Monthly Progressive Test

Class: X

Subject: PCMB (G)

Test Booklet No.: MPT05 | Test Date: 22082024

Time: 180 mins | Full Marks: 200

Solutions

Physics

1. Ⓐ

R = 5Ω I = 2A

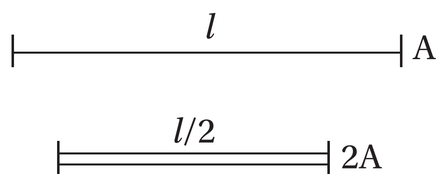
Using Ohm's V = RI = 5 × 2 V = 10 V

2. Ⓓ

Ohm's law suggests V = RI where V vs I graph will be a straight line. So Non-ohmic conduction is given in option (D)

3. Ⓑ

R = 2 Ω



$$R = p\frac{l}{A}$$

$$R' = p.\frac{l/_2}{2A} = p.\frac{l}{A}.\frac{1}{4}$$

$$R' = \frac{R}{4} = \frac{2}{4} = 0.5\Omega$$

doubled onitself in area means it is folded half the length to get end area doubled.

4. Ⓒ

Both the alloy – constant and Manganin are used to prepare standard resistor that does not show much change with temperature.

Cont.. 2

5. Ⓐ

Potential difference = Resistance (constant) × current

So, option A is wrong with respect to Ohmis law.

6. Ⓒ

$\varepsilon = 4$ volt $\quad r = 0.5\ \Omega \quad R = 1.5\ \Omega$

$$I = \frac{\in}{R+r} = \frac{4}{1.5+0.5} = \frac{4}{2} = 2A$$

7. Ⓓ

$p = 40W$

$V = 200$ volt

$$P = VI = V.\frac{V}{R} = \frac{V^2}{R}$$

R = constant (resistance of the filament)

$V^2 \propto P$

$V \propto \sqrt{P}$

$$\therefore \frac{V_1}{V_2} = \sqrt{\frac{P_1}{P_2}}$$

$$\Rightarrow \frac{200}{100} = \sqrt{\frac{40}{P_2}}$$

$$\Rightarrow 2 = \sqrt{\frac{40}{P_2}}$$

$$\Rightarrow \frac{40}{P_2} = 4$$

$$\Rightarrow P_2 = \frac{40}{4} = 10\ \text{W}$$

8. Ⓐ

$I = A \quad t = 1s$

$$I = \frac{q}{t} = \frac{ne}{t}$$

$$\Rightarrow n = \frac{It}{e} = \frac{1 \times 1}{1.6 \times 10^{-19}}$$

$$\Rightarrow n = 6.25 \times 10^{18}$$

9. Ⓐ

$$R = \frac{\Delta V}{\Delta I} = \frac{6.8}{0.4} = 17\Omega$$

10. Ⓐ

$$P = \frac{RA}{l} \rightarrow \frac{\Omega.m^2}{m} = \Omega.m$$

11. Ⓐ

12. Ⓐ

$$p = \frac{V^2}{R}$$

13. Ⓑ

V = 12 volt I = 0.5 A

$$R = \frac{V}{I} = \frac{12}{0.5}\Omega = 24\,\Omega$$

14. Ⓒ

15. Ⓓ

V = 12 V R = 30 Ω

$$I = \frac{V}{R} = \frac{12}{30} = \frac{2}{5} = 0.4\text{ A}$$

16. Ⓐ

f = 20 cm

$\upsilon = 20$ cm

For $\upsilon = f$; object must be at infinity.

