Monthly Progressive Test (Solution)

Class: X

Subject: PCMB

Academic **E**xcellence **P**rogramme **TECHNO ACE**

Physics

1. Ⓐ

   (Sound)
   P(332 m/s)

   O ——————————— $A(3 \times 10^8 \text{ m/s})$

2. Ⓓ

   Reflection
   Refraction

3. Ⓑ

   I
   Plane mirror

4. Ⓒ

   μ_1 μ_2 μ_1 μ_1 μ_2 μ_1

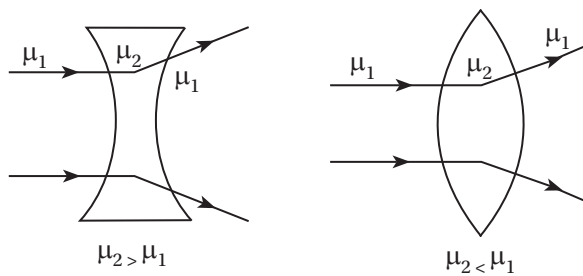 $\mu_2 > \mu_1$ $\mu_2 < \mu_1$
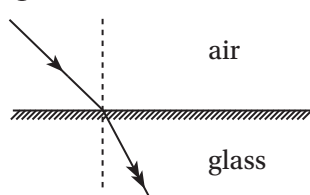
5. Ⓓ

   When $f < u < 2f$ then $v > 2f$

6. Ⓓ

   air
   glass

7. Ⓒ

If $u = -2f$ then $v = 2f$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{2f} = \frac{1}{2f} \quad \Rightarrow v = 2f$$

8. Ⓐ

If $u < f$, we get magnified virtual image.
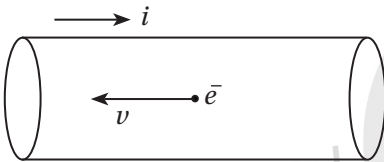
9. Ⓐ

$$P = \frac{100}{5} = +20 \text{ D}$$

10. Ⓒ

This is the definition of power of accommodation of eye lens.

11. Ⓐ

Use $W = Q \cdot \Delta V$

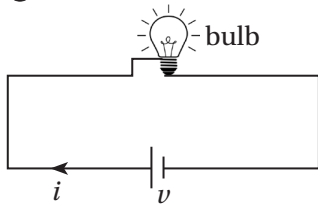1 joule = 1 coulomb × 1 volt

12. Ⓑ

13. Ⓓ

$Q = it \qquad \therefore \ i = Q/t$

14. Ⓓ

15. Ⓐ

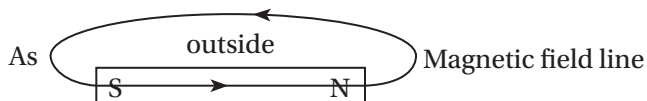In graphite form carbon is a conductor but insulator in diamond form.

16. Ⓐ

As electric field ($\vec{E}$) and magnetic field ($\vec{B}$) are vector quantities.

17. Ⓑ
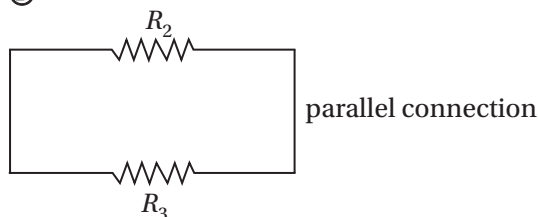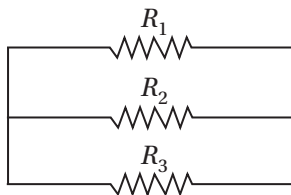
As magnetic field line is a closed loop.

18. Ⓒ

As Magnetic field line

19. Ⓓ

A plug key (ON)

20. Ⓓ

parallel connection

21. Ⓑ

R_1, R_2, R_3 are in parallel connection.

22. Ⓒ

Assertion is true, but Reason statement is false.

23. Ⓓ

Assertion; $R \propto \dfrac{1}{A}$, Reason; $R \propto l$

24. Ⓒ

$V = i \cdot R \implies V = (2i)(R/2)$

25. Ⓓ

$V = i \cdot R \implies V = \left(\dfrac{i}{2}\right)(2R)$

Chemistry

26. Ⓓ

Tertiary butyl alcohol is

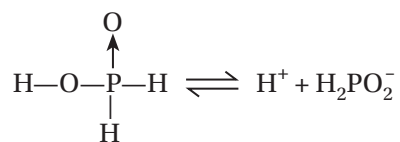$$\overset{3\ CH_3}{\underset{1\ CH_3}{H_3C\overset{2}{-}C}}{-}OH$$

I.U.P.A.C. name is : 2-methyl propan-2-ol.

