KD Campus
KD Campus Pvt. Ltd
2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

Answer-key & Solution

AE Electrical
MOCK -(13)
Date 10 / 9/ 2017

1. B	16. D	31. A	46. B	61. B	76. C	91. A	106. C
2. A	17. C	32. A	47. B	62. A	77. D	92. D	107. C
3. C	18. B	33. D	48. C	63. D	78. D	93. A	108. D
4. D	19. C	34. C	49. B	64. C	79. D	94. A	109. B
5. B	20. D	35. C	50. C	65. B	80. C	95. C	110. B
6. C	21. B	36. B	51. C	66. A	81. A	96. A	111. B
7. A	22. C	37. B	52. B	67. C	82. A	97. D	112. C
8. D	23. D	38. A	53. B	68. B	83. D	98. A	113. A
9. B	24. A	39. C	54. C	69. A	84. C	99. A	114. B
10. C	25. B	40. B	55. D	70. B	85. B	100. B	115. A
11. C	26. B	41. B	56. B	71. B	86. A	101. A	116. D
12. C	27. A	42. B	57. C	72. B	87. B	102. D	117. D
13. D	28. A	43. B	58. C	73. A	88. A	103. A	118. A
14. B	29. A	44. A	59. C	74. D	89. C	104. C	119. B
15. C	30. D	45. B	60. A	75. C	90. A	105. B	120. D

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 (AE-Electrical) MOCK TEST no. 13

1. B Let the two numbers be A and B.
$A + B = 18$
$A^2 + B^2 = 256$
$(A + B)^2 = A^2 + B^2 + 2AB$
$\Rightarrow (18)^2 = 256 + 2AB$
$\Rightarrow 324 = 256 + 2AB$
$\Rightarrow 2AB = 68$
$\Rightarrow AB = 34$
$\therefore$ The product of two numbers = **34**

2. A Let r be the radius $4\pi (r + 2)^2 - 4\pi r^2 = 792$

$$\Rightarrow (r + 2)^2 - r^2 = \frac{792}{4\pi}$$

$$\Rightarrow r^2 + 4r + 4 - r^2$$

$$= \frac{792 \times 7}{4 \times 22} = 63$$

$\Rightarrow 4r = 63 - 4 = 59$
$\Rightarrow r = 14.75$ m
$\therefore$ Required radius = **14.75 m**

3. C $\sin 3A = \cos (A - 56°)$
$\Rightarrow \cos (90° - 3A) = \cos(A - 56°)$
$\Rightarrow 90° - 3A = A - 56°$
$\Rightarrow 90° + 56° = 3A + A$
$\Rightarrow 4A = 146°$

$$\Rightarrow A = \frac{146}{4} = \mathbf{36.5°}$$

4. D Ist person $\rightarrow$ 6 — 4
IInd person $\rightarrow$ 8 — 24 — 3
I + II + Boy $\rightarrow$ 3 — 8

$$\therefore \text{ Share of Boy} = \frac{1}{8} \times 5000 = ₹\ \mathbf{625}$$

5. B Let the sum be P.

$$\therefore 1015 = P\left[\left(1 + \frac{3}{100}\right)^2 - 1\right]$$

$$\left[\because C.I. = P\left[\left(1 + \frac{r}{100}\right)^n - 1\right]\right]$$

$$\Rightarrow 1015 = P\left[\left(\frac{103}{100}\right)^2 - 1\right]$$

$$\Rightarrow 1015 = P\left(\frac{10609 - 10000}{10000}\right)$$

$$\Rightarrow P = ₹\ \frac{1015 \times 10000}{609}$$

$$= ₹\ \frac{10150000}{609}$$

$$\therefore \text{ S.I.} = \frac{10150000 \times 2 \times 3}{609 \times 100} = ₹\ \mathbf{1000}$$

6. C We know that,

$l = a + (n - 1)d$ → common Diff.
last term; first term; no. of terms

Here,
$l = 7875$ (The number nearer to 8000 which is divisible by 225)
$a = 1125$ (The number nearer to 1000 which is divisible by 225)
$d = 225$
ATQ,
$7875 = 1125 + (n - 1)225$
$\Rightarrow (7875 - 1125) = (n - 1)225$

$$\Rightarrow (n - 1) = \frac{6750}{225}$$

$\Rightarrow (n - 1) = 30$
$\Rightarrow n = 30 + 1 = 31$
$\therefore$ Required answer = **31**

7. A Let x be the maximum marks
then, pass marks = 24% of x + 12 = 30% of x + 6 $\Rightarrow$ 6% of x = 6 $\Rightarrow x$ = 100
Maximum marks x = **100**

