



Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL,
2017

2018-19
EXM/P/09/00

F. Y. B. Sc.

School of Science

Physics

PHS 101

Physics I

Semester – I

End Semester Examination

Time: 30 Min Max Marks: 20

Mandya 28 Nov 18

10:00 to 10:30 am

Seat No.

PRN No.

Student Sign.

Invigilator Sign.

Examiner Sign.

Marks Obtained

Instructions: 1) All Questions are compulsory.

2) Mark \checkmark to the correct option. Do not circle.

3) More than one options marked will not be considered for assessment.

4) Rough calculations on paper are not allowed.

5) Use non-programmable calculator is allowed.

Q.1	A) Select correct alternative	Marks	Bloom's Level	CO
i)	A liquid wets a solid surface if the angle of contact between them is _____. a) A right angle b) an acute angle c) an obtuse angle d) none of these	01	L1	101.4
ii)	If radius of the spherical shell is doubled then its moment of inertia becomes _____ times of its original value. a) Two b) four c) half d) one fourth	01	L2	101.2
iii)	When two vectors are perpendicular, their _____. a) Dot product is zero b) Cross product is zero c) Both are zero d) Both are not necessarily zero	01	L1	101.1
iv)	In critically damped motion when $\mu^2 = \omega^2$, the damping force between them is _____. a) restoring force b) dissipative force c) opposing force d) decreasing force	01	L1	101.3
v)	Gravitational potential is essentially a _____ quantity and	01	L1	101.3

- its maximum value is _____ at infinity.
- a) Positive, infinity b) positive, zero
c) negative, zero d) negative, infinity
- vi) The gravitational field intensity at a point inside the spherical shell is given by _____. 01 L1 101.3
- a) $\frac{Gm}{r^2}$ b) $\frac{Gm}{a^2}$ c) Zero d) one
- vii) In Physics, a radian per second is a unit of _____. 01 L1 101.2
- a) angular displacement b) angular velocity
c) angular acceleration d) angular momentum
- viii) Identify the correct vector identity. 01 L1 101.1
- a) $i \cdot j = j \cdot j = k \cdot k = 0$ b) $i \times j = j \times k = k \times i = 1$
c) $i \cdot j = j \cdot k = k \cdot i = 1$ d) $i \cdot i = j \cdot j = k \cdot k = 1$
- ix) A differential equation is considered to be ordinary if it has _____. 01 L1 101.1
- a) one dependent variable
b) more than one dependent variable
c) one independent variable
d) both a and c
- x) The Young's modulus Y , the modulus of rigidity η and Poisson's ratio σ for a material are related by the expression _____. 01 L1 101.4
- a) $Y = 2\eta(1 + \sigma)$ b) $Y = 2\eta(1 - \sigma)$
c) $Y = \eta(1 - \sigma)$ d) $Y = \eta(1 + \sigma)$
- B) Fill in the blanks**
- i) Viscosity of a fluid _____ relative motion between its adjacent layers. 01 L1 101.4
- ii) If there is no external force acting on a system of particles, the _____ of the system is conserved. 01 L1 101.2
- iii) As distance increases, value of gravitational field strength 01 L1 101.3

- _____.
- | | | | | |
|-----|--|----|----|-------|
| iv) | The _____ of a differential equation is the highest power of the highest order differential coefficient appearing in it. | 01 | L1 | 101.1 |
| v) | The moment of inertia of a solid cylinder about its own axis of symmetry is _____. | 01 | L1 | 101.3 |
- C) State True or False**
- | | | | | |
|------|--|----|----|-------|
| i) | The quantity aK^2 is called flexural rigidity. _____ | 01 | L1 | 101.4 |
| ii) | A rocket will gain a mass in its flight. _____ | 01 | L1 | 101.2 |
| iii) | If $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$ then the angle between A and B is π .
_____ | 01 | L1 | 101.1 |
| iv) | The quantity which has the only magnitude is called vector quantity. _____ | 01 | L1 | 101.1 |
| v) | The gravitational force of attraction between two bodies separated by a distance r is proportional to $1/r^2$.
_____ | 01 | L1 | 101.3 |



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PHS101

School of Science
Physics I

Physics
Semester – I

End Semester Examination

Time: 2.5 hr. Max Marks: 80

Mandy 28 Nov 18

Instructions:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of logarithmic table and calculator are allowed.

10:30 am to 1:00 pm

Q.2	Answer the following questions	Marks	Blooms Level	CO
a)	Explain the system of particles and the law of conservation of angular momentum for the system of particles.	12	L3	101.2
b)	Derive an expression for the moment of inertia of solid cylinder about its own axis of symmetry.	4	L3	101.2

OR

b)	Explain the following terms i) Angular acceleration ii) Torque	4	L2	101.2
Q.3	Answer the following questions	Marks		CO
a)	Derive the relation between surface tension, excess pressure and radius of curvature and show that excess pressure inside a liquid drop is $2T/r$.	12	L3	101.4
b)	Obtain the equation of continuity for a steady fluid flow.	4	L3	101.4

OR

b)	A bar 80 cm long, having breadth and depth 0.5 cm each is supported horizontally at its ends. The depression produced at the middle by a load of 200 gm is 2 mm. Calculate Young's modulus of the material of the bar.	4	L3	101.4
Q.4	Answer the following questions	Marks		CO
a)	Derive an expression for gravitational field and gravitational potential at a point inside the spherical shell.	12	L3	101.3
b)	i) A sphere of mass 40 kg is attracted by a second sphere of mass 80 kg with a force equal to the weight of $\frac{1}{4}$ milligram. If their centers are 30 cm apart, calculate the constant of	8	L3	101.3

gravitation if $g = 9.81 \text{ m/s}^2$.

ii) A thin spherical shell has radius 1 m. Its surface density is 0.25 kg/m^2 . Calculate the gravitational potential and field at a point outside the shell at distance 1 m from its surface, if $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$.

OR

Q.5	b) Explain forced vibratory motion of body. Obtain the differential equation of forced vibratory motion. Hence obtain expressions for the amplitude of the wave.	8	L3	101.3
	c) Explain the Kepler's law planetary motion.	4	L2	101.3
	Answer the following questions	Marks		CO

- | | | | | |
|----|---|----|----|-------|
| a) | i) Solve first order homogeneous differential equation
$(x^2 + y^2)dx - 2xydy = 0$ | 12 | L3 | 101.1 |
| | ii) Find the second order differential equation | | | |

$$x \frac{d^2 y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$$

- | | | | | |
|----|--|---|----|-------|
| b) | Explain the law of addition of vector algebra. | 8 | L3 | 101.1 |
|----|--|---|----|-------|

OR

- | | | | | |
|----|--|---|----|-------|
| b) | i) Find the scalar triple product of $A = 2i - 3j + k$, $B = 3i + j + 2k$ and $C = i + 4j - 2k$ | 8 | L2 | 101.1 |
| | ii) Determine the order and degree of following differential equations | | | |

A. $y = x \frac{dy}{dx} + 5 \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$

B. $y \frac{dy}{dx} = x \left(\frac{dy}{dx}\right)^2 + 4$

C. $y = x \frac{dy}{dx} - 2 \sqrt{1 + \left(\frac{dy}{dx}\right)^4}$

D. $\left(\frac{d^2 y}{dx^2}\right) + \cos\left(\frac{dy}{dx}\right) = 0$

- | | | | | |
|----|--|---|----|-------|
| c) | Evaluate i) $(i - 2j) \times (2i - k)$ ii) $(i + j + k) \times (2i - j - k)$ | 4 | L2 | 101.1 |
|----|--|---|----|-------|