27. Ⓒ

The hydrocarbon used for welding purpose is acetylene.

28. Ⓐ

The basicity of hypophosphorous acid (H_3PO_2) is 1, as it has only. One replaceable hydrogen.

$$H{-}O{-}\overset{O}{\underset{H}{\overset{\uparrow}{P}}}{-}H \rightleftharpoons H^+ + H_2PO_2^-$$

29. Ⓒ

Polymerisation of ethyne at 600°C in presence of copper tube gives benzene.

$$3C_2H_2 \xrightarrow[600°C]{Cu\ tube} C_6H_6\ (Benzene)$$
(ethyne)
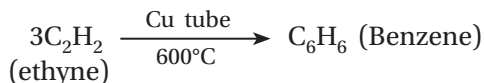
30. Ⓒ

Metals present in type metal : Pb (82%), Sb (15%), Sn (3%)

31. Ⓓ

Bleaching powder [Ca(OCl)Cl] is an example of mixed salt (acidic).
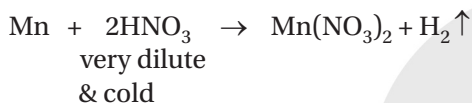
32. Ⓒ

a—SO_2—2—acidic oxide

b—H_2O—3—neutral oxide

c—Al_2O_3—4—Amphoteric oxide

d—CaO—1—basic oxide

33. Ⓓ

Hydrogen gas is evolved when Mn reacts with very dilute nitric acid.

$$Mn\ +\ 2HNO_3\ \rightarrow\ Mn(NO_3)_2 + H_2\uparrow$$
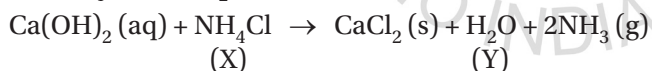very dilute
& cold

34. Ⓒ

The only non-metallic liquid at room temperature is Bromine (Br_2)

35. Ⓓ

The combination of carbon monoxide and hydrogen is known as water gas. Producer gas is ($CO + N_2$).

36. Ⓑ

$X = NH_4Cl$; $Y = H_2O$

$$Ca(OH)_2\ (aq) + NH_4Cl\ \rightarrow\ CaCl_2\ (s) + H_2O + 2NH_3\ (g)$$
(X) (Y)

37. Ⓒ

Chemical formula of Glauber's salt is $Na_2SO_4 \cdot 10H_2O$

38. Ⓒ

Plaster of paris containing packets are properly sealed. When it comes in contact with air it becomes very hard as gypsum is formed.

39. Ⓓ

The next homologous compound of methanal is ethanal.

40. Ⓑ

Steel contain non-metal, carbon (C) as one of their constituents.

41. Ⓑ

Ionic compounds generally have high melting point. This is correct. It is because they are ionic in nature and forms a very stable crystal. This is also true. But it is not the correct explanation of assertion.

42. Ⓐ

Reactivity series is an arrangement of element based on their reactivity. This is true. Reactivity series is used to

separate elements based on their reactivity. This is also correct and also the correct explanation of assertion.

43. Ⓑ

General formula of alkyne C_nH_{2n-2}. Benzene is an aromatic compound. This is also correct, but it is not the correct explanation of assertion.
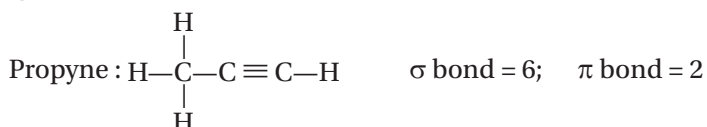
44. Ⓐ

pH of pure distilled water is always 7 at S.T.P. This is correct. Pure water contains equal concentrations of hydronium and hydroxylions. This is also correct and correct explanation of assertion.