Pass marks = $\frac{30}{100} \times 100 + 6 =$ **36.**

8. D Here, 12 – 2 = 10,16 – 6 = 10,24 – 14 = 10
Now, LCM of 12, 16 and 24 = 48
$\therefore$ The lowest 4-digit number exactly divisible by 48 = 1008
$\therefore$ Required number = 1008 – 10 + 48 = **1046**

9. B $\frac{\sqrt{24}+\sqrt{600}}{\sqrt{216}} = \frac{2\sqrt{6}+10\sqrt{6}}{6\sqrt{6}}$

$$= \frac{12\sqrt{6}}{6\sqrt{6}} = \mathbf{2}$$

10. C Let the required number of extra days =D – 4.
ATQ,
$300 \times 31 = 27 \times 300 + 120 \times D$

$4 \times 300 = 120 \times D$
$\Rightarrow D = 10$ days
$\therefore$ Extra number of days $= (10 - 4) =$ **6 days**

11. CDownstream speed (u) $= \frac{D}{T} = \frac{8}{40} \times 60$
$= 12$ km/h

Upstream speed (v) $= \frac{D}{T} = \frac{3}{30} \times 60$
$= 6$ km/h

Speed of boat in still water $= \frac{1}{2}(u + v)$

$= \frac{1}{2}(12 + 6) =$ **9 km/h**

Speed of stream $= \frac{1}{2}(u - v) = \frac{1}{2}(12 - 6)$
$=$ **3 km/h**

12. C Let the original number of students in two classes be $2x$ and $3x$ respectively.
ATQ,

$$\frac{2x + 20}{3x + 20} = \frac{4}{5}$$

$\Rightarrow 10x + 100 = 12x + 80$
$\Rightarrow 12x - 10x = 100 - 80$
$\Rightarrow 2x = 20$

$$\Rightarrow x = \frac{20}{2} = 10$$

$\therefore$ Total number of students originally
$= 2x + 3x = 5x$ (put $x = 10$)
$= 5 \times 10 =$ **50**

13. D $4\sin^2\theta + 5\cos^2\theta$
$= 4\sin^2\theta + 4\cos^2\theta + 5\cos^2\theta$
$= 4(\sin^2\theta + \cos^2\theta) + 5\cos^2\theta$
$= 4 + \cos^2\theta$ $[\because \sin^2\theta + \cos^2\theta = 1]$
$\because$ Minimum value of $\cos\theta = -1$
But $\cos^2\theta \geq 0$, when $\theta = 90°$
$[\because \cos 0° = 1, \cos 90° = 0]$
$\therefore$ Required minimum value $= 4 + 0 =$ **4**

14. B $x = 3 + 2\sqrt{2}$

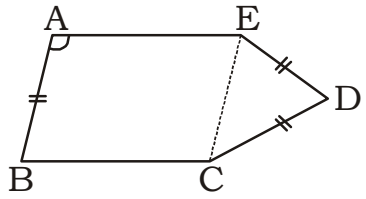
$$\therefore \frac{1}{x} = 3 \times 2\sqrt{2}$$

$$\therefore \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = x + \frac{1}{x} - 2$$

$$\Rightarrow \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} - 2 = 4$$

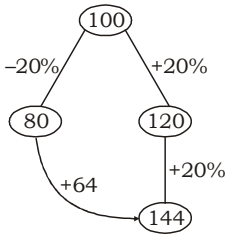
$$\Rightarrow \sqrt{x} - \frac{1}{\sqrt{x}} = 2 \Rightarrow 3\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right) = 3 \times 2 =$$ **6**

15. C



$\angle BCE = 94°$, AB = CD = ED (given)
$\therefore$ CD = ED = CE $[\because$ AB = CE$]$
ΔECD is an equilateral triangle.
$\therefore \angle ECD = 60°$
$\angle BCD = 94° + 60°$
$=$ **154°**

16. D Let the cost price of an article = ₹ 100
ATQ,



Original Profit = 20%

New Profit $= \frac{64}{80} \times 100 = 80\%$
$\therefore$ Change in profit percent
$= \frac{(80 - 20)}{20} \times 100$
$=$ **300%**

17. C $\tan^2\alpha = 1 + 2\tan^2\beta$
$\Rightarrow \sec^2\alpha - 1 = 1 + 2(\sec^2\beta - 1)$
$\Rightarrow \sec^2\alpha - 1 = 2\sec^2\beta - 1$

