DEPARTMENTOFPHYSICS

**MID TERM ONE XAMS 2023**

# 535/2

**PHYSICS**

# Paper 2

**2 hours15 minutes**

# INSTRUCTIONSTOCANDIDATES:

## Answerany**five**questions.

*Anyadditionalquestion(s)answeredwill***not***bemarked.*

## Mathematical tables and silent non – programmable calculators may be used.Wherenecessary use thefollowingconstants.

|  |  |  |
| --- | --- | --- |
| *Acceleration duetogravity,g,* | *=* | *10ms-2.* |
| *Densityof water* | *=* | *1000Kgm-3* |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| QTNS |  |  |  |  |  | TOTAL |
| MARKS |  |  |  |  |  |  |

1. (a) (i) Statetheprincipleofmoments. (1mark)

(ii) Figure1belowshowsauniformmetrerule,pivotedatthe10cmmarkwhichbalanceswhenamassof300gissuspendedat the0cm.

0 10cm 100cm

300g

Figure1.

Calculatethemassofthe metrerule. (4marks)

* 1. (i) Statetheconditionsfora bodytobeinequilibrium. (2marks)
     1. With the aid of a diagram, distinguish between stable and unstableequilibrium. (4marks)
     2. Stateanytwoways inwhich stabilityofabodycan beincreased.

(2marks)

* 1. Explainwhypassengers arenotadvisedtostand whiletravellinginbuses.

(3marks)

1. (a) (i) Definetheterms***density***and***relativedensity***. (02marks)

(ii) LiquidXofmass200ganddensity1.0gcm-3ismixedwithanotherliquidYofmass 300ganddensity2.0gcm-3to give amixture.

Calculatethedensityofthemixture. (03marks)

1. (i) Statethelawoffloatation. (01mark)

(ii) Anobjectfloatsinwaterwiththreequartersofitsvolumesubmerged.Calculatethedensityoftheobject. (03marks)

1. Astoneweighs40Ninairand20Ninwater.Calculatethe;
   1. relativedensityofthestone. (02marks)
   2. thedensityofthestone. (02marks)
2. Describeanexperimenttodeterminetherelativedensityofaliquidusingadensitybottle. (03 marks)
3. (a) (i) Whatismeantbyrectilinearpropagationoflight? (1mark)

(ii) Anobjectofheight250cmisplacedatadistanceof150cmfromapinholecamera.Ifthe cameraisoflength7.2cm,findthe imageheight.

(3marks)

1. (i) Describeanexperimenttodeterminethefocallengthofaconcave

mirrorusinganilluminatedobject. (05marks)

1. An object of height 2cm is placed 20cm infront of a concave mirror of focallength15 cm.Bygraphicalconstruction, determinethe;
   1. positionoftheobject. (4marks)
   2. heightoftheobject. (2marks)
   3. natureofimageformed. (1mark)
2. (a) Definetheterms***efficiencyandmechanicaladvantage*** (2marks)
3. (i)Drawapulleysystemofvelocityratio5with3blocksintheupperblock.

(2marks)

(ii)Find the efficiency of a pulley system above in (b)(i) above if it lifts a load of1000Nusinganeffortof 300N. (4marks)

1. (i) Explainwhytheefficiencyofapulleysystem islessthan 100%.(2marks)

(ii)Give**two**exampleswherepulleysareused. (2marks)

1. Describe an experiment to determine the centre of gravity of an irregularcardboard. (4marks)
2. (a) (i) Definetheterm***pressure*** andstateitsS.Iunit. (2marks)

(ii) Stateanytwofactorsonwhichthe pressure exertedbyafluiddepends.

(2marks)

1. Withtheaidofalabeleddiagram,describehow a***forcepump***works. (5marks)

OIL



100N

**Fig.2**

Figure2 aboveshowsahydraulicmachine.

* 1. Give**one**examplewhere thismachineisused. (1mark)
  2. Statetheprincipleappliedinthemachineabove. (1mark)
  3. If an effort of 100 N is applied at the smaller piston of area 0.04 m2, findthemassofthecarraisediftheareaofthelargerpistonis 0.08m2.

(3marks)

1. Explainwhyasharppangaispreferredtoabluntpangawhencuttingapiece

ofwood. (2marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 6. | (a) | (i) | Definethetermv***elocity.*** | (1mark) |
|  |  | (ii) | Draw ***velocity-time***graphforastonethrownvertically | upwards.(2marks) |

1. Writedownthe**three**equationsofuniformlyacceleratedmotion. (*03marks*)
2. Abodychangeditsvelocityfrom5ms-1to26ms-1in7seconds.
   1. Calculateitsacceleration. (*02marks*)
   2. Ifthebodycontinuesmoving,finditsvelocityafter12seconds.

(2marks)

1. Thefigure3belowshowsavelocitytime graphforacyclist.

5



B

C

A0

2

6

V(ms-1)

time(s)

* 1. DescribethemotionofthecyclistfromAtoC (2marks)
  2. Calculatethetotaldistancecovered. (2marks)

1. If the ball of mass 0.03kg is raised 1.5 m above the surface and then released,whatisitskineticenergyjustbeforehittingthesurface? (2marks)
2. (a) (i) Whatismeantbyrectilinearpropagationoflight? (1mark)

(ii) Anobjectofheight250cmisplacedatadistanceof150cmfromapinholecamera.Ifthe cameraisoflength7.2cm,findthe imageheight.

(3marks)

1. (i) Describeanexperimenttodeterminethefocallengthofaconcave

mirrorusinganilluminatedobject. (05marks)

1. An object of height 2cm is placed 20cm infront of a concave mirror of focallength15 cm.Bygraphicalconstruction, determinethe;
   1. positionoftheobject. (4marks)
   2. heightoftheobject. (2marks)
   3. natureofimageformed. (1mark)
2. (a) Definethefollowingterms:
   1. Lowerfixedpoint (01mark)
   2. Upperfixedpoint (01mark)
3. (i) Give**two***advantages*and**two***disadvantages*ofmercuryoveralcoholasa

thermometricproperty. (4marks)

(ii) Giveanytwoexamplesofthermometricproperties.(2marks)

1. (i) Definecapillarity (01mark)

(ii) State**two**applicationsofcapillarity (01mark)

1. Explainwhywarmwatermakeswashingofclotheseasier.(2marks)
2. Inanunmarkedthermometer,thelengthofthemercurythreadwas4𝑐𝑚iniceand24𝑐𝑚in steam.Atwhattemperaturewouldthelength be 16𝑐𝑚?

(03marks)

**THE END.**