(S)} = \frac{K}{(S+1)(S+2)}$
2. [✓ $\frac{C(S)}{R(S)} = \frac{-K}{(S+1)(S+2)+K}$]
3. $\frac{C(S)}{R(S)} = \frac{K}{(S+1)(S+2)-K}$
4. None of the above

$$G(s) = \frac{-K}{(s+1)(s+2)}$$

$$\frac{\frac{-K}{(s+1)(s+2)}}{1 - \frac{K}{(s+1)(s+2)}}$$

109. Power consumed by a balanced 3-phase, 3 wire load is measured by the two wattmeter method. The first wattmeter reads twice that of the second. Then the load impedance angle in radians is :

①

1. π/12
2. π/8
3. [✓ π/6]
4. π/3

$w_1 = 2w_2$

$\phi = \tan^{-1}\sqrt{3}\left(\frac{w_1 - w_2}{w_1 + w_2}\right)$

30°

111. The following four vector field are given in Cartesian co-ordinate system. The vector field which does not satisfy the property of magnetic flux density is

①

1. $y^2a_x + z^2a_y + x^2a_z$
2. $z^2a_x + x^2a_y + y^2a_z$
3. [✓ $x^2a_x + y^2a_y + z^2a_z$]
4. $y^2z^2a_x + x^2z^2a_y + x^2y^2a_z$

$\nabla \cdot \vec{B} = 0$

113. Kirchoff's current and voltage laws (KCL and KVL) apply for

~~①~~ 3

1. Resistive circuit only
2. Linear circuit only
3. Non-linear circuits only
4. Both linear and non linear circuits

115. For a good conductor, the depth of penetration of electromagnetic wave is given by :

①

1. [✓ $\delta = \left[\frac{2}{\omega\sigma\mu}\right]^{\frac{1}{2}}$] $= \sqrt{\frac{2}{2\pi f \sigma \mu}}$
2. $\delta = \left[\frac{1}{\omega\sigma\mu}\right]^{\frac{1}{2}}$
3. $\delta = \left[\frac{2}{\omega\sigma^2\mu}\right]^{\frac{1}{2}}$
4. $\delta = \left[\frac{2}{\omega\sigma}\right]^{\frac{1}{2}}$

117. The intrinsic impendence of free space is

①

1. [✓ $\left(\frac{\mu_0}{\epsilon_0}\right)^{\frac{1}{2}}$]
2. $\frac{\mu_0}{\epsilon_0}$
3. $\mu_0\epsilon_0$
4. $(\mu_0\epsilon_0)^{\frac{1}{2}}$

$Z_0 = \sqrt{\frac{\mu_0}{\epsilon_0}}$

119. The Thevenin's and Norton's equivalents of a network can be found

①

1. If it contains voltage sources only
2. If it contains current sources only
3. If it contains voltage/ current sources but not dependent sources
4. [✓ Even it contains voltage/ current sources and/or dependent sources]

110. An analog voltmeter uses external multiplier setting. With a multiplier setting of 20KΩ, it reads 440V and with a multiplier setting of 80 KΩ it reads 352V. For a multiplier setting of 40 KΩ, voltmeter reads

1. 371V
2. 383 V
3. 394 V
4. 406 V

112. A digital to analog converter with a full scale output voltage of 3.5 V has a resolution close to 14 mV. Its bit size is :

①

1. 4
2. [✓ 8]
3. 16
4. 32

$\frac{14}{3500} = \frac{1}{2^n - 1}$

$\frac{3500}{14} = 2^n - 1$

$2^n = 251$

14)3500(250
28
70
70

114. In a string of suspension insulator, the maximum voltage appears across the unit

①

1. Most far from the conductor
2. [✓ Nearest to the conductor]
3. At the middle
4. None of the above

116. Consider the following statements regarding capacitance

①

T (i) voltage of a capacitance cannot change suddenly;

F (ii) current through a capacitance cannot change suddenly.

