**ANNUAL EXAMINATION 2020**

**(Only for Regular Students)**

***Centre No. 135 Centre Name- Disha College, Raipur (C.G.)***

**Class-B.Sc.-II Subject- Mathematics**

**Paper No- III Paper Name- Mechanics**

**Time- 3 hrs. M.M.-50**

Note-Solve any two from each unit. All question carry equal marks.

Unit-I

Q1. ,d laf/kr prqHkqZt ds foijhr Hkqtkvksa ds e/; fcUnqvksa dks yEckbZ l vkSj l' ds gYds NM+ksa ls laca) fd;k x;k gSA ;fn bu NM+ksa esa ruko T vkSj T' gS rks fl) dhft, fd%

The middle points of opposite sides of a jointed quadrilateral are connected by light rods of length l and l'. If T and T' be the tensions in these rods, prove that-

Q2. lkekU; dSVujh dk dkrhZ; lehdj.k Kkr dhft,A

Find the Cartesian equation of the common catenary.

Q3. 3P, 7P rFkk 5P cy Øe'k% ,d leckgq f=Hkqt ABC dh rhu Hkqtkvksa AB, BC rFkk CA ds vuqfn'k fØ;k djrs gSA buds ifj.kkeh dk ifjek.k] fn'kk ,oa fØ;kjs[kk dk lehdj.k Kkr dhft,A

Forces equal to 3P, 7P, 5P act along the sides AB, BC and CA of an equilateral triangle ABC. Find the magnitude, direction and line of action of the resultant .

Unit-II

Q1. nks cy ,d js[kk y = 0, z = 0 ds vuqfn'k rFkk nwljh js[kk x = 0, z = c ds vuqfn'k yxrk gSA pwWafd cy cny jgs gS] rks n'kkZb, fd buds lerqY; ejksM+ ds v{k }kjk tfur i`"B (x2 + y2) z = cy2 gSA

Two forces act, one along the line y = 0, z = 0 and the other along the line x = 0, z = c. As the forces very, show that the surface generated by the central axis is (x2 + y2) z = cy2

Q2. lery lx + my + nz =1 dk 'kwU; fo{ksi fcUnq Kkr dhft,A

Find the null point of the plane lx + my + nz =1

Q3. fdlh fn;s x;s cy&fudk; ds dsUnzh; v{k dk lehdj.k Kkr dhft,A

Find the equation of the central axis of any given system of forces.

Unit-III

Q1. ,d d.k ,d ljy js[kk esa ljy vkorZ xfr ls xfreku gS tc ;g ,d foJkekoLFkk esa xfreku jgrk gSA rc mlds iFk esa e/; fcUnq ls rhu Øekxr lsd.M esa bldh pfyr nwfj;k¡ Øe'k% x1, x2, x3 gSA fl) dhft, fd bldk vkorZdky gSA

A particle is moving with S.H.M. and while making an excussion from position of rest to the other its distances from the middle point of its path at three consecutive seconds are x1, x2, x3. Prove that the time of a complete revolution is:

Q2. /kqzo dh vksj fn"V og cy Kkr dhft, ftlds varxZr oØ fufeZr fd;k tk ldsA

Find the force directed towards the pole under which the curve can be described.

Q3. ;fn ç{ksI; iFk ds fdlh ukfHkxr thok ds fljks ij osx v1 rFkk v2 gks rFkk u osx dk {kSfrt ?kVd gks rks fl) dhft, fd%

If v1 and v2 be the velocities at the ends of a focal chord of a projectiles path and u, the horizontal component of velocity, then show that.

Unit-IV

Q1. lw;Z dh ifjØek djus okys fdlh xzg dk egRre rFkk U;wure osx Øe'k% 30 vkSj 29-2 fdeh çfr lsd.M gSA mldh d{kk dh mRdsUnzrk Kkr dhft,A

The greatest and least velocities of a certain planet in its orbit round the sun are 30 and 29.2 km per second respectively. Find the eccentricity of its orbit.

Q2. ,d d.k ,d lery oØ cukrk gSA ;fn lEiw.kZ xfrdky esa Li'kZ js[kh; rFkk vfHkyac js[kh; Roj.k çR;sd vpj gks] rks fl) dhft, fd le; t esa xfr ds eqM+us dh fn'kk dk dks.k fuEufyf[kr lEcU/k }kjk fn;k tkrk gSA

A particle is describing a plane curve. If the tangential and normal acceleration are each constant throughout the motion, prove that angle which the direction of motion turns in time t is given by:

where A, B are constants.

Q3. ,d #{k pØt dk vk/kkj {kSfrt gS vkSj 'kh"kZ uhps gSA ,d d.k dLi ls foJke voLFkk ls çkjEHk dj uhps 'kh"kZ ij vkdj ;fn foJke voLFkk çkIr djrk gS rks fn[kkb;s fd

The base of a rough cycloidal arc is horizontal and its vertex downowrd. A bead slides along it starting from rest at the cusp and coming to rest at the vertex. Show that where is the coefficient of friction.

Unit-V

Q1. xksyh; /kzqoh; funsZ'kkdksa ds inksa esa fdlh d.k dk Roj.k Kkr dhft,A

Find the acceleration of a particle in terms of polar coordinates. (Spherical co-ordinates)

Q2. ,d xksykdkj cwWan ok"i esa fxjrs gq, la?kuu }kjk c dh vpj nj ls nzO;eku çkIr djrh gSA n'kkZb, fd fojke esa fxjrs gq, t le; ckn bldk osx gS] tgkWa M cwWan dk çkjafHkd nzO;eku gSA

A spherical drop of liquid falling freely in a vapour acqures mass by condensation at a constant rate c. Show that the velocity after falling from rest in time is

where M is the initial mass of the drop.

Q3. ,d d.k V osx ls ,d fpdus {kSfrt lery ij ,sls ek/;e esa ç{ksfir fd;k tkrk gS] ftldh çfr bdkbZ lagfr ij çfrjks/k K gSA n'kkZb, fd t le; ds i'pkr d.k dk osx v vkSj bl le; esa pyh xbZ nwjh s fuEukafdr ls nh tkrh gSA and

A particle is projected with velocity V along a smooth horizontal plane in a resisting medium resistance per unit mass is K. Show that the velocity v after a time t and the distance travelled s in that time are given by: and

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