45. Ⓒ

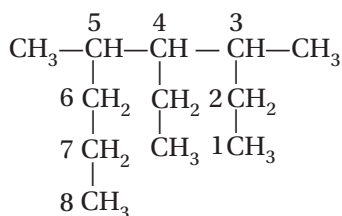The chemical formula of plaster of paris is : $CaSO_4 \cdot \frac{1}{2}H_2O$

46. Ⓑ

Propyne :
$$H-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-C \equiv C-H \qquad \sigma \text{ bond} = 6; \quad \pi \text{ bond} = 2$$

47. Ⓑ

Ionic compounds are soluble in water as it is polar compound.

48. Ⓑ

4-ethyl-3,5-dimethyl-octane.

$$
\begin{array}{ccccc}
& \overset{5}{} & \overset{4}{} & \overset{3}{} & \\
CH_3 & -CH & -CH & -CH & -CH_3 \\
& | & | & | & \\
& 6\,CH_2 & CH_2 & 2\,CH_2 & \\
& | & | & | & \\
& 7\,CH_2 & CH_3 & 1\,CH_3 & \\
& | & & & \\
& 8\,CH_3 & & &
\end{array}
$$

49. Ⓓ

Ethyne gives red ppt with ammoniacal cuprous chloride and white ppt with Tollen's reagent. But, ethene does not reacts.

50. Ⓓ

Total number of structural isomers of C_5H_{10} are 10; Cyclic = 5; Non-cyclic = 5

Mathematics

51. Ⓓ

$p(x) = x^2 + (a + 1) x + b$
$p(2) = 0 \Rightarrow 4 + 2 (a + 1) + b = 0$
$\Rightarrow 2a + b = -6$ .... (i)
$p(-3) = 9 - 3 (a + 1) + b = 0$
$\Rightarrow -3a + b = -6$ ....(ii)
Solving (i) & (ii) $a = 0, b = -6$

52. Ⓑ

$2x + 3y + 5 = 0$
$kx + 4y - 10 = 0$

For unique solution, $\dfrac{2}{k} \neq \dfrac{3}{4} \Rightarrow 3k \neq 8 \Rightarrow k \neq \dfrac{8}{3}$
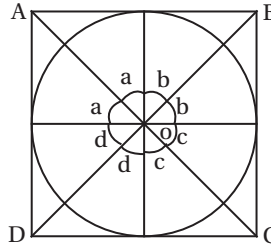
53. Ⓓ

Given a + b = 125°

Again, 2a + 2b + 2c + 2d = 360°

$\Rightarrow$ a + b + c + d = 180°

$\Rightarrow$ c + d = 180° – 125° = 55°

$\therefore \angle COD = 55°$

54. Ⓑ

2 + 4 + 6 + ... to 25 terms.

a = 2, d = 2

$\therefore S_{25} = \dfrac{25}{2} \{2 \times 2 + 24 \times 2\}$

$= \dfrac{25}{2} \{4 + 48\}$

$= 25 \times 26 = 650$

55. Ⓒ

Volume of one cube = 27 cm³.

$\therefore$ edge = 3 cm.

When two cubes are joined together, then dimensions of the cuboid

= 6cm × 3cm × 3cm.

$\therefore$ Surface area of resulting cuboid

$= 2 (6 \times 3 + 3 \times 3 + 6 \times 3)$ cm²

$= 2 (18 + 9 + 18)$ cm²

$= 90$ cm²

56. Ⓒ

$\sin \theta + \sin^2 \theta = 1$

$\Rightarrow \sin \theta = 1 - \sin^2 \theta = \cos^2 \theta$

$\Rightarrow \sin^2 \theta = \cos^4 \theta$

$\Rightarrow 1 - \cos^2 \theta = \cos^4 \theta$

$\Rightarrow \cos^4 \theta + \cos^2 \theta = 1$

57. Ⓑ
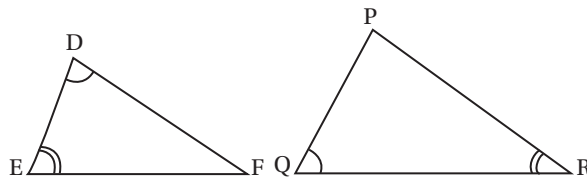
$\angle D = \angle Q, \angle R = \angle E$

$\therefore \angle F = \angle P$

$\therefore \Delta DEF \sim \Delta QRP$

$\therefore \dfrac{DE}{QR} = \dfrac{EF}{RP} = \dfrac{DF}{QP}$

$\therefore \dfrac{EF}{RP} = \dfrac{DE}{PQ}$ is not true.

