Obtain the depression of a beam supported at its ends and loaded in the middle.

OR

'; kurk xqkkad dh ifjHkk"kk nhft, A nO ds /kkjkjs{kh; iokg ds fy, lokbtyh dk 0;atd 0;qiUu dhft, A

Define coefficient of viscosity. Derive Poiseuille's expression for the stream line flow of a liquid.

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Code No. : S-153

Annual Examination - 2019

B.Sc. Part - I

PHYSICS

Paper - I

MECHANICS, OSCILLATIONS AND PROPERTIES

OF MATTER

Max.Marks : 50

Time : 3 Hrs.   **Min.Marks : 17**

Vhi % [k.M ^v* eas I vfry?kiÛkjh izu gS ftUgsagy djuk vfuok; Zg A [k.M ^c* eas y?kiÛkjh ç'u ,oa [k.M ^I * eas nh?kZmÙkjh ç'u gS A [k.M ^v* dks I cl sigysgy dj A

Note : Section 'A', containing 10 very short-answer-type questions, is compulsory. Section 'B' consists of short-answer-type questions and Section 'C' consists of long-answer-type questions. Section 'A' has to be solved first.

Section - 'A'

fuEukfadr vfry?kiÛkjh ç'uka ds mÙkj ,d ;k nks okD;ka eans A

Answer the following very short-answer-type questions in one or two sentences.   **(1x10=10)**

ç'u 1- tMRoh; funZsk ra= dh rhu fo'kskrk,afyf[k,A

Write the three properties of Inertial frame of reference.

ç'u 2- dsyj dsxgh; xfr dsiFke fu;e dk xf.krh; :i fyf[k, rFkk crkb;sbl fu;e dksD;k dgrsgSN

Write the mathematical form of Kepler's first law and what is this law called?

ç'u 3- e[; tMRo vk?kwkZ rFkk e[; v{kka ea I cak fyf[k,A

Write the relation between principal moment of Inertia and Principal axes.

P.T.O.

ç'u 4- ,Bu ykksyd dsvkorZdky grqvko';d I# fyf[k,A ,Bu ykksyd fdls dgrsgSa

Write the expression for the time period of Torsional Pendulum. What do you mean by Torsional Pendulum?

ç'u 5- izkkfsnr nksfy= dsfo'kskkrk xqkkad dksifjHkkf"kr djrsgq vkSr xfrt ÅtkZdk 0;atd fyf[k,A

Define the quality factor of driven harmonic oscillator and write the expression for kinetic energy.

ç'u 6- fdl -fdl fLFkfr esfyl ktwvkdfr dk vkdkj nh?kZòÙkh; gksxk\

In which conditions shape of Lissajous figures will be elliptical?

ç'u 7- dSFkkM dju n'kh Zdh Ipkfgrk Isvki D;k le>rsgSa

What do you mean by the sensitivity of Cathode Ray Oscilloscope?

ç'u 8- I osx oj.kd Isvki D;k le>rsgSa

What do you mean by momentum selector?

ç'u 9- lokbtsyh dk I# fyf[k,A

Write Poiseuille's formula.

ç'u 10-rjy ds?kwokhZ rFkk v?kwokhZ iokg dksle>kb;A

Explain rotational and irrotational flow of fluid.

Section - 'B'

fuEukafdr y?kq mÙkjh; ç'uksa dsmÙkj 150&200 'kCn Ihek eana
Answer the following short-answer-type questions with word limit 150-200 (3x5=15)

ç'u 1- f}d.k fudk; dslekuhr n0;eku IsD;k rkRi;Z gSSnksfila I leL;k dk ,d fila I leL;k ealy?kqkdj.k fdl idkj fd;k tk I drk gSa

What do you understand by reduced mass? How can the two body problem be reduced to a single body problem?

OR

dksfj;ksfyl cy D;k gSa bl dsfy, 0;atd itkr dhft,A dksfj;ksfyl cy dk ,d mnkgj.k nhft,A

What is Coriolis force? Obtain an expression for it. Give one example of Coriolis force.

ç'u 2- foHko dwi D;k gksrk gSa foHko dwi ealLFkk;h ,oavLFkk;h Irqyu dh fLFkfr;ksaLi"V dhft,A

What is potential well? Explain the positions of stable and unstable equilibrium in a potential well.

OR

gYegksYVt vuqukn D;k gSa bl dsnksyuksadk vodyu Iehdj.k fyf[k, rFkk bl sgy djdsvkorZdky Kkr dhft,A

What is Helmholtz Resonator? Write the differential equation of oscillations and solve it for Time period.

ç'u 3- izkkfsnr nksfy= }kjk 'kfä vo'kkskk.k ,oavuqukn dh 0;k[;k dhft,A

Explain power absorption and resonance by a forced ascillator?