Tick the correct answer :

1. Both statements (i) and (ii) are false
2. Statements (i) is false but (ii) is true
3. [✓ Statements (i) is true but (ii) is false]
4. Both statements (i) and (ii) are true

118. Integrating meters are used for the measurement of

①

1. Current
2. Voltage
3. Power
4. [✓ Energy]

120. The characteristics equation of the series RLC circuit is:

①

1. $s^2 + (LC)s + \frac{R}{L} = 0$
2. $s^2 + \left(\frac{1}{LC}\right)s + \frac{R}{L} = 0$
3. $s^2 + \left(\frac{R}{L}\right)s + LC = 0$
4. [✓ $s^2 + \left(\frac{R}{L}\right)s + \frac{1}{LC} = 0$]

56.

2000)35
168
320
336

(s+1)(s+2) − k

①

121. A second order control system exhibits 100% overshoot. It's damping ratio is :

①

1. Less than 1
2. Equal to 1
3. Greater than 1
4. Equal to zero

$\frac{-\pi\xi}{\sqrt{1-\xi^2}} = \ln 1 = 0$

122. The following material used for making a piezoelectric transducer is :

1. Quartz
2. Rochelle salt
3. Barium titanate
4. All of the above

① 123. A unity feedback control system has

$$G(s) = \frac{K}{s^2(sT+1)}$$

The order and type of the closed loop system will be :

1. 3 and 3
2. 2 and 3
3. 1 and 3
4. 3 and 2

124. A series L – C – R circuit has a resonant frequency f_0, with R = 1Ω, L=1H and C=1F. If the components values are tripled, the new resonant frequency will be :

①

1. $3f_0$
2. unaltered
3. $\frac{f_0}{\sqrt{3}}$
4. $\frac{f_0}{3}$

$f_0 = \frac{1}{3\, 2\pi\sqrt{3L3C}}$

125. The most essential condition for parallel operation of two 1−Ø transformers is that they should have the same :

①

1. KVA rating
2. Polarity
3. Percentage impedance
4. Voltage ratio

126. The induced emf of a DC machine running at 750 rpm is 220V. The percentage increase in field flux for generating an induced emf of 250V at 700 rpm would be :

①

1. 42.4%
2. 21.7%
3. 11.25%
4. 7%

E = 220V → 750 rpm

E = 250V → 700 rpm

127. An OPAMP has a common mode gain of 0.01 and a differential mode gain of 10^5. Its common mode rejection ratio would be :

①

1. 10^7
2. 10^3
3. 10^{-3}
4. 10^{-7}

$A_c = 0.01$

$A_d = 10^5$

$\text{CMRR} = \frac{10^5}{10^{-2}} = \boxed{10^7}$

128. In a frequency modulation system, maximum frequency deviation allowed is 1000Hz and modulating frequency is 1 KHz. Determine modulation index β.

①

1. 2
2. ~~1~~
3. 1000
4. 2000

$\Delta f = 1000\text{Hz}$

$f_m = 1\text{KHz}$

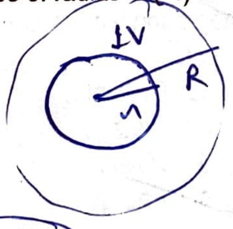
$B.W = 2(\Delta f + f_m)$

$= 2(\beta+1) f_m$

129. A hollow metallic sphere of radius 'r' is kept at a potential of 1 volt. The total electric flux coming out of the concentric spherical surface of radius R(>r) is

①

1. 4πε₀r
2. $4\pi\varepsilon_0 r^2$
3. 4πε₀R
4. None of the above



~~$Q = 4\pi\varepsilon_0$~~

$Q = CV = \boxed{4\pi\varepsilon_0 r} \times 1$

130. In a long transmission line with R, L, G and C are the resistance, inductance, shunt conductance and capacitance per unit length, respectively. The condition for distortion less transmission is :

①

1. RC = LG
2. RC = $\sqrt{\frac{L}{C}}$
3. RG = LC
4. G = $\sqrt{\frac{C}{L}}$

$\beta \cdot f_m = \Delta f$

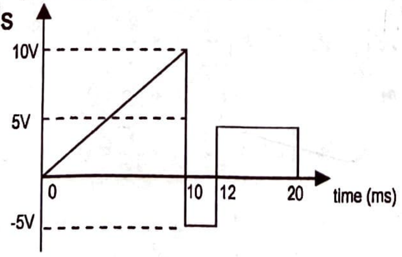
$\beta = \frac{1000}{1000}$

R L C G

131. A periodic voltage waveform observed on an oscilloscope across a load is shown. A permanent magnet moving coil (PMMC) meter connected across the same load reads

