(4)
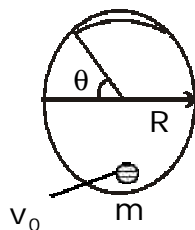
(c) A 30 gm bullet initially travelling 500 m/sec. penetrates 12 cm into a wooden block. What is average force does it exert?

(a) keâÙe&keâ efneæ evIe keâesheefj Yeeefelle keâeefpeS SJebmecePeeFÙes-

(b) keâÙe&Tpee&Òceeêle keâer efleJeÙevee keâeefpeS SJeb efnæ keâjes-

(c) Skeâ 30 «eece keâer ieesueer ÒejcYe celW 500 m/sec keâ Jeie mesieeIe keâj les nÝ Skeâ uekeâÌ[er keâ iešŠkeâ celW 12 cm lepme peeleer nÝ Ùen ekeâÖlevee Deenmele yeue ueieeleer nÝ?

3. A particle of mass m=0.2 kg is moving inside a smooth vertical circle of radius R=50cm (See fig.). If it is projected horizontally with velocity v_0=4 m/sec from its lowest position. Find the angle θ at which it will lose contact with the circle?

Skeâ keâCe efpemekeâe õJÙeceeve m=0.2kg nÝ Skeâ R=50cm ÒepÙee JeeueseÛekeââves TOJeeØej Jeèe celWefe jne nw(efÛe$e oKe), Ùeefo Fmekeâes Jeèe keâ vÙeevelece efmLeefle cel#e¤e efoMee celW v_0=4 m/sec. keâ Jeie mes0#eshele keâjs kieâCe Jeèe keâ efkeâÖlevee keâesÛe hej mechekeâ lees osÝe? 7½

S-601

B.Sc. (Part-I) Examination, 2015

(Regular & Exempted)

PHYSICS

First Paper

(Mechanics & Wave Motion)

Time Allowed : Three Hours]   [Maximum Marks : 50

Note : Answer five questions in all, attempting Question No. 1, which is compulsory and one question each from Units I, II, III, and IV.

Deeve JeeÙeÙeeÙe&Ùeeefmeb 1 Deegj FkeâeeF&I, II, III SJeb IV ÒelÙekeâ cellmes Skeâ-Skeâ ÒeMve uees les nÝ, keâgue heeÛe ÒeMveeW keâ Gòej oeefpeeS~

1. (i) Define frictional force with suitable examples. $10 \times 2 = 20$

Ie<e&Ce yeue keâes GefÛele Goen j CeeWkeâeârmen ewUel ee mesheefj Yeeeelle keâeefpeS~

(ii) What do you understand by Coriolis force?

keâesefj Ùeesefueme yeue mes Deehe keâÙee mecePeles nQ?

(iii) Write down short notes on Escape Ve-
locity.

heueeÙeve Jesie hej mebef#ehle ueKe efueKeWs~

(iv) Prove that Central force is a conserva-
tive force.

efmeæ keâerefpeS efkeâ keâsvõerÙe yeue Skeâ mebj#eer yeue nw~

(v) Write down the moment of inertia of solid
sphere and rectangular lamina about its
axis perpendicular to its plane.

"eesme ieesues leLee DeeÙeleekeâej hešue keâs leue keâs uecyeJeled
De#e keâs heefjle: pe[Je DeeIeC&keâe mešc efueKeKeS~

(vi) Describe elastic and inelastic collision with
suitable examples.

GesÙele Goenj CeeWkeâer menÙeelee mes heæCe&efllÙeemLe leLee
DeæelÙeemLe mešveŠšeWkeâes JeeCe&e keââjW

(vii) Find the average recoil force on a ma-
chine gun firing 120 shots per second. The

mass of each bullet is 10 gm and nuzzle
velocity is 800 m/sec.

