

Annual Online Examination 2020

(Only for Regular Students)

Centre Code– 135

Centre Name- Disha College, Raipur (C.G.)

Subject - Physics

Class-B.Sc.-I

Paper - I

Time - 3 Hours

Paper Name – Mechanics, Oscillations and Properties of Matter

M.M. - 50

Note: Attempt all questions.

UNIT - 1

- (a) What do you meant by the central force??

दिशा के द्वारा दिया गया उत्तर:

(4)

- (b) For a particle moving under a central force show that:

(i) angular momentum of the particle remains constant, (ii) particle moves in a rigid plane,
(iii) areal velocity of the particle remains constant.

दिशा के द्वारा दिया गया उत्तर:

(i) अंकुरी संगति धूम्रपाली के बारे में बताया गया है। (ii) पर्यावरण के बारे में बताया गया है।

(iii) वर्षा के बारे में बताया गया है।

OR वर्णन

- (a) Prove that the centre of mass of two point particle lies on the line joining them and the ratio of distances of centre of mass from the particles is equal to the inverse ratio of their masses?

दिशा के द्वारा दिया गया उत्तर:

(8)

- (b) Define centre of mass.

दिशा के द्वारा दिया गया उत्तर:

(2)

UNIT – 2

- (a) Explain products of inertia. What do you understand by potential well and explain periodic oscillations in it.

(4)

दिशा के द्वारा दिया गया उत्तर:

- (b) Show that the motion of a mass attached at the free end of a massless spring suspended by a rigid support is simple harmonic. Establish the expression for the time period of its oscillations.

दिशा के द्वारा दिया गया उत्तर:

(6)

OR वर्णन

- (a) What do you meant by moment of inertia of a body?.

दिशा के द्वारा दिया गया उत्तर:

1/2

- (b) Deduce an expression for the kinetic energy of a rotating body. Deduce an expression representing the Euler's equations for the motion of a rigid body.

दिशा के द्वारा दिया गया उत्तर:

(6)

UNIT - 3

- (a) Explain power absorption by a forced harmonic oscillator and half power points and also find the expression?

(5)

ç.kšnr vkorl nksy= ds fy; s 'kDr vo'ksk.k ,oa v) ZkDr fcUnyka dks i jHkk'kr dft, rFk 0; d 0; illu dft; A

- (b) Prove that band width per unit mass is equal to damping constant. (5)

fl) dft; sfd cSM plMbz qfr bdkbz n; eku ds Åoenu fu; rk dscjkj gkrh gA

OR vFok

- (a) What is Lissajous figure? (3)

fyLI ktwvkdfr; k D; k gA

- (b) Explain Lissajous figures when two mutually perpendicular simple harmonic oscillations of the frequency ration 1:1 and phase difference varying between 0 and π , superpose. (7)

I jy vkorl xfr; k ftudh vkorRr; k dk vuqkr 1% gS rFk dykkrj 0 Is π ds chp cnyrk gS ,d dsk ij vi; kjkir djrh gS dk ifj. keh foLkki u Kkr dft, A

UNIT - 4

- (a) Describe the principle and construction of cyclotron.

I kbDyVku ds fl)kr ,oa l jruk dks I e>k; A (5)

- (b) Deduce an expression for the energy acquired by the particle. Write its limitations?

bl ds }jk vkor'kr d.k dh qkr Åtklgrq0; atu 0; illu dft, A bl dh I hek; k gA (5)

OR vFok

- (a) An electron of energy 10ev is revolving in a circular path in a magnetic field 1×10^{-4} weber/m². Calculate : (i) speed of electron, (ii) radius of circular path and (iii) frequency of the electron ($m_e = 9.0 \times 10^{-31}$ kg).

10ev Åtkl dk ,d byDVku 1×10^{-4} osj/ ehVj² ds pfcdh; {k= ea oRrkdkj ekxZ ea pDdj yxk jgk gA

Kkr dft, & 1/2 byDVku dh pky 1/2 byDVku dh vkorRr 1/2 oRrkdkj ekxZ dh f=T; k (5)

- (b) A beam of electrons moves in magnetic field of intensity 2.0×10^{-3} weber/m² directed along y-axis, normal to it. The velocity of electron is 3.0×10^7 m/s along x-axis. What magnitude of electric field be simultaneously applied to keep the electron beam undeflected. (5)

2.0×10^{-3} osj/ ehVj² rhork ds y fn'k eafn'V pfcdh; {k= ea ml ds yEcor byDVku dk ,d ijt xfr djrk gA byDVku dk ox 3.0×10^7 m/s x fn'k eafn'V pfcdh; {k= dsgh I kfk fdruh rhork dk fo|t {k= fdI fn'k ea yxk; k tk; s fd byDVku ijt vius ekxZ I s vfopfyr jgA

UNIT - 5

- (a) What is Poisson's ration? Show that the theoretical value of Poison's ratio lies between -1 and 0.5(i.e. $-1 < \sigma < 0.5$).

ikbtu vuqkr Is vki D; k I r>rs gS fl) dft, fd ikbtu vuqkr dk I gkr dku -1 vkg 0.5 ds chp gkrk gS(i.e. $-1 < \sigma < 0.5$) (5)

- (b) Prove that $Y = 2\eta(1+\sigma)$ Or $\sigma = Y/2\eta - 1$.

fl) dft, Y = 2\eta(1+\sigma) Or \sigma = Y/2\eta - 1. (5)

OR vFok

- (a) State stoke's law for a body moving in a viscous medium. Show that the terminal speed of a ball falling in a viscous liquid is proportional to the square of its radius. (5)

fdI h ' ;ku rjy ea xfreku fi.M ds fy; s LVkd dk fu; e fyf[k, rFk fl) dft; sfd fdI h ' ;ku rjy ea fxjrh xlyh dh I hekkr ;k vLR; pky ml dh f=T; k ds oxZ ds I ekuikrh gkrh gA

- (b) What do you meant by the torsion in a cylinder? Obtain an expression for the torque required to twist a uniform solid cylinder and hollow cylinder.

fdI h cyu dh ,Bu n<rk Is D; k I e>rs gA ,d I e#i Bkd cyu rFk [kkys cyu dks ,Bu ds fy; s vko'; d cy vkrk ds fy; s 0; ad fuxfer dft; A (5)