SGU

Sanjay Ghodawat University, Kolhapur
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2019-20
EXM/P/09/00

F. Y. B. Sc.	School of Science	Physics
PHS 101	Physics I	Semester – I
	End Semester Examination	Max Marks: 20

Time ½ Hrs 10·30 to 11·00 ar

Seat No.

Monday 02-12-2019

PRN No.

Student Sign.

Invigilator Sign.

Examiner Sign.

Marks Obtained

section-A

Instructions:
1) All Questions are compulsory.
2) Mark √ 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.

			Marks	BL	CO
Q.1		**Select correct alternative**			
i)	The quantity Yak^2 is called ----------------.		01	L1	CO4
	a) geometrical moment of inertia	b) flexural rigidity			
	c) bending moment	d) beam of bending			
ii)	A liquid wets a solid surface if the angle of contact between them is -----------------.		01	L1	CO4
	a) a right angle	b) an acute angle			
	c) an obtuse angle	d) a parallel angle			
iii)	If v is velocity of a fluid through a pipe of cross-sectional area A, then which of the following relation is correct?		01	L1	CO4
	a) $v \propto A$ b) $v \propto A^2$ c) $v \propto \frac{1}{A}$ d) $v \propto \frac{1}{A^2}$				
iv)	The dimensions of angular velocity are given by ------------.		01	L1	CO2
	a) $[L^0M^0T^{-1}]$ b) $[L^0M^1T^{-1}]$ c) $[L^0M^0T^{-1}]$ d) $[L^1M^0T^{-1}]$				
v)	Rocket motion is based on law of conservation of ------------.		01	L1	CO2
	a) energy	b) linear momentum			
	c) torque	d) angular momentum			
vi)	If no external ----------------- acts on a particle, its linear momentum is conserved.		01	L1	CO2
	a) force b) velocity c) acceleration d) torque				
vii)	The gravitational force of attraction between two bodies		01	L1	CO3

separated by a distance r is proportional to ---------------.

a) r^2 b) $\frac{1}{r^2}$ c) r d) r^3

viii) The gravitational field at any point in the interior of the shell, due to the shell, is ---------------. 01 L1 CO3

a) maximum b) minimum c) zero d) one

ix) In critically damped motion, the damping force is -------------- the restoring force. 01 L1 CO3

a) less than b) greater than

c) equal to d) independent on

x) Gravitational field intensity at a point outside the spherical shell is given by ----------------. 01 L1 CO3

a) $\frac{Gm}{r^2}$ b) $\frac{Gm}{a^2}$ c) Zero d) one

xi) The oscillatory motion of a body under the action of an externally applied periodic force is called ----------. 01 L1 CO3

a) damped oscillatory motion b) free oscillatory motion

c) forced oscillatory motion d) over damped oscillatory motion

xii) Kepler's third law states that $T^2 \propto$ ----------------. 01 L1 CO3

a) a^3 b) a c) a^2 d) a^4

xiii) Gravitational potential at a point inside a spherical shell is equal to the value of the potential on the -------------- of the shell. 01 L1 CO3

a) surface b) center c) mid-point of any radius d) outside

xiv) A frame of the reference is either at rest or moving with a uniform velocity is known as ----------------------. 01 L1 CO1

a) relative b) non-inertial c) inertial d) accelerating

xv) An ordinary differential equation contains ----------- dependent variable and ---------- independent variable. 01 L1 CO1

a) one, one b) one, more than two

c) one, zero d) zero, one

xvi) According to Newton's second law, the time rate of change of ------------of a particle is proportional to the external force and 01 L1 CO1

is in the direction of force.

