GOVERNMENT DEGREE COLLEGE, PORUMAMILLA

DEPARTMENT OF PHYSICS

INTERNAL EVALUCTION

1. Internal exam – 10 marks
2. Seminar- 5 marks
3. Assignment – 5 marks
4. Attendance- 5 marks

Total- 25 marks

COURSE FILE

. Internal marks entry sheet

. Internal question paper and key

. Answer scripts

. Seminar record

. Assignment question paper and key

. Attendance

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YOGI VEMANA UNIVERSITY

KADAPA-516005

Semester- I Internal Awards for B.Sc Degree Examinations May-2022

College: **Govt. Degree College, Porumamilla** Strip No.: **32351**

Subject: **PHYSICS::MECHANICS WAVES AND OSCILLATIONS - 2RS16181** Max. Marks: **25**

S.No.	Roll Number	Internals 10 Marks	Seminars 5 Marks	Assignments 5 Marks	Attendence 5 Marks	Marks in Figures	Marks in Words
1	**216026050001**	10	5	5	4	**24**	TWENTY-FOUR
2	**216026050002**	10	5	5	4	**24**	TWENTY-FOUR
3	**216026050003**	10	5	5	4	**24**	TWENTY-FOUR
4	**216026050004**	10	5	5	4	**24**	TWENTY-FOUR
5	**216026050005**	10	5	5	4	**24**	TWENTY-FOUR
6	**216026050006**	9	5	5	4	**23**	TWENTY-THREE
7	**216026050007**	10	5	5	4	**24**	TWENTY-FOUR
8	**216026050008**	10	5	5	4	**24**	TWENTY-FOUR
9	**216026050009**	10	5	5	4	**24**	TWENTY-FOUR
10	**216026050010**	10	5	5	4	**24**	TWENTY-FOUR
11	**216026050011**	10	5	5	5	**25**	TWENTY-FIVE
12	**216026050012**	10	5	5	4	**24**	TWENTY-FOUR
13	**216026050013**	10	5	4	4	**23**	TWENTY-THREE
14	**216026050014**	10	5	5	4	**24**	TWENTY-FOUR
15	**216026050015**	10	5	5	4	**24**	TWENTY-FOUR
16	**216026050016**	10	4	5	4	**23**	TWENTY-THREE
17	**216026050017**	10	4	5	4	**23**	TWENTY-THREE
18	**216026050018**	9	5	4	5	**23**	TWENTY-THREE
19	**216026050019**	10	5	5	4	**24**	TWENTY-FOUR
20	**216026050020**	10	5	4	4	**23**	TWENTY-THREE
21	**216026050021**	10	5	5	4	**24**	TWENTY-FOUR
22	**216026050022**	10	5	4	5	**24**	TWENTY-FOUR
23	**216026050023**	10	5	4	5	**24**	TWENTY-FOUR
24	**216026050024**	10	5	5	5	**25**	TWENTY-FIVE
25	**216026050025**	9	5	4	4	**22**	TWENTY-TWO
Total Marks:						**594**	FIVE HUNDRED NINETY-FOUR

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29/04/2022

Verified By

Seal of the College

Govt. Degree College Porumamilla

Semester – 1

Physics paper-1 → Mechanics waves and oscillations

Hall ticked number:- 216026050018

1) Diffined sentral force and give exampules.

Central Force:-

A central force is defined as a force which always acts on a particle of body towards or away form a fixed point and whose magnitude depends upon only on the distence form the fixed the of point.

Examples of central forces:-

The gravitational force of attraction between two masses: The gravitational force exerted on a particle by another particle which is stationary in an inertial frame exerted on a particle by an of reference is a central force. Consider the gravitational attraction force between two stationary masses M_1 and M_2 separated at a distence r. The force experienced by first particle due to the second partical can be written as

$$F_{12} = G_1 \frac{m_1 m_2}{r^2} \hat{r}$$

Negative sigh indicates that force is attractive.

