INDIAN SCHOOL AL WADI AL KABIR

DEPARTMENT OF SCIENCE 2023-24

Subject: Physics (042)

MARKING SCHEME

Maximum Marks: 70 Marks SET1 Time Allowed: 3 hours

General Instructions: (1) There are 33 questions in all. All questions are compulsory.

(2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.

(3) All the sections are compulsory.

(4) Section A contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each,

Section B contains five questions of two marks each,

Section C contains seven questions of three marks each,

Section D contains two case study based questions of four marks each and Section E contains three long answer questions of five marks each.

(5) There is no overall choice. However, an internal choice has been provided in one question in Section B, one question in Section C, one question in each CBQ in Section D and all three questions in Section E. You have to attempt only one of the choices in such questions.

[1] Impulse

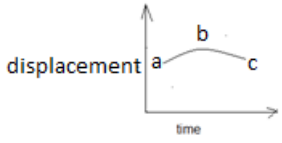
[2] to find the correct value

[3] [M^0LT^0

[4] both [b] & [c]

[5]

[d]



[6] At $\frac{3h}{4}$ from the ground

[7]90

[8] a = r ∝

[9] 30m

[10] 360N

[11] light

[12] 10m

[13] [a] Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

[14] (d) Assertion (A) is false and Reason (R) is also false

[15] c) Assertion (A) is true, but Reason (R) is false

[16] (d) Assertion (A) is false and Reason (R) is also false

SECTION B [2 MARKS]

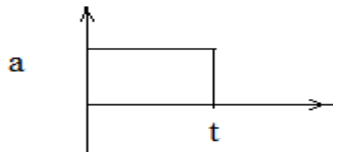
[17]

dimension of P = $ML^{-1}T^{-2}$ -----[1/2]

Dimension of V = L^3 ----[1/2]

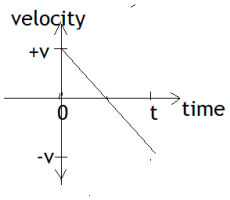
[Ans. a = ML^5T^{-2}, b =L^3][1/2 + ½]

[18



---[1]attempt

[b].



if correct [1+1]

[19]

a .b = ab cos Θ -----[1] or 3 √2 = 2x3 cos Θ ----[1/2] Θ = 45 -----[1/2]

OR

$\vec{P} + \vec{Q}$ = R = √{$P^2 + Q^2 + 2$ PQcosΘ} ----[1]

13 = √{$12^2 + 5^2 + 2$ x12x 5 cosΘ} ----[1/2]

Θ = 90 ------ [½]

[20]conservation of momentum statement ---[1/2]

Fig. -----[1/2]

F = $\frac{dP}{dt}$ ----[1/2]

Steps -----[1/2]

[21][i] w= mgh = 10 x10 x 2 = 200J [1/2 + ½]

[ii] Θ = 90 , w = 0 [1/2 + 1/2]]

[22]

F = K $m^a v^b r^c$

M L T^{-2} = $M^a[LT^{-1}]^b L^c$ ---- [1/2+1/2]]

b =2,a =1,c = -1] ---[½ + ½ + ½]

F = K $m^1 v^2 r^{-1}$ ----[1/2] or F = $\frac{mv^2}{r}$

[23] X = ½ gt^2 ----[a] ---[1]

100- x = 100 t – ½ gt^2 ---[b] ------[1]

Or 100 = 100 t ---- [1/2] or t = 1s ---[1/2]

OR

For max. acceleration,

$v^2 = u^2 + 2as$ or $v^2 = 2 \times 5 \times d1$ or $d1 = v^2/10m$ -- or correct formula -----[1/2]

<u>For max. retardation</u>

$V^2 = u^2 + 2as$ or $0 = v^2 + 2 \times a \times d2$ or $0 = v^2 + 2 \times -10 \times d2$ or

$d2 = V^2/20$ mor correct formula ----[1/2]

But d1 + d2 = 1500

$1500 = v^2/10 + V^2/20$ or V = 100m/s ---[1/2]

We have a = v-u/t or 5 = 100-0/t1 or t1 = 20s ---- [1/2]

& a = v-u/t or -10 = 0-100/t2 or t2 = 10s ---[1/2] or t = t1 + t2 = 30s -- [1/2]

[24] [i] formula ---- [1/2]

$3000 = u\sin37^o \times 5 + ½ \times 10 \times [5]^2$ ----[1/2] or u = 958m/s ---[1/2]

[ii] distance = speed x time ---[1/2]
CB = ucos37 x 5 ----[1/2] or CB = 3832m ---[1/2]

[25]--Definition –[1/2]

Fig. ----[1/2]

[i] Steps ---[1/2]

Final answer –[1/2]

[ii] Steps ---[1/2]

Final answer ---[1/2]

[iii] Steps ---[1/2]

Final answer ---[1/2]

ANY 2 to be answered[1 +1]

[26] Vg = - MbVb/Mg --- [1/2] OR Vg = .2m/s ---[1/2]
$v^2 = u^2 + 2as$ or a = - .08m/s^2 ---[1/2 +1/2]
Or F = ma = 8 x .08 = -0.64N ----- [1/2 + 1/2]
[27]
Impulse def. -----[1]
Impulse = F xt ----[1/2]
Steps ---[1]
Final answer ---[1/2]

[28] Statement --- [1]

Fig –[1/2]

W = F xs [1/2] or W = ma xs ---[1/2]

Steps ---[1/2]

For final answer alone [1/2]

SECTION D[4 Marks] CASE STUDY

[29][i] [c] equal to ucosθ

[ii] [a] at H

[iii] [b]10m

OR

[c] 40^0

[iv] Answer(c)R = 4H

[30]

[i] [b] limiting friction is directly proportional to normal reaction

[ii] [b] 10N

[iii] [c] 1.5N

OR

[c] 250N

[iv] [a] pull , because the frictional force acting is $\mu\{ mg- F\sin\Theta\}$

SECTION E [5 MARKS]

[31]

[a] 2 uses - [1/2 + ½]

[b] graph ---[1]

[i] Steps ---[1]

[ii] steps---[1]

[c] both, doesnot depends upon mass ---[1/2 + ½]]

OR

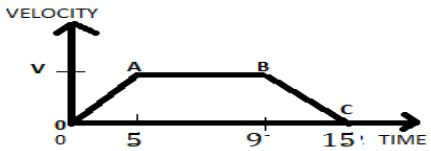
[a] What is the use of displacement- time graph ?

[a] to find velocity -- --[1]

[b] Graph ---[1]

Steps ---[1]

[c]



---[1]

a = - 5 unit ----[1]

[32] [a]projectile def – [1]

[b] labelled fig ---[1]
steps ---[2]
Final answer alone ---[1/2]
[c] 4 sin 30^0—[1]

OR

[a] accelerated, change in direction [1+1]
[b] labelled Figure –[1]
Steps ---[2]

Final answer alone ---[1/2]

[33] [a] fig. –[1]
Steps- --- [3]

Final answer alone –[1/2]

[b] provide extra centripetal force due to normal component ---[1]
OR

[a] fig. –[1]

Steps- [1]

Final answer alone –[1/2]

[b]maximum value of static friction -- [1]

[c] μR = ma

0.4 x m x 10 = m a - [1]

Or a = -4 unit ---[1/2]

$v^2 = u^2 + 2as$

0 = 20 x 20 + 2 x -4 x s

S = 50m --[1/2]