①

1. 4V
2. 5 V
3. 8 V
4. 10 V

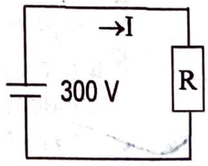


$\frac{\frac{1}{2}\times \cancel{10}^{5}\times 10 - 2\times 5 + 8\times 5}{20} = \frac{50-10+40}{20} = \frac{80}{20}$

132. In the figure, the value of resistor R is (25 + I/2)Ω where I is the current in amperes. The current I is

①

1. 10 A
2. 20A
3. 30 A
4. 60 A



$\left(25+\frac{I}{2}\right)\Omega$

$600 = 50I + \frac{I^2}{2}$

$I^2 + 50I - 600 = 0$

$I^2 + 30I + 20I - 300$

$E \propto N\phi \Rightarrow \frac{250}{220} = \frac{N_2}{N_1} \times \frac{\phi_2}{\phi_1} \Rightarrow \frac{25}{22} = \frac{14}{15} \times \frac{\phi_2}{\phi_1}$

$400 \times 10^3 = \sqrt{3} \times 11 \times 10^3 \times I_L$

$I_L = \frac{200}{11\sqrt{3}}$

①

133. A 400 KVA, 11 KV star connected alternator has resistance of 5 ohm per phase. At half load, total short circuit load loss will be :

1. 2582.6 W
2. 1365.8 W
3. 1652.9 W
4. None of the above

$\left(\frac{200}{11\sqrt{3}}\right)^2 \times 15$

$(10.5)^2 \times 15$

①

135. Why rotor skewing is used in a three-phase squirrel-cage induction motor ?

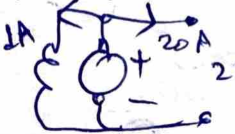
1. To reduce noise, parasitic torque and starting torque, but increases pullout torque
2. To reduce noise, parasitic torque, starting torque and pullout torque
3. To reduce noise and pullout torque, but increases parasitic torque and starting torque
4. To reduce noise and parasitic torque, but increases starting torque and pullout torque

$\downarrow T_{max} = \frac{V^2}{X_2'}\uparrow$

$\downarrow T_{st} = \frac{V^2}{X_2'}$

①

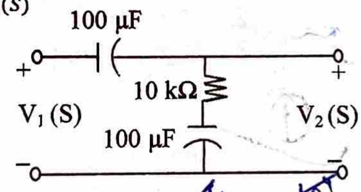
137. A DC shunt generator has a speed of 800 rpm when delivering 20A to the load at the terminal voltage of 220V. If the same machine is run as a motor it takes a line current of 20A from 220 V supply. The speed of the machine as a motor will be :



1. 800 rpm
2. More than 800 rpm
3. Less than 800 rpm
4. Both higher or lower than 800 rpm

①

139. The transfer function $\frac{V_2(S)}{V_1(S)}$ of the circuit shown below is:



1. $\frac{0.5s+1}{s+1}$
2. $\frac{03s+6}{s+2}$
3. $\frac{s+2}{s+1}$
4. $\frac{s+1}{s+2}$

$\frac{V_2(s)}{V_1(s)} = \frac{10^4 + \frac{10^4}{s}}{10^4 + \frac{10^4}{s} + \frac{10^4}{s}}$

$= \frac{s+\frac{1}{s}}{s+\frac{2}{s}}$

①

141. In a microprocessor based system, DMA facility is required to increase the speed of the data transfer between the :

1. Memory and register
2. Memory and I/O devices
3. Microprocessor and the memory
4. Microprocessor and the I/O devices

$Z_s =$

143. A 75 Ω transmission line is first short-terminated and the minima locations are noted. When the short is replaced by a resistive load R_L, the minima locations are not altered and the VSWR is measured to be 3. The value of R_L is

1. 25 Ω
2. 50 Ω
3. 225 Ω
4. 250 Ω

$E_g = 220 + 21 R_a$

$\downarrow E_g = 220 - 19 R_a$

$\downarrow E_g \propto \downarrow N$

1.73
×11
19.03

$\frac{460-420}{0.5} = \frac{40}{0.5}$

134. The current drawn by a 460 V DC motor of armature resistance 0.5 ohm and back emf 420 V is :

①

1. 0.8 Amp
2. 8 Amp
3. 80 Amp
4. 800 Amp

19) 200 (10.5
19
100
95

136. In context of a three phase transformer, what is the angle difference between the phase voltage in primary and secondary sides if the primary side is connected in star and secondary side is connected in delta connection?