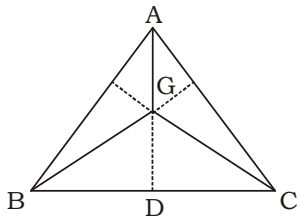
$$\Rightarrow \frac{1}{\cos^2\alpha} = \frac{1}{2\cos^2\beta}$$

$\Rightarrow \sqrt{2}\cos\alpha = \cos\beta$

$\therefore \sqrt{2}\cos\alpha - \cos\beta =$ **0**

18. B $x = 7$
$\therefore x^5 - 8x^4 + 8x^3 - 8x^2 + 8x - 2$
$= x^5 - (7 + 1)x^4 + (7 + 1)x^3 - (7 + 1)x^2 + (7 + 1)x - 2$
$= x^5 - 7x^4 - x^4 + 7x^3 + x^3 - 7x^2 - x^2 + 7x + x - 2$
When $x = 7$,
$= 7^5 - 7^5 - 7^4 + 7^4 + 7^3 - 7^3 - 7^2 + 7^2 + 7 - 2 =$ **5**

19. C



Area of ΔABC = 6 × ar(ΔBGD)
= 6 × 9 = **54 cm²**

20. D By componendo and dividendo,

$$\frac{\left(x^3+3x\right)+\left(3x^2+1\right)}{\left(x^3+3x\right)-\left(3x^2+1\right)} = \frac{234+109}{234-109}$$

$$\Rightarrow \frac{(x+1)^3}{(x-1)^3} = \frac{343}{125}$$

$$\Rightarrow \left(\frac{x+1}{x-1}\right)^3 = \left(\frac{7}{5}\right)^3$$

$$\Rightarrow \frac{x+1}{x-1} = \left(\frac{7}{5}\right) \Rightarrow 5x+5 = 7x-7 \Rightarrow x = \mathbf{6}$$

21. B Let the original volume of cylinder be 100
⇒ Volume after change

$$= 100 \times \frac{150}{100} \times \frac{150}{100} \times \frac{40}{100} = 90$$

Hence, percent decrease = 100 – 90 = **10%**

22. C $1 \times 3 \times 5 \times 7 \times \ldots\ldots\ldots \times 99 \times 2^8$.
For calculating number of zeros we have to find the combination of 2 and 5. Here no. of 2's is 8. So the max possible number of zeros is **8.**

23. D Percentage of students failed in 2016

$$= \frac{35}{200} \times 100 = \mathbf{17.5\%}$$

24. A Total passed students,
= 140 + 150 + 165 = 455
Total students
= 170 + 195 + 200 = 565
∴ Required percentage

$$= \frac{455}{565} \times 100 = \frac{9100}{113} = \mathbf{80\frac{60}{113}\%}$$

25. B Required percentage

$$= \frac{20}{170} \times 100 = \frac{200}{17} = \mathbf{11\frac{13}{17}\%}$$

26. B Change 'stem' into 'stems', as the subject of the sentence 'need' is singular.

27. A Change 'adopt' into 'adapt', which means 'to make oneself suitable to a new environment'. 'Adopt' means 'to accept'.

28. A Change 'is' into 'are', as 'people' takes plural verb.

29. A Change 'you' into 'your'. 'Gerund' is preceded by a possessive adjective.

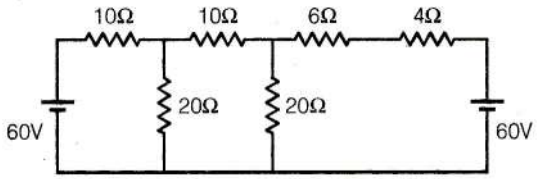
39. C 'Information' takes no plural form.

87.(B) At resonance
$I = I_R = 1$ mA

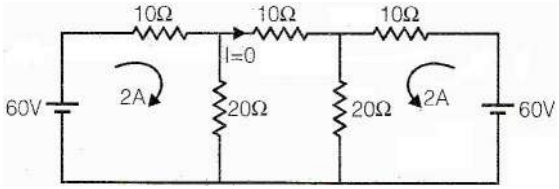
$$\left|I_R + I_L\right| = \sqrt{I_R^2 + I_L^2} = \sqrt{1^2 + I_L^2} > 1mA$$

$$\left|I_R + I_L\right| > 1mA$$

88.(A) Using source transformation, the circuit is redrawn.

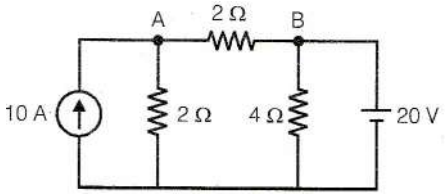


Further,



It is a symmetrical network.
So, I = 0.