OR

voefnr vkoÙkhZnksfy= dsfy, Jkfdy ,oan{krkad dksle>kb;A fl) dhft, fd Jkfdy vf/kd gkusij nksfy= dk n{krkad Hkh vf/kd gksrk gSA

Explain the relaxation time and Quality factor for damped harmonic oscillator. Prove that for more relaxation time, the quality factor is more.

ç'u 4- fl) djksfd fdlh prqdh; {k= eatc ,d xfreku vkos'kr d.k] {k= dh fn'kk Isdksk θ cukrsgq inÀk djrk gSrksml dk ekxZdqMyuhor gksrk gSA bl ekxZdh fip dk I# LFkkfir dhft,A

Show that if a moving charged particle enters in a magnetic field at angle θ with its direction, its path is helical. Establish the expression for the pitch of this path.

OR

/ku vk;uksa dsfof'k"V vkosk q/m Kkr djus dh Fkkelu dh ijoy; fof/k dk o.kZu dhft,A

Describe the Thomson's parabolic method of determination of specific charge q/m of positive ions.

ç'u 5- nksukafljkaij vk/kkfjr rFkk chp ealHkkjfjr nMM dsvoueu dk I# fuxfer dhft,A

P.T.O.

ç'u 2- ,Bu ykyd dh lgk;rk lsrkj dsinkFkZdk n<rk xq<kd Kkr djus
grq0;ktd LFkkfir dhft,A

Deduce expression for finding the modulus of rigidity of material of wire with the help of a torsional pendulum.

OR

n0;eku foghu fLiax dsfljkaij tM+snksn0;ekukdh xfr dksle>kb;A
ljy vkoÙkZxfr grql ehdj.k rFkk vkoÙkZdky grq0;ktd idlr dhft,A

Explain the motion of two masses connected at the ends of massless spring. Obtain the equation for simple harmonic motion and The expression for time period.

ç'u 3- v/;kjksi.k dk fl)kar fyf[k,A a_1 rFkk a_2 vk;ke dh nks ljy vkoÙkZ
xfr;kj ftudh vkofÙk;kj leku $\left(=\dfrac{\omega}{2\pi}\right)$ gSl eku dyk eav/;kjksfir

gksrh gA n'kkb;sfd ifj.kkeh xfr (a_1+a_2) vk;ke rFkk $\left(\dfrac{\omega}{2\pi}\right)$ vkofÙk
dh ljy vkoÙkZxfr gksxhA

Write the principle of superposition. Two simple harmonic motions of

amplitudes a_1 and a_2 with same frequencies $\left(=\dfrac{\omega}{2\pi}\right)$ superpose in

same phase. Show that the resultant motion will be a simple harmonic

motion of frequency $\left(\dfrac{\omega}{2\pi}\right)$ and amplitude (a_1+a_2).

OR

nks leku vkofÙk dsL=karka ls idlr fyLltuvkdfr dh 0;k[;k xkQh;
fof/k ls dhft, tc dykarj $\dfrac{\pi}{2}$gksA

Explain Lissajous figure obtained from two sources of same frequency

by graphical method when phase difference is $\dfrac{\pi}{2}$.

ç'u 4- byDVVku xu D;k gS\ bldh dk;Zof/k dkso le>kb;A

What is an electron gun? Explain its working.

OR

,d leku pqacdh; {ks= esa vkof'kr d.k dh xfr dkso le>kb;A

Explain the motion of charged particle in a uniform magnetic field.

ç'u 5- ikblka dh fu"ifÙk Isa vki D;k le>rs gSa\ bldh Ihek,¡ fyf[k,A

fl) dhft, $\sigma = \dfrac{3K - 2\eta}{2\eta + 6K}$

What do you understand by Poission's theorem. Mention its limits Prove

that : $\sigma = \dfrac{3K - 2\eta}{2\eta + 6K}$

OR

nzo dsfdlh oØ i"B ij vfrfjDr nkc dk 0;atd fuxfer dhft,A

Deduce an expression for the excess pressure across a curved surface of a liquid.

Section - 'C'

fuEufdr nh?kZ mÙkjh; ç'uka ds mÙkj 300&350 'Kn Ihek eaa na

Answer the following long-answer-type questions with word limit 300-350   **(5x5=25)**

ç'u 1- dVnzh; cy ds vrxZr dSyj xgh; xfr ds iFke fu;e dh 0;qifr dhft,A

Derive Kepler's first law of planetary motion under central force.

OR

,d Bksl xksys ds vnj fdlh fcanq ij xq Roh; foHko dsfy, 0;atd fuxfer dhft,A

Deduce an expression for the gravitational potential at a point inside the solid sphere.