a) velocity   b) displacement

c) acceleration   d) momentum

xvii) The ---------------- of a differential equation is highest power of the highest order differential coefficient occurring in it.   01   L1   CO1

a) order   b) degree   c) power   d) linearity

xviii) If the three vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ are coplanar then their scalar triple product is ------------------.   01   L1   CO1

a) zero   b) one   c) infinity   d) two

xix) If $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$ then the angle between A and B is ---------.   01   L1   CO1

a) 90°   b) 0°   c) 45°   d) 180°

xx) The magnitude of the vector product is numerically equal to the area of ------------------- whose adjacent sides are represented by two vectors.   01   L1   CO1

a) circle   b) hyperbola   c) parallelogram   d) ellipse

F. Y. B. Sc.	School of Science	Physics
PHS 101	Physics I	Semester – I
monday 02/12/2019	End Semester Examination Section- B	Max Marks : 80 Time - 2.5 Hrs. 11.00 am to 1.30 pm

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.

Q.2		Answer the following questions	Marks	BL	CO
	a)	Obtain the relation between excess pressure, surface tension and radius of curvature for a curved liquid surface.	08	L2	CO4

OR

| | a) | Derive an expression for the depression of the free end of a cantilever due to a load. | 08 | L2 | CO4 |
| | b) | Explain Young's modulus and Bulk modulus for an isotropic solid. | 04 | L1 | CO4 |

Q.3		Answer the following questions	Marks	BL	CO
	a)	Explain the law of conservation of linear momentum for a system of particles.	08	L2	CO2
	b)	Obtain the moment of inertia of a solid cylinder about its own axis of symmetry.	04	L2	CO2

OR

| | b) | Define the terms: <br> i) Torque   ii) Moment of inertia <br> iii) Angular momentum   iv) Angular displacement | 04 | L2 | CO2 |

Q.4		Answer the following questions	Marks	BL	CO
	a)	Obtain an expression for the gravitational field and potential at a point inside and outside the spherical shell.	16	L2	CO3
	b)	What is simple harmonic motion? Obtain the velocity of simple harmonic motion at a distance x from the mean position.	08	L3	CO3

OR

ESE

b) i) A sphere of mass 60 kg is attracted by a second sphere of mass 90 kg with a force equal to the weight of 1/3 miligram. If their centers are 20 cm apart, calculate the constant of gravitation if g = 9.81 m/s².   08   L3   CO3

ii) Calculate the period of revolution of Venus round the sun, if its mean distance from the sun is 0.72 astronomical unit.

c) Explain Kepler's laws of planetary motion.   04   L2   CO3

Q.5   **Answer the following questions**   **Marks**   **BL**   **CO**

a) i) Explain the law of addition of vectors.   16   L3   CO1

ii) Prove that $\vec{A}.\vec{B} = A_xB_x+A_yB_y+A_zB_z$ and

$$\vec{A} \times \vec{B} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{vmatrix}$$

OR

a) i) Solve $\dfrac{dy}{dx} = \dfrac{(x^2-1)(y+2)}{(y^2-1)(x+2)}$ 16   L3   CO1

ii) Solve $(1 + x^2)dy = (1 + y^2)dx$

iii) Solve homogenous equation $\dfrac{dy}{dx} = \dfrac{y^2}{xy+x^2}$

b) i) Find the scalar triple product of $\vec{A} = 5\vec{i}+3\vec{j}+2\vec{k}$,   8   L3   CO1
$\vec{B} = \vec{i}+7\vec{j}-4\vec{k}$ and $\vec{C} = 4\vec{i}-2\vec{j}+2\vec{k}$

ii) Find the vector triple product of $\vec{A} = 4\vec{i}+5\vec{j}-2\vec{k}$,
$\vec{B} = \vec{i}+2\vec{j}+4\vec{k}$ and $\vec{C} = 2\vec{i}+\vec{j}-7\vec{k}$

c) Determine the order and degree of differential equation   4   L2   CO1

1. $\dfrac{d^2y}{dx^2}=0$

2. $y = x\dfrac{dy}{dx} + \dfrac{a}{\frac{dy}{dx}}$

3. $\dfrac{d^2y}{dx^2} + m^2y = 0$

4. $y\dfrac{d^2y}{dx^2} - \left(\dfrac{dy}{dx}\right)^2 = y^2logy$

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