Y Δ

1. Star side leads by 113 degree w.r.t. delta side
2. Delta side leads by 30 degree w.r.t. star side
3. Star side lags by 145 degree w.r.t. delta side
4. Delta side lags/ leads by 30 degree w.r.t. star side

①

138. The voltage at the two ends of a transmission line are 132 KV and its reactance is 40 ohm. The capacity of the line is :

$\frac{3.3 \times 132}{40}$ MW =

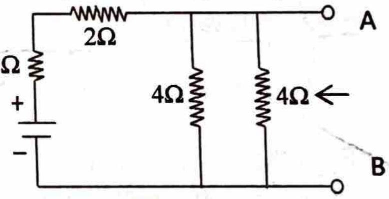
1. 435.6 MW
2. 515 MW
3. 215 MW
4. 351.5 MW

105
×105
525
000×
105××
11025 ×15 16537

132
×3.3
396
396×
435.6
3

①

140. The Thevenin's resistance of the circuit at port AB is :



1. 1 Ω
2. 1.33 Ω
3. 1.2 Ω
4. 1.5 Ω

$\frac{4}{3}$

①

142. The current in a coil changes from 5A to 1A in 0.4 second. The induced voltage is 40V. The self inductance in Henry is :

1. 1
2. 2
3. 4
4. 10

$\frac{4}{0.4}$

$V = L\frac{dI}{dt}$

$40 = L \times 10$

①

144. A 50 KVA transformer has a core loss of 500W and full load core loss of 900W. The load at which the efficiency is maximum is :

$500 = x^2 \times 900$

$x = \sqrt{\frac{5}{9}} \times 50$

$= \frac{\sqrt{5}}{3} \times 50$

1. 47.5 KVA
2. 45.5 KVA
3. 37.27 KVA
4. None of the above

2.2

$I = \frac{-50 \pm \sqrt{(50)^2 + 4 \times 600}}{2} = \frac{-50 \pm \sqrt{2500 + 2400}}{2}$

$\frac{-50+70}{2}$

308) 6700 (2

$\frac{1}{2}LI^2 = \frac{1}{2}CV^2$

145. The hysteresis loop of a magnetic material has an area of 5 cm² with the scales given 1 cm = 2AT and 1 cm = 50 mwb. At 50 Hz, the total hysteresis loss :

1. 15 W
2. 20 W
3. 25 W
4. 50 W

$5 \times 2AT \times 50 \times 10^{-3}$ wb

$= .500 \times 10^{-3} =$

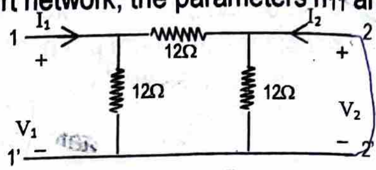
①

$\frac{1}{2}\phi I = \frac{1}{2} \times (50 \times 10^{-3} \times 4)$

$= 250 \times 10^{-3}$

①

146. For the given two port network, the parameters h_{11} and h_{21} are



1. 1Ω and 2 Ω
2. 2 Ω and 1
3. 6 Ω and - ½
4. None of the above

①

147. Merz – Price current scheme protection is used in

1. transformer
2. alternator
3. Both A and B
4. Inductor Motor

①

148. Maximum demand/ connected load is termed as :

1. Average demand
2. Demand factor
3. Load factor
4. Diversity factor

$V_1 = h_{11} I_1 + h_{12} V_2$

$I_2 = h_{21} I_1 + h_{22} V_2$

①

149. The average power delivered to an impedance (4–j3)Ω by a current 5 cos(100πt+100°)A is :

1. 44.2 W
2. 50 W
3. 62.5 W
4. 125 W

$\frac{5}{\sqrt{2}} \angle 100^\circ \times (4 - j3)$

$\left(\frac{5}{\sqrt{2}}\right)^2 \times 4$

①

150. (∇xH) = J is differential form of

1. Gauss's Law
2. Ampere's circuital law
3. Poisson's equation
4. Laplace's equation

①

151. A conductor of length 100 cm, moves at right angle to a uniform field flux density of 1.5 Wb/m² with a velocity of 50 m/s. The emf induced in the conductor will be :

