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AW-1621

# B.Sc. (Part-I) Semester-I Examination

#### 1S: PHYSICS

# (Mechanics, Properties of Matter Waves and Oscillation)

lin	ne : I	hree Hours]	1	Maximum Marks : 80			
No	te :-	<ol> <li>All questions are compulsory.</li> </ol>					
		(2) Draw neat diagrams wherever nec	essary.				
1.	(a)	Fill in the blanks :	· · · · · · · · · · · · · · · · · · ·				
		(i) The acceleration due to gravity at	the poles is .				
		(ii) The fundamental frequency is also					
		(iii) Coefficient of viscosity wit		re			
	(b)	(iv) Young's modulus of elasticity is related with change in  Choose correct answer:					
	(0)	(i) The angle of contact of water with glass is					
		(a) 90°	(b) 0°				
		(c) Less than 90°	(d) Greater than 90	0			
		(ii) Kepler's second law of planetary r					
		(a) Elliptical orbit	(b) Period				
		(c) Areal velocity	(d) Volume				
		(iii) The moment of linear momentum					
		(a) Couple	(b) Torque				
		(c) Impulse	(d) Angular momen	-			
		(iv) In compound pendulum, centre of	_				
		(a) Interchangeable	(b) Not Interchange				
		(c) At equal distance from C.G.	(d) None of the abo	ove 2			
	(c)	Answer in one sentence :					
		(i) What is cantilever ?					
		(ii) Define streamline flow.					
		(iii) Define cohesive force.					
		<ul><li>(iv) Define moment of inertia.</li></ul>		4			
		HER					
2.	(a)	) Define acceleration due to gravity. Explain variation of 'g' with :					
		(i) Height	(ii) Depth	6			
		State and prove Gauss's Theorem.		4			
	(c)	Define :					
		(i) Gravitational field	(ii) Gravitational po	otential 2			
	OR						
3.	(p)	) Derive an expression for gravitational potential due to spherical shell at a point outsid					
		the shell.		6			
	(q)	State and prove Kepler's Third law of	planetary motion.	6			
	EIT	HER					
4.	(a)	State and prove theorem of parallel axe	es, for moment of Inerti	a. 5			
	(b)	A uniform rod of length 'L' and mass 'm' rotates about an axis passing through one of					
		its ends. Calculate moment of inertia a		4			
	(c)	e) If a disc has mass 5kg and radius 0.5m, calculate M.I. of a disc about a tangen					
	-	perpendicular to its plane.					

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	UK		
5.	(p)	State and prove law of conservation of angular momentum.	4
	(q)	Derive an expression for M.I. of circular disc about an axis passing through its cent	er
		and perpendicular to its plane.	5
	(r)	Calculate M.I. of a disc of mass 1 kg and radius 10cm about an axis passing throug	gh
		its center and perpendicular to its plane.	3
		HER	
6.	(a)	What is compound pendulum? Obtain an expression for the periodic time of compound	nd
	41.5	pendulum.	6
	(b)		4
	(c)	A mass of 50 gm is attached to a spring having spring constant 0.2. Determine tin	ne
	on	period of oscillation.	2
-	OR	Defends and a STIM about the eithering of her mount in writers are	:-
7.	(p)	Define the angular S.H.M. show that the vibration of bar magnet in uniform magnet	ıc
	(-)	field is angular S.H.M.	0
	(q)	Solve the differential equation of damped harmonic motion and show that velocity	OI A
	(-)	particle decreases exponentially.	2
		What are bifilar oscillations ?	2
0			-
8.	(a)	Find the resultant displacement for the superposition of two mutually perpendicul S.H.M's of same period.	6
	(b)	What is piezoelectric effect? Explain the production of ultrasonic waves of piezoelectric	ic
	(0)	oscillation.	6
	OR		U
9.	(p)	Describe construction and working of Kundt's tube.	4
7.	(p)	Derive Newton's formula for velocity of sound in medium.	5
	(r)	State applications of Ultrasonic wave.	3
		HER	_
10		Find the expression for twisting couple per unit twist for cylindrical wire.	6
10.		Explain how modulus of rigidity of wire can be determined by Maxwell Needle.	
	OR		-
11.	(p)	What are torsional oscillations? Derive an expression for the periodic time of torsion	nal
	11	pendulum.	6
	(a)	Derive an expression for depression at the loaded end of light beam clamped horizonta	lly
		at the other end.	6
	EIT	THER	
12.	(a)	State and prove Bernoulli's theorem.	6
	(b)	State and prove Stoke's law.	4
	(c)	What is the significance of Reynold's number ?	2
	OR		
13.	(p)	Explain Jaeger's method to determine surface tension of a liquid.	6
	(q)	Explain:	
		(i) Streamline flow	
		(ii) Turbulent flow.	4
	(r)	What is surface tension? Give its unit and dimensions.	2



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(h)	(iv) Young's modulus of elasticity is related with change in  Choose correct answer:					
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	(.)	(a) 90°	(b)			
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		(c) Areal velocity		Volume		
	(:::)	The moment of linear momentum i				
	(111)			-		
		(a) Couple		Torque		
	(:)	(c) Impulse		Angular momentum		
	(IV)	In compound pendulum, centre of	-			
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(c)		wer in one sentence :				
	4 .	What is cantilever?				
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	its ends. Calculate moment of inertia about this axis.					
(c)	If a disc has mass 5kg and radius 0.5m, calculate M.I. of a disc about				angent	
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		Define linear S.H.M. and obtain differential equation of S.H.M.	*
	(c)	A mass of 50 gm is attached to a spring having spring constant 0.2. Determine tin period of oscillation.	2
	OR		
7.	(p)	Define the angular S.H.M. show that the vibration of bar magnet in uniform magnet field is angular S.H.M.	ic 6
	(q)	Solve the differential equation of damped harmonic motion and show that velocity	of
		particle decreases exponentially.	4
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8.	(a)	Find the resultant displacement for the superposition of two mutually perpendicul	аг
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