58. Ⓑ

p(x) = ax²+bx+c and a+b+c=0

= ax² – ax – cx + c

= ax (x – 1) – c(x–1)

= (x–1) (ax – c)

$\therefore$ one zero is $\dfrac{c}{a}$

59. Ⓑ

The median of the new data will be also 40 because median will be remain same if observations after median value are increased by a constant value.

60. Ⓒ

$\Sigma f_i = 17$, $\Sigma f_i x_i = 3p + 63$, mean = 6.

$\therefore$ $6 = \dfrac{3p+63}{17} \Rightarrow 3p + 63 = 102$

$\Rightarrow 3p = 39$

$\Rightarrow p = 13$

61. Ⓒ

$(k-4)x^2 - 2kx + (k + 5) = 0$

$\because$ roots are equal

$\therefore 4k^2 - 4(k-4)(k+5) = 0$

$\Rightarrow \cancel{k^2} - \cancel{k^2} - k + 20 = 0$

$\Rightarrow k = 20$

62. Ⓐ

OQ – PQ = 1 cm

Let PQ = x cm

$\therefore$ QR = (x+1) cm

$\therefore (x+1)^2 = x^2 + (7)^2$

$\Rightarrow x^2 + 2x + 1 = x^2 + 49$

$\Rightarrow 2x = 48$

$\Rightarrow x = 24$

$\therefore \sin Q = \dfrac{OP}{OQ} = \dfrac{7}{25}$

63. Ⓒ

Radius of cone = 5 cm and height = 12 cm.

$\therefore l = \sqrt{144+25}$ cm = 13 cm

$\therefore$ Surface area of solid

$= 2\pi r^2 + \pi r l$

$= \pi r (2r + l)$

$= \dfrac{22}{7} \times 5(2 \times 5 + 13)$ cm^2

$= \dfrac{22}{7} \times 5 \times 23$ cm^2

$= 361.43$ cm^2

64. Ⓓ

Number of spade cards = 13.

Total cards = 52

$$\therefore \text{ Required probability} = \frac{13}{52} = \frac{1}{4}$$

65. Ⓓ

<pre>
        m   n
─────────────────┬────────────────────
A (3, 7)   P (−19/3, 7/3)   B (−11, 0)
</pre>

$$\therefore \left(\frac{m(-11)+n \times 3}{m+n}, \frac{m \times 0 + 7 \times n}{m+n} \right) = \left(\frac{-19}{3}, \frac{7}{3} \right)$$

$$\Rightarrow \frac{7n}{m+n} = \frac{7}{3} \Rightarrow 3n = m+n$$

$$\Rightarrow m = 2n \Rightarrow \frac{m}{n} = \frac{2}{1} \Rightarrow m:n = 2:1.$$

66. Ⓐ

Volume of cone $= \frac{1}{3}\pi r^2 h$

$$= \frac{1}{\cancel{3}} \times \frac{\cancel{22}^{11}}{7} \times \frac{5}{\cancel{2}} \times \frac{5}{2} \times \cancel{9}^3 \text{ cm}^3$$

$$= \frac{825}{14} \text{ cm}^3$$

67. Ⓑ

Volume of cone with a hemispherical end

$$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$$

$$= \frac{\pi r^2}{3}(h+2r)$$

$$= \frac{22}{7} \times \frac{1}{3} \times \frac{5}{2} \times \frac{5}{2} \times (9+5) \text{ cm}^3$$

$$= \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{1}{3} \times \frac{25}{\cancel{4}_{\cancel{2}}} \times \cancel{14}^2 \text{ cm}^3$$

$$= \frac{275}{3} \text{ cm}^3$$

68. Ⓐ

Volume of her brother's ice-cream

$= 9 \times 4 \times 2 \text{ cm}^3$

$= 72 \text{ cm}^3$

69. Ⓐ

HCF of 31 and 200 is 1 because 31 and 200 are co-prime numbers.

$\therefore$ Assertion is true.

Reason (R) : HCF of Co-prime numbers is 1 which is true and it is the correct explanation of Assertion (A).

70. Ⓑ

Area of sector containing angle 120°

$$= \frac{\cancel{120}^{0}}{\cancel{360}^{0}_{3}} \times \frac{22}{\cancel{7}} \times \cancel{7} \times 7 \text{ cm}^2$$

$$= \frac{154}{3} \text{ cm}^2$$

∴ Assertion (A) is true.

Reason (R) : Area of circle with radius r is πr^2 which is true but reason is not the correct explanation of assertion (A).