17. Ⓑ

$V_A = 10$ V

$V_B = 6$ V

VA – VB = (10 – 6) V = 4V

18. Ⓐ

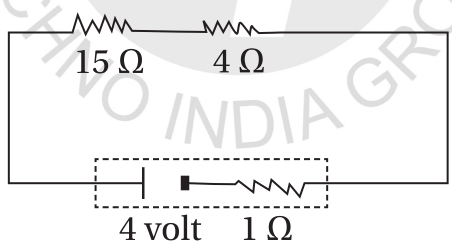
19. Ⓑ

20. Ⓐ

V = 10 volt R = 2Ω

$$I = \frac{V}{R} = \frac{10}{2} = 5A$$

21. Ⓒ



$\in = 2$ volt R = R1+R2 = (15+4)Ω = 19Ω

r = 1Ω

$$I = \frac{\in}{R + r} = \frac{2}{19+1} = \frac{2}{20} = 0.1\text{ A}$$

22. Ⓐ

$V_{15} = 15 \times 0.1 = 1.5$ volt

23. Ⓒ

$V_4 = 4 \times 0.1 = 0.4$ volt

24. Ⓑ

$V_T = V_{15} + V_4 = (1.5 + 0.4)\ V = 1.9$ volt

25. Ⓑ

$VL = rI = 1 \times 0.1 = 0.1$ volt

Chemistry

26. Ⓑ

Carbon forms carbon monoxide (CO) and carbon dioxide (CO_2)

Sulphur forms sulpher dioxide (SO_2) and sulpher trioxide (SO_3)

Iron forms ferric oxide ($F_e2O_{3)}$ and ferrous oxide (FeO)

Boron forms only one oxide boron trioxide (B_2O_3)

27. Ⓓ

The structure of nitrogen is : $N \equiv N$:

So, X = 2 and Y = 3

So,(X + Y) = 5

28. Ⓐ

Aluminium (Al), copper (Cu), iron (Fe) are strong metals and mercury (Hg) is a weak metal

29. Ⓐ

Nitrogen (N_2) is a very stable molecule and less reactive. Hence it is used as a food preservative

30. Ⓑ

Element	Physical state at room temperature	Metal / non-metal
Sodium (Na)	Solid	Metal
Bromine (Br)	Liquid	Non-metal
Oxygen (O)	Gaseous	Non - metal
Iodine (I)	Solid	Non - metal

31. Ⓑ

Structure of ethyne (C_2H_2) is $H - C \equiv C - H$

32. Ⓐ

Sodium can release electron very easily hence it is a strong metal. It can react with water most vigorously.

33. Ⓑ

In case of corrosion, iron is oxidised into FeO which is further oxidised into Fe_2O_3. Now, FeO and Fe_2O_3 combines with each other and forms $Fe_3O_4 . xH_2O$

34. Ⓑ

CH_4, CCl_4 and CO_2 are non-polar covalent molecule while NH_3 is a polar covalent molecule.

35. Ⓒ

Iron, aluminium and zinc are less reactive metals with respect to sodium, magnesium, calcium. Hence, iron, aluminium and zinc cannot react with cold or hot water. But they can react with steam

36. Ⓒ

$$Ca + 2H_2O \xrightarrow{\text{room temperature}} Ca(OH)_2 + H_2 \uparrow$$

Produced hydrogen gas sticks to the surface of the metal andd hence metal starts floating

37. Ⓐ

Nitrogen (7) has electronic configuration 2 . 5

Phosphorus (15) has electronic configuration 2 . 8 . 5

38. Ⓒ

Copper wire is insulated by giving a coating of an insulating material which prevents the charging of wire and it helps in managing any other environmental effects like moisture, temperature, humidity, etc. Thus electricity can pass through the wire safely. There is no relationship between coating of copper wire and its ductility.

39. Ⓓ

Magnesium is a strong metal and it reacts with oxygen spontaneously and magnessium oxide is formed

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO$$

40. Ⓐ

Oxygen is a highly reactive non-metal and it can react with maximum elements present on earth

41. Ⓐ

Higher pH data indicates weak acid and lower pH data indicates strong acid

42. Ⓒ

Electrolysis is a chemical change and in this process, large molecule breaks into smaller molecules or atoms. Hence it is an example of decomposition reaction.