But $F = f(r)\hat{r}$

$$f(r) = G_1 \frac{m_1 m_2}{r^2} - \frac{C}{r^2}$$

$\therefore$

$$C = -G_1 m_1 m_2$$

where

$$f(r) \propto \frac{1}{r^2}$$

or

The earth moves around the sum under a central force which is always directed towards the sun.

* The electrostatic force between two charges: The electrostatic force exerted on a charged particle by another stationary charged particle is central force. The electrostatic force between two charges q_1 and q_2 separated at a distance r is given by

$$F_{12} = \frac{1}{4\pi\epsilon_0} \cdot \frac{q_1 q_2}{r^2} \cdot \hat{r}$$

$$\therefore F = f(r)\vec{r}$$

$$f(r) = \frac{1}{4\pi\epsilon_0} \cdot \frac{q_1 q_2}{r^2}$$

$$f(r) = \frac{c}{r^2} \text{ or } \frac{1}{r^2} \qquad \therefore c = \frac{1}{4\pi\epsilon_0} q_1 q_2$$

The electrostatic force of electron is hydrogen atom moves under a central force which is always directed towards the nucleus.

* The elastic force acting on a mass suspended from a spring:- A particle attached to one end of spring whose other end is stationary in an inertial frame of reference is also an example of central force. In this case, the elastic force acting on the mass is expressed as $F = -kx$

where x is the distance of a mass from the unstretched position of the spring and k is spring constant. The spring always pulls towards the fixed end or pushes away from it.

2 Derived Einstein's mass energy reaction?

A, According to classical mechanics, the energy is difined in terms of work (force x distance) and the force is the rate of change of momentum, hence

$$F = \frac{d}{dt}(mv) \quad \text{---} \quad (1)$$

According to theory of relativity, the mass as well as velocity are variables thus

$$F = m\frac{dv}{dt} + v\frac{dm}{dt} \quad \text{---} \quad (2)$$

when a particle is displaced through a distance dx by the application of a force F then the increase in kinetic energy dk is given by

$$dk = F\,dx. \quad \text{---} \quad (3)$$

Substituting the value of f from eq (2) in eq (3) we get.

$$dk = m\frac{dv}{dt}\cdot dx + v\frac{dm}{dt}\cdot dx \quad \text{---} \quad (4)$$

$$dk = mv\,dv + v^2\,dm \quad \because \frac{dx}{dt} = v$$

The variation of mass with velocity is given by

$$m = \frac{m_0}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$$

Squaring both sides we have

$$m^2 = \frac{m_0^2 c^2}{c^2 - v^2}$$

$$m^2c^2 - m^2v^2 = m_0^2c^2$$

Differentiation this equation, we get

$$c^2 2m\,dm - v^2 2m\,dm - m^2 2v\,dv = 0$$

$$c^2\,dm - v^2\,dm - mv\,dv = 0$$

$$c^2\,dm = mv\,dv + v^2\,dm$$

Comparing equation (4) an (5) we get ∴ mo and c are constant

$$c^2 2m\,dm - v^2 2m\,dm - m^2 2v\,dv = 0$$

$$c^2\,dm - v^2\,dm - mv\,dv = 0$$

$$c^2\,dm = mv\,dv + v^2\,dm \quad \text{— (5)}$$

Differentiating the (4) and (5)

$$dk = c^2\,dm \quad \text{— (6)}$$

Now consider that the body is at rest initially and by the application of force in acquires a velocity v. The mass of body increases from mo to m. The total kinetic

$$\int dk = \int_{mo}^{m} c^2\,dm$$

$$k = c^2(m - mo) \quad \text{— (7)}$$

This is the increase in kinetic energy due to the increase in mass in mass. we know that the energy of a moving particle is the sum of its kinetic energy of motion and the energy at rest thus,

Total energy. $E = k + mo c^2$

$$E = c^2(m - mo) + mo c^2$$

$$E = mc^2 \quad \text{— (8)}$$

This eq(8) is gives the universal equivalence between mass and energy.