71. Ⓑ

mean = 53, median = 50
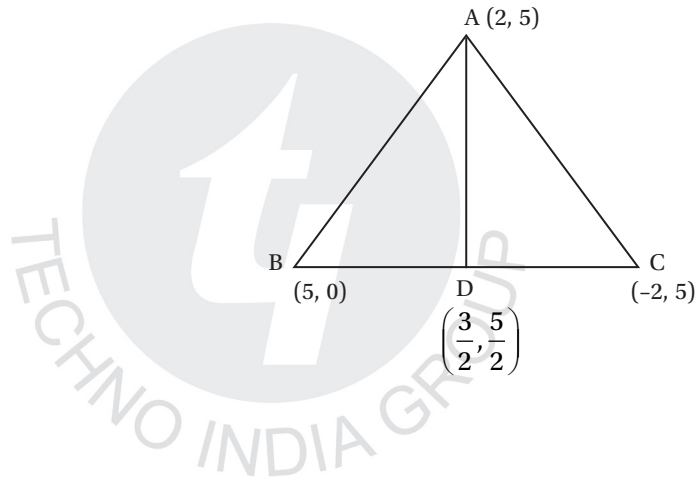
mode = 3 median – 2 mean

= 3 × 50 – 2 × 53

= 150 – 106 = 44

72. Ⓑ

$$AD = \sqrt{\left(2 - \frac{3}{2}\right)^2 + \left(5 - \frac{5}{2}\right)^2}$$

$$= \sqrt{\frac{1}{4} + \frac{25}{4}}$$

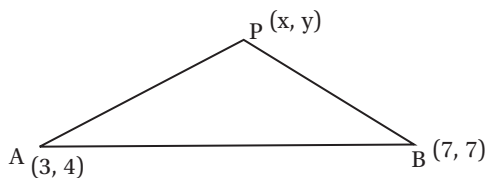$$= \frac{\sqrt{26}}{2} = \sqrt{\frac{13}{2}} \text{ units}$$

73. Ⓐ

P (Sunny day) = 0.68

∴ p (not sunny day) = 1 – 0.68 = 0.32

74. Ⓒ

(PA + PB) will be least if P, A and B are collinear. So, PA + PB = AB

$AB = \sqrt{16 + 9}$ = 5 units.

∴ least value of PA + PB = 5 units.

75. Ⓒ

Radius of each circle = $\frac{7}{2}$ cm

∴ Area of two circles = 2× πr^2

$$= \cancel{2} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{\cancel{2}} \text{ cm}^2$$

= 77 cm^2

Area of rectangular card board = 98 cm^2.

= Area of remaining card board.

= (98 – 77) cm^2

= 21 cm^2

Biology

76. Ⓒ

Glucose

Glucose is the respiratory substrate of all living organisms

77. Ⓑ

Oesophagus

78. Ⓒ

Stacks of thylakoid

79. Ⓐ

ADH

ADH causes the reabsorption of water from the collecting duct of nephrons

80. Ⓓ

Blood pressure

81. Ⓑ

Upward, xylem

82. Ⓐ

Phototropism

Sunlight acts as the stimulus

83. Ⓒ

Inhibit growth

84. Ⓓ

Goitre

Iodine is essential for the proper functioning of the thyroid gland and release of the hormone, thyroxine, from it

85. Ⓑ

Olfactory lobes

86. Ⓐ

Planaria

87. Ⓒ

Endosperm

88. Ⓑ

Ovulation

89. Ⓒ

   Recessive

90. Ⓓ

   Solar energy

91. Ⓓ

   A is false but R is true
   Skeletal muscle cells respire anaerobically only during strenuous activities

92. Ⓓ

   A is false but R is true
   In tubectomy, the fallopian tubes of the female are cut and ligated

93. Ⓑ

   Both A and R are true, but R is not the correct explanation of A

94. Ⓒ

   A is true but R is false
   Most of the reflex actions are controlled by spinal cord, others by the brain

95. Ⓒ

   A is true but R is false
   Saprophytes are a type of heterotrophs, they lack chlorophyll

96. Ⓒ

   TTRR and ttrr
   Both parents are pure types

97. Ⓐ

   Tall with round seeds
   Heterozygous individuals

98. Ⓓ

   Dwarf with wrinkled seeds

99. Ⓑ

   Biological magnification

100. Ⓐ

   Plankton
   First trophic level