43. Ⓑ

Calcium carbonate is a stable molecule and hence it decomposes when it is heated strongly. This is an example of thermal decomposition. The equation is

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

44. Ⓑ

Aqueous solution of NaCl is colourless

45. Ⓓ

The equation is $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2 \uparrow$

Hydrogen is a colourless and odourless gas

46. Ⓐ

Carbon dioxide is an acidic oxide as it forms an acidic solution when it comes contact with water

47. Ⓓ

Electronic configuration of phosphorus (15) is 2.8.5 and it needs 3 electrons to achieve the octate in the outermost shell. Now, when if forms covalent bonds with other 5 chlorine atoms then the outer shell becomes a 10 electron system. Thus it is not obeying the octate rule.

48. Ⓐ

Carbonate, sulphite, etc ores needs calcination i.e. heating the ores in absence oxygen

49. Ⓑ

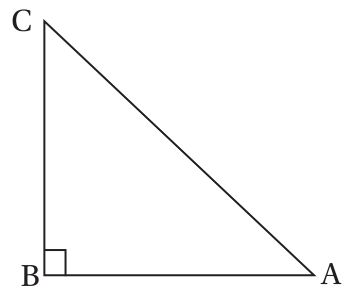
Ductility is related to make wires by the metals

50. Ⓒ

Diamond and graphite are the allotrops of carbon

Mathematics

51. Ⓑ



AC = 50 cm

AB = 14 cm

$$\therefore\ BC = \sqrt{(50)^2 - (14)^2}\ \text{cm}$$

$$= \sqrt{64 \times 36}\ \text{cm}$$

$$= 48\ \text{cm}$$

$$\therefore\ \tan A = \frac{BC}{AB} = \frac{\cancel{48}^{24}}{\cancel{14}_{7}} = \frac{24}{7}$$

52. Ⓒ

$$\sin\theta = \frac{12}{13}$$

$$\cos\theta = \frac{5}{13}$$

$$\tan\theta = \frac{12}{5}$$

$$\therefore\ \frac{2\cos\theta + 3\tan\theta}{\sin\theta + \tan\theta\sin\theta} = \frac{2\times\frac{5}{13} + 3\times\frac{12}{5}}{\frac{12}{13} + \frac{12}{5}\times\frac{12}{13}}$$

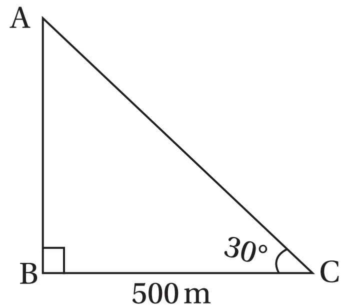
$$= \frac{\frac{50+468}{65}}{\frac{60+144}{65}} = \frac{\cancel{518}^{259}}{\cancel{204}_{102}} = \frac{259}{102}$$