89.(C)



Applying KCL at node A

$$\frac{V_A}{2} + \frac{V_A - V_B}{2} = 10$$

⇒ $2V_A - V_B = 20$ ...(i)
But, $V_B = 20$ V
Hence current through branch AB

$$= \frac{V_A - V_B}{2} = \frac{20-20}{2} = 0$$

91(A)
Let W = stray losses (mechanical and magnetic losses)
Average voltage across resistance = (200+190)/2 =195 V,
Average current = 10A
∴ Power absorbed W' = 1950 W

Using the relation $\frac{W}{W'} = \frac{t_2}{t_1 - t_2}$; we get

$$W = 1950 \times \frac{20}{30-20} = 3,900 \text{ watt}$$

96 (A)

$$\%\, drop = \frac{(\%R)\, I \cos\phi}{I_f} + \frac{(\%X)\, I \sin\phi}{I_f}$$

Where I_f is the full-load current and I the actual current.

$$\therefore \quad \%\, drop = \frac{(\%R)\, kW}{kVA\, rating} + \frac{(\%X)\, kVAR}{kVA\ rating}$$

In the present case, kW = 400 ×0.8 = 320 and kVAR = 400 × 0.6 = 240

$$\therefore \quad \%\, drop = \frac{2.5 \times 320}{500} + \frac{5 \times 240}{500} = 4\%$$

98. (A)

I = 200/8 = 25 A, Z = 1280,
$\theta_m = 4 \times 360/160 = 9°$; P = 8

$$AT_c/\text{ pole} = ZI\left(\frac{1}{2p} - \frac{\theta_m}{360}\right) =$$

$$1280 \times 25\left(\frac{1}{2 \times 8} - \frac{9}{360}\right) = 1200$$

99. (A)

Formula : $E = L.\frac{2I}{T_c}$ Now, L = 0.05 ×10^{-3}H ; W_b = 1.2 segments

$$v = \frac{1500}{60} \times 64 = 1600 \text{ segment/second}$$

$$\therefore \quad T_c = \frac{1.2}{1600} = 7.5 \times 10^{-4} \text{ second;}$$

$$I = \frac{150}{4} A = 37.5A$$

$$\therefore \quad \frac{2I}{T_c} = \frac{2 \times 37.5}{7.5 \times 10^{-4}} = 10^5 A/s$$

For linear commutation, E = 0.05 ×10^{-3} ×10^5 = 5V

113. (A) Leakage resistance is inversely proportional the length then,

$$R \propto \frac{1}{l}$$

and $$\frac{R_1}{R_2} = \frac{l_2}{l_1}$$

$$\Rightarrow \quad R_2 = \frac{R_1 l_1}{l_2}$$

$$\Rightarrow \quad R_2 = \frac{1 \times 150}{100} = 0.5\ M\Omega.$$

114. (B) Load factor

$$= \frac{2000 \times 12 + 1000 \times 12}{2000 \times 24}$$

$$= \frac{24 + 12}{48} = 0.75$$

115.(A) Ta ∝ Φ I_a ∝ I_a^2. Also, Ta ∝ N^2.

Hence $N^2 \propto I_a^2$ or $N \propto I_a$

∴ $N^2 \propto I_{a1}$ and $N^2 \propto I_{a1}$ or $N_2/N_1 = I_{a2}/I_{a1} \propto I_{a1}$

Since, $N_2/N_1 = 1/2$

∴ $I_{a2}/I_{a1} = 1/2$ or $I_{a2} = I_{a1}/2$

Let V_1 and V_2 be the voltages across the motor in the two cases. Since motor resistance is neglible, $E_{b1} = V_1$ and $E_{b2} = V_2$. Also $\Phi_1 \propto I_{a1}$ and $\Phi_2 \propto I_{a2}$ or $\Phi_1/\Phi_2 = I_{a1}/I_{a2} = I_{a1} \times 2/I_{a1} = 2$

Now $$\frac{N_2}{N_1} = \frac{E_{b2}}{E_{b1}} \times \frac{\Phi_1}{\Phi_2} \text{ or } \frac{1}{2} = \frac{V_2}{V_1} \times 2$$

$$\text{or } \frac{V_2}{V_1} = \frac{1}{4}$$

$$\therefore \quad \frac{V_2 - V_1}{V_1} = \frac{4-1}{4} = 0.75$$

∴ Percentage reduction in voltage = $\frac{V_1 - V_2}{V_1} \times 100 = 0.75 \times 100 = 75\%$