1. 150V
2. 75V
3. 50V
4. 37.5V

$L = 100$ cm

$= 1$ m

$B = 1.5$ wb/m², $u = 50$ m/sec

$V = u l B =$

$= l(\vec{v} \times \vec{B})$

$= 1(50 \times 1.5)$

$= 75$

$= \frac{25}{2} \times 4^2$

①

152. The gauge factor is defined as :

1. $\frac{\Delta L/L}{\Delta R/R}$
2. $\frac{\Delta R/R}{\Delta L/L}$
3. $\frac{\Delta R/R}{\Delta D/D}$
4. $\frac{\Delta R/R}{\Delta P/P}$

①

153. An integrating digital voltmeters measures

1. True average value
2. rms value
3. Peak value
4. None of the above

154. The magnetizing current in a transformer is rich in :

1. 3rd harmonics
2. 5th harmonics
3. 7th harmonics
4. 13th harmonics

①

155. From the options given below, which of the one is correct Laplace transform of the signal :

S = x(t) = $e^{-at}u(t) - e^{-bt}u(-t)$

1. $L(S) = (s + a + b)/(s + a)(s + b)$
2. $L(S) = (2s + a + b)/(s - a)(s + b)$
3. $L(S) = (s + a + b)/(s - a)(s - b)$
4. $L(S) = (2s + a + b)/(s + a)(s + b)$

$\frac{1}{s+a} + \frac{1}{s+b}$

$\frac{+s+a}{(s+a)(s-b)}$

①

156. If the open loop transfer function of a feedback system is given be $G(s)H(s) = \frac{K}{S(S+2)(S^2+2S+5)}$ then the centroid of the asymptotes will be

1. −1, j0
2. 1, j0
3. 0,−j1
4. 0,j1

$s = 0$

$s = -2$

$s = \frac{-2 \pm \sqrt{4 - 20}}{2}$

$= -1 \pm \sqrt{}$

①

157. Dummy coils are provided in the DC generator in order to :

1. Reduce eddy current losses
2. Provide mechanical balance for the rotor
3. Enhance flux density
4. Amplify voltage

①

158. In 8085 microprocessor system, the direct addressing instruction is :

1. MOV A, B
2. MOV B, $0A_H$
3. MOV C, M
4. STA 8000_H

$x = \frac{(0-2-1-1) - 0}{4-0}$

$= -\frac{10}{4}$

①

159. Which of the following statement is true ?

1. $\delta(2t) = 2\delta(t)$
2. $\delta(-t) = -\delta(t)$
3. $\delta(-t) = \delta(t)$
4. None of the above

①

160. Which of the following statements is correct for a single phase Hysteresis motor?

1. It can run at sub synchronous speed only
2. It can run at synchronous and sub synchronous speed
3. It can run at synchronous speed only
4. It can run at synchronous and super synchronous speed

$\frac{1}{s+a}$

①
161. In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic or Boolean instruction is stored in the :
1. Carry status flag
2. Auxiliary carry status flag
3. Sign status flag
4. Zero status flag

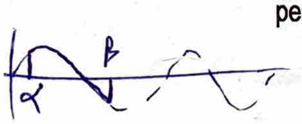
163. Lorentz force equation is expressed as :
①
1. $\bar{F} = q[\bar{E}+(\bar{v}.\bar{B})]$
2. $\bar{F} = 2q[\bar{E}-(\bar{v} \times \bar{B})]$
3. $\bar{F} = 2q[\bar{E}+(\bar{B} \times \bar{v})]$
4. $\bar{F} = q[\bar{E}+(\bar{v} \times \bar{B})]$

