Section A

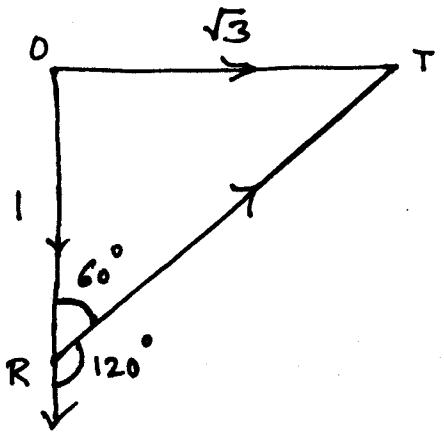
Q.No.	(a)	(b)	(c)	(d)	Q.No.	(a)	(b)	(c)	(d)
1	☐	☐	☐	☒	16	☐	☐	☐	☒
2	☐	☐	☐	☒	17	☐	☒	☐	☐
3	☐	☐	☐	☒	18	☐	☐	☒	☐
4	☒	☐	☐	☐	19	☒	☐	☐	☐
5	☐	☒	☐	☐	20	☐	☒	☐	☐
6	☒	☐	☐	☐	21	☐	☒	☐	☐
7	☐	☐	☒	☐	22	☐	☐	☐	☒
8	☒	☐	☒	☐	23	☐	☐	☐	☒
9	☐	☐	☒	☐	24	☐	☒	☐	☐
10	☐	☐	☒	☐	25	☐	☐	☐	☒
11	☐	☐	☐	☒	26	☐	☐	☐	☒
12	☐	☐	☒	☐	27	☐	☐	☒	☐
13	☐	☐	☒	☐	28	☐	☐	☒	☐
14	☒	☐	☐	☐	29	☐	☐	☐	☒
15	☐	☒	☐	☐	30	☐	☐	☐	☒

Section A (continued)

Q.No.	(a)	(b)	(c)	(d)	Q.No.	(a)	(b)	(c)	(d)
31	☐	☒	☐	☐	46	☐	☒	☐	☐
32	☒	☐	☐	☐	47	☐	☐	☒	☐
33	☐	☐	☐	☒	48	☐	☐	☒	☐
34	☒	☐	☐	☐	49	☐	☐	☐	☒
35	☒	☐	☐	☐	50	☐	☒	☐	☐
36	☒	☐	☐	☐	51	☐	☐	☐	☒
37	☒	☐	☐	☐	52	☐	☐	☒	☐
38	☐	☒	☐	☐	53	☒	☐	☐	☐
39	☐	☒	☐	☐	54	☐	☐	☐	☒
40	☐	☒	☐	☐	55	☒	☐	☐	☐
41	☒	☐	☐	☐	56	☐	☐	☒	☐
42	☐	☐	☒	☐	57	☐	☐	☐	☒
43	☐	☒	☐	☐	58	☐	☐	☐	☒
44	☐	☒	☐	☐	59	☒	☐	☐	☐
45	☐	☒	☐	☐	60	☐	☒	☐	☐

Q.No.61 (Section B)

A.)



1 mark

Magnitude is $\left(\sqrt{3+1}\right)$ km hr^{-1} = 2 km hr^{-1}

0·5 mark

Direction is 60° (or 120°). i.e. arctan $(\sqrt{3})$ with respect to the rabbit's path. 0·5 mark

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B.) $F = 4 + 12t$; $F\sin\theta = mg$ 1 mark

$\sin 30^\circ = \frac{1}{2}$ and $(4+12t)\sin 30^\circ = mg$

$\therefore$ $t = 3$ sec 0·5 mark

Use this page if you need additional space for any question in Section B. Mention the question number clearly.

61. B. $F = 4 + 12t$

This force has a constant part and a variable part. The horizontal component of the acceleration due to the constant part is.

$$\frac{4\cos\theta}{m} \quad \left[\cos 30^\circ = \frac{\sqrt{3}}{2}\right].$$

$$= \sqrt{3}\ ms^{-2} \quad [\because m = 2\,kg]$$

The average acceleration along the horizontal direction, due to the variable part is

$$\frac{1}{2}\cdot(12t)\frac{\cos 30^\circ}{m} = 3\frac{\sqrt{3}}{2}t\ ms^{-2}$$

Full average acceleration is,

$$\bar{a} = \left(\sqrt{3} + \frac{3\sqrt{3}}{2}t\right) ms^{-2}$$ 1 mark

$$\text{velocity} = \bar{a}t = \left(\sqrt{3}t + \frac{3\sqrt{3}}{2}t^2\right) ms^{-1}$$

$$= \frac{33}{2}\sqrt{3}\ ms^{-1} \quad [\because t = 3\,sec]$$

$$\simeq 28.58\ ms^{-1}$$ 0.5 mark

Q.No.62 (Section B)

$m = 0.25\ kg$, $u = 5\ ms^{-1}$, $v = -40\ ms^{-1}$

1 mark

$\Delta p = m(v-u) = -11.25\ kg\,ms^{-1}$

1 mark

Average force $= \frac{\Delta p}{\Delta t} = -75\ N$ 1 mark

Average change in momentum, Δp, is the area under the triangle.