53. Ⓒ

sin 30° + cos 60°

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

54. Ⓐ

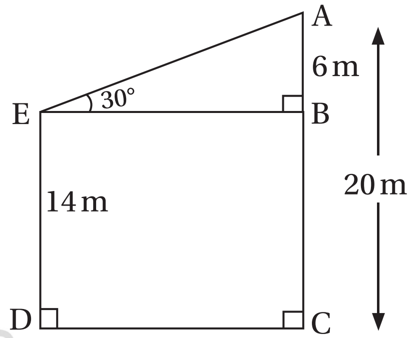


$\tan 30^\circ=\frac{AB}{BC}$

$\Rightarrow \frac{1}{\sqrt{3}}=\frac{AB}{500\text{ m}}$

$\therefore AB=\frac{500}{\sqrt{3}}\text{ m}=\frac{500\sqrt{3}}{3}\text{ m}$

55. Ⓐ



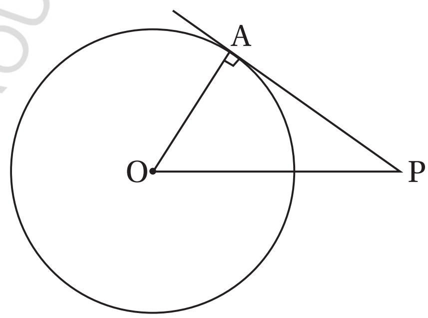
$AB=(20-14)\text{ m}=6\text{ m}$

$\therefore \frac{AB}{AE}=\sin 30^\circ$

$\Rightarrow \frac{6\text{m}}{AE}=\frac{1}{2}$

$\Rightarrow AE=12\text{ m}$

56. Ⓒ



$AP=8\text{ cm}$

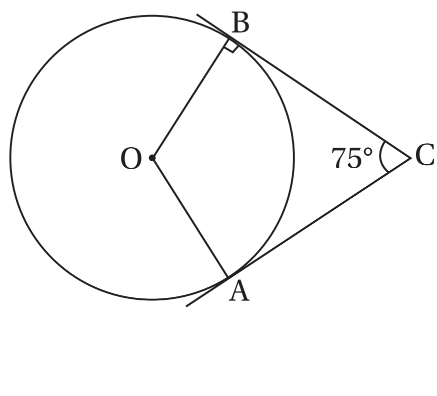
$OP=10\text{ cm}$

$\therefore OA=\sqrt{(10)^2-(8)^2}\text{ cm}$

$=\sqrt{36}\text{ cm}$

$=6\text{ cm}$

57. Ⓓ



$\angle OBC=\angle OAC=90^\circ$

$\therefore \angle AOB=360^\circ-(90^\circ+90^\circ+75^\circ)$

$=360^\circ-255^\circ$

$=105^\circ$

58. Ⓐ

(A) : $\tan A=\frac{12}{5}$ $\therefore \sec A=\sqrt{1+\tan^2 A}$ (A is acute angle)

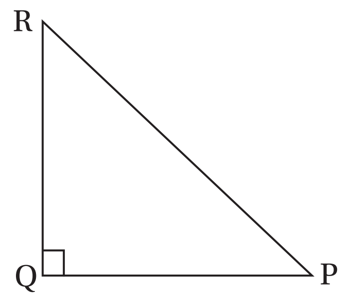
$$= \sqrt{1 + \frac{144}{25}}$$

$$= \sqrt{\frac{169}{25}} = \frac{13}{5} \text{ True}$$

(R) : $\sec A = \sqrt{1 + \tan^2 A}$ True

(R) is the correct explanation of (A).

59. Ⓐ



(A) : $\cos P = \frac{PQ}{PR}$

$\cos R = \frac{QR}{PR}$

$\therefore \cos P = \cos R \Rightarrow \frac{PQ}{PR} = \frac{QR}{PR}$

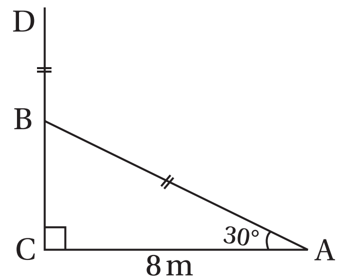
$\Rightarrow PQ = QR$

$\Rightarrow \angle P = \angle R$ True

(R) : In isosceles triangle, base angles are equal. True

(R) is the correct explanation of (A).

60. Ⓑ



$\frac{BC}{AC} = \tan 30°$

$\Rightarrow \frac{BC}{8m} = \frac{1}{\sqrt{3}}$

$\Rightarrow BC = \frac{8}{\sqrt{3}} m = \frac{8\sqrt{3}}{3} m$

61. Ⓑ

$\frac{AC}{AB} = \cos 30° = \frac{\sqrt{3}}{2}$

$\Rightarrow \frac{8m}{AB} = \frac{\sqrt{3}}{2} \Rightarrow AB = \frac{16}{\sqrt{3}} m$