165. The peak value of cos (wt + 60°) – sin (wt–30°) is
①
1. 1
2. √2
3. 2
4. √3

~~Cos(wt+60°)~~
Sin(wt+60°+90°) – Sin(wt–30°)
Sin(wt+150°) – Sin(wt–30°)

167. In a half adder having two inputs A and B and two outputs (S and C are sum and carry output bits respectively). Boolean expression for S and C in terms of A and B is :
①
1. $S = \bar{A}.B + A.\bar{B}$ $C = A.B$
2. $S = A.B + \bar{A}.B$ $C = A+B$
3. $S = \bar{A}.B + A.B$ $C = A+\bar{B}$
4. $S = \bar{A} + \bar{A}.\bar{B}$ $C = \bar{A}+B$

①
169. A single phase thyristorized ac voltage controller operating with firing angle α feeds a R–L load. The conduction angle of the thyrister is :
1. π –α
2. 2 π –α
3. π –2α
4. None of the above



①
171. The unit feedback system has transfer function $G(s)=\frac{9}{S(S+3)}$. Its natural frequency will be :
1. 12
2. 9
3. 6
4. 3

$1+\frac{9}{s(s+3)}=0$
$s^2+3s+9=0$

①
173. Creep error may occur in induction type energy meter due to :
1. Over compensation of friction
2. Increase in temperature
3. overvoltage across voltage coil
4. Both 1 and 3

①
175. The sequence components of the fault current are as follows : $I_{(positive)}$= j1.5 pu, $I_{(negative)}$= –j0.5pu, $I_{(zero)}$=–j1pu. The type of fault in the system is :
1. LG
2. LL
3. LLG
4. LLLG

162. A memory system has a total of 8 memory chips, each with 12 address lines and 8 data lines. Total size of the memory system is :
①
1. 6 Kbytes
2. 32 Kbytes
3. 48 Kbytes
4. 64 Kbytes

$8 \times 2^{12} \times$ Byte
= 32

164. In a transformer, zero voltage regulation at full load is :
①
1. Not possible
2. Possible at unity power factor load
3. Possible at leading power factor load
4. Possible at lagging power factor load

V.R. = Z_{pu} Cos(θ_{eq} –
$\theta_{eq} - \phi$ =
$\phi = \theta_{eq}$ –

166. The coefficient of reflection of voltage for a short circuited line is :
①
1. 0
2. –1.0
3. 1.0
4. 2.0

$\Gamma_v = \frac{Z_L - Z_s}{Z_L + Z_s} =$

168. X_d, X'_d, X''_d are steady state of d-axis synchronous reactance, transient d axis reactance and sub-transient d axis reactance of a synchronous machine, respectively. Which of the statement is true :
①
1. $X_d > X'_d > X''_d$
2. $X''_d > X'_d > X_d$
3. $X'_d > X''_d > X_d$
4. $X_d > X''_d > X'_d$

$X_d'' < X_d' < X_d$

170. The per unit impedance of a synchronous machine is 0.242. If base voltage is increased by 1.1 times, then per unit value will be :
1. 0.266
2. 0.242
3. 0.220
4. 0.200

$Z_{pu} = 0.242$
$Z_{pu\,new} = 0.242 \times (\quad) \times ($
$\frac{0.242}{1.21} =$

172. In current transformers, turn compensation is provided mainly to reduce the :
1. Power loss
2. Phase angle error
3. Ratio error
4. None of the above
①

$\frac{1}{3}$

174. When a Ferromagnetic material is magnetized by alternating source voltage. The phenomenon of magnetostriation causes :
1. Increase in the body temperature
2. Change in permeability of the material
3. Small changes in its dimension
4. Decrease in the saturation flux density

①
176. It is desirable to eliminate 5th harmonic voltage from the phase voltage of an alternator. The coils should be short pitched by an electrical angle of :
1. 30°
2. 36°
3. 72°
4. 18°

$2\alpha = \frac{2\pi}{5}, \frac{4\pi}{5}$
=

$121\overline{)24.2}\;0.2$
242
0

$\cos\frac{n\alpha}{2} = 0 = \frac{\pi}{2}$
$\alpha = \frac{\pi}{5} = \frac{180}{5}$