Skeâ ceMeerve yevokeâ pees 120 meeš Skeâ meke&âC[c l
oeielee nw lees ceMeerve yevokeâ hej Deemele efjkeâerÙeeue yeue
yeleeFUes-efleÙeUekeââ ieesuee keâe õJÙeceeve 10 «eece I   veeheeue
Jesie 800 m/sec. nw

(viii) Explain the Poisson's Ratio.

hJeeFpeve Devegheele keâes meceePeeFS~

(ix) Find the wavelength and frequency of
given equation $Y=5 \sin \pi(0.02x-4.0t)$ cm.

efoÙes meceekeââjCe $Y=5 \sin \pi(0.02x-4.0t)$ cm keâer
efueÙees lej efheesõÙeb& leLee DeeJeebe %eele keââjpeS~

(x) Write down the relation between phase
velocity and group velocity.

keâuee Jesie leLee «eghe Jesie keââer yeeÙeÙes mecyevOe efueeKeÙes-

Unit-I   7½

FkeâeF&1

2. (a) Define and explain the concept of work.

   (b) Prove and discuss the work-energy theo-
rem.

Unit-II   7 ½

FkeâeF&II

4. (a) Write down the theorem of perpendicu-
         lar axis and prove it.

    (b) Derive the relation between angular ac-
         celeration and linear acceleration.

    (a) uecyeJeled De#e keâe ÒcesÙe efueKees SJeb efmeæ keâjes-

    (b) jKeerÙe leLee keâesCeerÙe lJejCe keâe yeerÛe mecyevOe mLeeefhele
         keâjW

5. A circular disc of radius 0.1m and mass 1.0 kg
    is rotating at 10 revolution/sec. about its axis.
    Find the work done and rotational kinetic en-
    ergy that must be done to increase 20 revo-
    lution per second.

    1.0kg leLee 0.1m efÒepÙee keâe Skeâ Jeòeekeâej ef[mkeâ Deheveer
    De#e keâe heefjle: 10 ÛekeâÇej /second cecWleCeške keâjlee nÜ 20
    Ûekeâ̂eâj/second mes leCeške keââjves keâ efueÜs keââeleÜ&leLee leCeške
    iedlepe Tpee&%eele keââjes-

Unit-III   7½

FkeâeF&III

6. What are Kepler's law of planetary motion?
    Show that how Newton's law of gravitation
    follow from them and prove it.

    «eneWkeâer ieefle keâ keâíhuej keâe efveÙece keâÙee ieÙe™lJeekeâ<eÛe keâ
    vÙeefSve keâ efveÙece efkeââme Øekeâej keâíhuej keâ efveÙece keâe DeveêÙeâjÇe
    keâj leer nf? Fmes efmeæ keâjes-

7. Explain that orbit of geostationary satellite is
    equitorial and circular and prove inverse square
    law of gravitation.

    keââefece Ghe«en keâerkeâ#ee meceDe#eeÙíe SJebÚeèeeÙíe netlear nwmecePeeFS,
    leLee ieÙ™lJeekeâ<eÛe keâ efveS JÙÙeg›eâce Jeie&efveÙece keââes efmeæ keâjes-

    Unit-IV   7½

    FkeâeF&IV

8. Define simple harmonic motion with suitable
    examples. Derive the differential equation of
    simple harmonic motion and solve it.

    GeÛee GoenjCe osesnÇ§ mejue DeeJele&ieefle keââes   keââeefhoeS~

---

mejue DeeJele&ieefle keâ efueS DeJekeââueve meceekeââjÇ Ce efueeeKeS SJel
Fmekeââes nue keââeefhoeS~

9. A particle execute Simple Harmonic Motion of
    period 31.4 sec and its amplitude 5.0 cm. Cal-
    culate its maximum velocity and maximum ac-
    celeration.

    Skeâ keââCe mejue DeeJele&ieefle keâj jne nÇ# efpemekeâe DeeJele&keââeue
    31.4 sec. leLee DeeÛeece 5.0 cm nÇ# Fmekeââ DeeDekeââÛece
    ieefhope leLee DeeDekeââlece IJejjÇ Ce keââer ieCevee keââeefhoeS~