$= \frac{16\sqrt{3}}{3} m$

62. Ⓐ

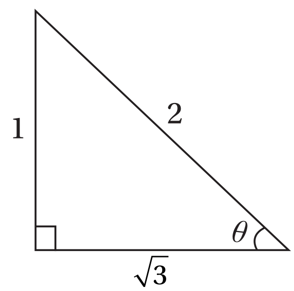
Height of the tree

$= BC + AB$

$$= \left(\frac{8\sqrt{3}}{3} + \frac{16\sqrt{3}}{3}\right) m = \frac{24\sqrt{3}}{3} m$$

$$= 8\sqrt{3} \text{ m}$$

63. Ⓐ



$$\tan\theta = \frac{1}{\sqrt{3}}$$

$$\therefore \frac{2\tan\theta}{1-\tan^2\theta} = \frac{2\times\frac{1}{\sqrt{3}}}{1-\frac{1}{3}} = \frac{\frac{2}{\sqrt{3}}}{\frac{2}{3}}$$

$$= \sqrt{3}$$

64. Ⓑ

From C to B angles will be in increasing order.

65. Ⓑ

A circle can have two parallel tangents to a given secant.

66. Ⓓ

$a = 3, d = 4$

$\therefore a_n = 3 + (n - 1)4 = 4n - 1$

67. Ⓐ

$$AB = \sqrt{(x-1)^2 + (7-3)^2} = \sqrt{(x-1)^2 + 16} = 5$$

$\Rightarrow x^2 - 2x + 17 = 25$

$\Rightarrow x^2 - 2x - 8 = 0$

$\Rightarrow (x - 4)(x + 2) = 0$

$\therefore x = 4 \qquad (\because x > 0)$

68. Ⓐ

$$\alpha + \beta = \frac{7}{4},\ \alpha\beta = \frac{3}{4}$$

$$\therefore \frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta} = \frac{(\alpha+\beta)^2 - 2\alpha\beta}{\alpha\beta}$$

$$=\frac{\frac{49}{16}-\cancel{2}\times\frac{3}{\cancel{4}\,2}}{\frac{3}{4}}$$

$$=\frac{\frac{49-24}{16}}{\frac{3}{4}}=\frac{25}{\cancel{16}\,4}\times\frac{\cancel{4}}{3}$$

$$=\frac{25}{12}$$

69. Ⓐ

$$\frac{x}{a}=\frac{y}{b}=k$$

$\Rightarrow\ x = ak,\ \ y = bk$

$ax + by = a^2 + b^2$

$\Rightarrow\ a^2k + b^2k = a^2 + b^2$

$\Rightarrow\ k(a^2 + b^2) = a^2 + b^2\ \Rightarrow\ k = 1$

$\therefore\ x = a,\ \ y = b$

70. Ⓑ

$$\begin{array}{r|l} 4 & 48,\ 72,\ 108 \\ \hline 2 & 12,\ 18,\ 27 \\ \hline 3 & 6,\ 9,\ 27 \\ \hline 3 & 2,\ 3,\ 9 \\ \hline & 2,\ 1,\ 3 \\ \hline \end{array}$$

$\therefore$ L.C.M. $= 4\times2\times3\times3\times2\times3$

$= 432$

$$\begin{array}{r|r|l} 432 & 1800 & 4 \\ & 1728 & \\ \hline & 72 & \end{array}$$

Time = 30 minutes

= 30 × 60 seconds

= 1800 seconds

$\therefore$ 4 times.