$\Rightarrow \frac{1}{2} \times t \times F_{max} = \Delta p$ 0.5 mark

$\therefore F_{max} = 2\frac{\Delta p}{t} = 150\ N$ 0.5 mark

For the second harder ball, time of contact is $0.125\ s$.

$\therefore F_{max} = 180\ N$ 1 mark

Q.No.63 (Section B)

PART I : b.) 801°c to 1465°c ——— 1 mark

PART II : a.) AB and CD ——— 2 marks

PART III : c.) CD ——— 2 marks

Q.No.64 (Section B) CALCULATION STEPS ARE VERY IMPORTANT
APPROXIMATE RESULTS ARE FINE

1/ Total energy of the products is

$6 \times [-393.5 - 285.8]$ kJ $= -4075.8$ kJ

Total energy of the reactants is -1273.3 kJ

} 0.5 mark

Net energy produced for 1 mole of glucose oxidigation is

$[-1273.3 - (-4075.8)]$ kJ $= -2802.5$ kJ $\simeq -2800$ kJ

⟶ [0.5 mark]

2/ 1 mole of glucose has $= [(6 \times 12) + (16 \times 6) + (1 \times 12)]$ gm
$= 180$ gm

∴ 10 gm is equivalent of $\frac{1}{18}$ mole.

Given the reaction equation, no. of moles needed to oxidize 10 gm of glucose is $\frac{6}{18} = \frac{1}{3}$ mole.

⟶ [1 mark]

$PV = nRT$. ∴ $V = \frac{1}{3} \times R \times 298 = \frac{1}{3} \times 0.0821 \times 298$
$= 8.16$ litres $\simeq 8$ litres

is the volume of oxygen needed. ⟶ [0.5 mark]

Volume of air need $= \frac{8.16}{20\%} = 40.8 \simeq 41$ litres / (40 litres)

⟶ [0.5 marks]

Use this page if you need additional space for any question in Section B. Mention the question number clearly.

Question 64: (contd.).

3/ 1 mole of glucose (180 gm) produces 6 moles of CO_2.

$\therefore$ $\frac{1}{18}$ mole of glucose will produce $\frac{1}{3}$ mole of CO_2.

→ [1 mark]

$PV = nRT$. $P = 1$ atm.

$\therefore V = \frac{1}{3} \times R \times 310 = \frac{1}{3} \times 0.0821 \times 310$ litres

$\simeq 8.5$ litres.

$\therefore$ 8.5 litres of dry CO_2 will be produced on combustion of 10 gm of glucose

→ [1 mark]

Q.No.65 (Section B)

a.) c. (oxygen uptake) ⟶ 0.5 mark

b.) a (oxygen debt) ⟶ 0.5 mark

c.) a or d ⟶ 1 mark

d.) a ⟶ 1 mark

e.) b ⟶ 1 mark

f.) c ⟶ 1 mark

Q.No.66 (Section B)

A. ~~No.~~ No. of dots is $n+2$ — 1 mark

No. of triangles is $\frac{n(n+1)}{2}$ — 2 marks

B. $V = xyz$ — 0.5 mark

$S = 2(xy + yz + zx)$ — 0.5 mark

$$\frac{1}{S} = \frac{1}{2xyz\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)}$$

$$\Rightarrow \frac{1}{S} = \frac{1}{2V\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)}$$

1 mark

Q.No.67 (Section B)

i.) WOMAN ——— B & E ——— 0.5 mark

MAN ——— C & F ——— 0.5 mark

ii.) B & D — 1 mark

iii.) MOTHER ——— B

FATHER ——— C — 1 mark

iv.) B — 1 mark

v.) A — 1 mark

Q.No.68 (Section B)

$$R = 1 + 1 \| R$$

2 marks

$$R = 1 + \left(\frac{1}{1} + \frac{1}{R}\right) = 1 + \frac{R \cdot 1}{R+1}$$

$$\Rightarrow \quad R^2 + 1R = R + 1^2 + R \cdot 1$$

1 mark

$$\therefore \quad R^2 - 1R - 1^2 = 0$$

1 mark

$$R = -\frac{(-1) \pm \sqrt{1^2 - 4 \cdot 1 \cdot (-1^2)}}{2}$$

0.5 mark

$$= \frac{1 + \sqrt{1^2 + 4 \cdot 1^2}}{2}$$

$$= \frac{1}{2}\left(1 + \sqrt{5}\right)$$

0.5 mark