71. Ⓐ

$$\frac{\tan A+\tan B}{1-\tan A\tan B}$$

$$=\frac{\tan 60^\circ+\tan 30^\circ}{1-\tan 60^\circ\tan 30^\circ}$$

$$= \frac{\sqrt{3}+\frac{1}{\sqrt{3}}}{1-\sqrt{3}\times\frac{1}{\sqrt{3}}} = \frac{\sqrt{3}+\frac{1}{\sqrt{3}}}{1-1} = \frac{\sqrt{3}+\frac{1}{\sqrt{3}}}{0} = \text{undefined}$$

72. Ⓑ

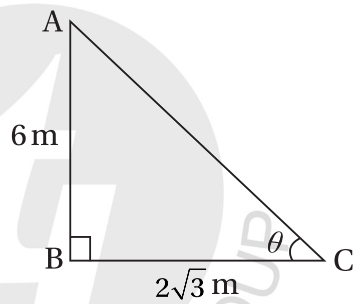
$$\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}$$

$$= \frac{\sin^2\theta+1+\cos^2\theta+2\cos\theta}{(1+\cos\theta)\sin\theta}$$

$$= \frac{2+2\cos\theta}{(1+\cos\theta)\sin\theta} = \frac{2(\cancel{1+\cos\theta})}{(\cancel{1+\cos\theta})\sin\theta} = 2\operatorname{cosec}\theta$$

73. Ⓐ

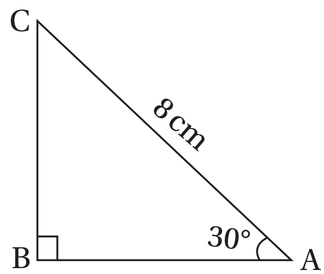
$$\tan\theta = \frac{6}{2\sqrt{3}}$$



$$= \sqrt{3} = \tan 60^\circ$$

$$\therefore\ \theta = 60^\circ.$$

74. Ⓒ



$$\frac{AB}{AC} = \cos 30^\circ$$

$$\frac{AB}{8\text{ cm}} = \frac{\sqrt{3}}{2}$$

$$\therefore\ AB = \frac{\sqrt{3}}{\cancel{2}}\times\cancel{8}\text{ cm} = 4\sqrt{3}\text{ cm}$$

$$\frac{BC}{AC} = \sin 30^\circ \Rightarrow \frac{BC}{8\text{ cm}} = \frac{1}{2} \Rightarrow BC = 4\text{ cm}$$

$$\therefore\ ar\,(\Delta ABC) = \frac{1}{2}\times 4\sqrt{3}\times 4\text{ cm}^2 = 8\sqrt{3}\text{ cm}^2$$

75. Ⓒ

$AR = AQ$

$BQ = BP$

CP = CS

DR = DS

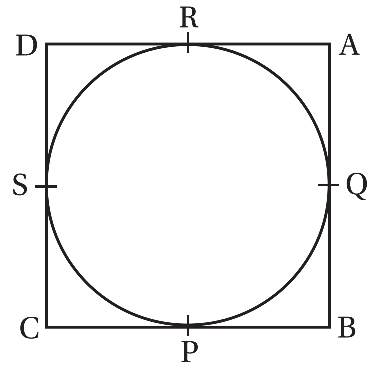
$\therefore$ AB + CD

= AQ + BQ + CS + DS

= AR + BP + CP + DR

= AR + DR + BP + CP

= AD + BC = 14.5 cm



Biology

76. Ⓒ

Bryophyllum

77. Ⓒ

Triploid

78. Ⓑ

Ovule

79. Ⓓ

Placenta

80. Ⓒ

Apple

81. Ⓒ

Hydra

82. Ⓑ

Ovum with X chromosome and sperm with X chromosome

83. Ⓒ

A is true but R is false

84. Ⓐ

Both A and R are true and R is the correct explanation of A.

85. Ⓓ

Style

86. Ⓐ

Stigma

87. Ⓐ

Ovary

88. Ⓒ

Germination of pollen tube to reach the ovule

89. Ⓐ

Falls off

90. Ⓒ

DNA

91. Ⓒ

Removal of undigested food

92. Ⓒ

Glucose

93. Ⓓ

Alveoli

94. Ⓑ

Ascent of sap.

95. Ⓑ

Both A and R are true but R is not the correct explanatiion of A.

96. Ⓒ

A is true but R is false

97. Ⓐ

I & II

98. Ⓓ

Gynoecium

99. ©

48

100. Ⓐ

Surgical