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No.	of P	rinte	d Pa	iges	: 4

பதிவு எண் Register Number
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## PART - III

இயற்பியல் / PHYSICS (ஆங்கில வழி / Tamil & English Version )

Time Allowed : 3.00 Hours ]									mum Marks	: 70	
Instructions :		(1)	Check the question paper for fairness of printing. If there fairness, inform the Hall Supervisor immediately.						lack of		
			(2)	Use <b>BI</b>	ue or Black in	ık to wri	te and underli	ne and	pencil to draw	diagrams.	
					ı	PART -	I				
Note	:	(i) (ii)	Choose	e the m	e questions. lost appropriat nd the corresp		er from the giv answer.	en <b>fo</b> ui	r alternatives a	<b>15x1=15</b> and write the	
1.	If $\pi = 3$	3.14, th	en the	value o	of $\pi^2$ is						
	(a)	9.8596	<b>5</b>	(b)	9.860	(c)	9.86	(d)	9.9		
2.	If the f	orce is	proport	ional to	square of vel	ocity, th	en the dimens	sion of <sub> </sub>	oroportionality	constant is	
	(a)	[MLT <sup>o</sup> ]	]	(b)	[MLT <sup>-1</sup> ]	(c)	[ML <sup>-2</sup> T]	(d)	[ML <sup>-1</sup> T <sup>0</sup> ]		
3.	10 is e	qual to		radia	an.						
	(a)	1.744 x 10 <sup>-2</sup>		rad		(b)	1.744 x 10 <sup>2</sup> r	rad			
	(c)	1.44 x	10 <sup>-2</sup> ra	d	XU	(d)	1.44 x 10 <sup>2</sup> rad				
4.	If one of	object is	s dropp	ed verti	cally downwar	d and a	nother object i	s throw	n horizontally	from the same	
	height, then the ratio of vertical distance covered by both objects at any instant t is										
	(a)	1		(b)	2	(c)	4	(d)	0.5		
5. An object is dropped in an unknown planet from height 50 m, it reaches the ground								ground in 2 s.			
	The ac	celerati	ion due	to grav	ity in this unk	nown pl	anet is				
	(a)	g = 20	m s <sup>-2</sup>	(b)	$g = 25 \text{ m s}^{-2}$	(c)	g = 15 m s <sup>-2</sup>	(d)	$g = 30 \text{ m s}^{-2}$		
6.	Two m	nasses	m <sub>1</sub> an	d m <sub>2</sub> a	are experienci	ing the	same force v	where	$m_1 < m_2$ . The	ratio of their	
	acceleration $\frac{a_1}{a_2}$ is										
	(a)	1				(b)	less than 1				
	(c)	greate	r than 1	L		(d)	all the three c	ases			
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(a)

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An object of mass m begins to move on the plane inclined at an angle $\theta$ . The coefficient of static												
friction of inclined surface is $\mu_s$ . The maximum static friction experienced by the mass is												
(a)	mg	(b)	$\mu_{\text{s}}\text{mg}$	(c)	$\mu_s mg  sin\theta$	(d)	$\mu_s$ mg cos	sθ				
The p	The potential energy of a system increases, if work is done											
(a)	by the syst	em agair	nst a conser	vative for	ce							
(b)	by the syst	em agair	nst a non-co	nservative	e force							
(c)	(c) upon the system by a conservative force											
(d)	(d) upon the system by a non-conservative force											
Two	Two equal masses $m_1$ and $m_2$ are moving along the same straight line with velocities 5 ms <sup>-1</sup> and											
-9 m	-9 ms <sup>-1</sup> respectively. If the collision is elastic, then calculate the velocities after the collision of											
m <sub>1</sub> aı	nd m <sub>2</sub> , respe	ctively										
(a)	-4 ms <sup>-1</sup> an	d 10 ms	1	(b)	10 ms <sup>-1</sup> and	d 0 ms <sup>-1</sup>						
(c)	-9 ms <sup>-1</sup> and	d 5 ms <sup>-1</sup>		(d)	5 ms <sup>-1</sup> and	1 ms <sup>-1</sup>						
A cou	iple produce:	S,										
(a)	pure rotati	on		(b)	pure transla	ation						
(c)	rotation ar	nd transla	ation	(d)	no motion							
The s	The speed of a solid sphere after rolling down from rest without sliding on an inclined plane of											
vertical height h is,												
(a)	$\sqrt{\frac{4}{3}gh}$	(b)	$\sqrt{\frac{10}{7}}$ gh	(c)	$\sqrt{2gh}$	(d)	$\sqrt{\frac{1}{2}gh}$					
The time period of a satellite orbiting Earth in a circular orbit is independent of												
(a)	Radius of t	the orbit	A'(	(b)	The mass o	f the sat	ellite					
(c)	(c) Both the mass and radius of the orbit											
(d)	(d) Neither the mass nor the radius of its orbit											
The kinetic energy of the satellite orbiting around the Earth is												
(a)	equal to po	otential e	nergy	(b)	less than potential energy							
(c)	greater tha	an kinetic	energy	(d)	zero							
If the external torque acting on the body is zero, the component of angular momentum along the												
axis of rotation is												
(a)	zero	(b)	constant	(c)	1	(d)	1/2					
The r	elation betw	een mor	mentum an	d kinetic	energy is							
	An obterior (a) The property (b) (c) (d) Two obterior (a) (c) A cout (a) (c) The structure (a) The tructure (a) The tructure (a) (c) (d) The key (a) (f) The key (a) (g)	An object of mass friction of inclined (a) mg  The potential ene (a) by the system (b) by the system (c) upon the system (d) upon the system (e) upon the system (for inclined (for inc	An object of mass m begin friction of inclined surface (a) mg (b). The potential energy of a set (a) by the system again (b) by the system again (c) upon the system by (d) upon the system by (d) upon the system by Two equal masses $m_1$ and $-9$ ms <sup>-1</sup> respectively. If the $m_1$ and $m_2$ , respectively (a) $-4$ ms <sup>-1</sup> and 10 ms (c) $-9$ ms <sup>-1</sup> and $5$ ms <sup>-1</sup> . A couple produces, (a) pure rotation (c) rotation and translation (c) rotation and translation $m_1$ and $m_2$ are rotation (d) Radius of the orbit (e) Both the mass and (f) Neither the mass in the kinetic energy of the set (a) equal to potential energy of rotation is (b) zero (b)	An object of mass m begins to move friction of inclined surface is $\mu_s$ . The mass m begins to move friction of inclined surface is $\mu_s$ . The mass mass mass mass mass mass mass mas	An object of mass m begins to move on the plat friction of inclined surface is $\mu_s$ . The maximum set (a) mg (b) $\mu_s$ mg (c)  The potential energy of a system increases, if we (a) by the system against a conservative form (b) by the system against a non-conservative (c) upon the system by a conservative force (d) upon the system by a non-conservative force (d) -9 ms <sup>-1</sup> respectively. If the collision is elastic, m <sub>1</sub> and m <sub>2</sub> , respectively (a) -4 ms <sup>-1</sup> and 10 ms <sup>-1</sup> (b) (c) -9 ms <sup>-1</sup> and 5 ms <sup>-1</sup> (d) A couple produces, (a) pure rotation (b) (c) rotation and translation (d) The speed of a solid sphere after rolling down vertical height h is, (a) $\sqrt{\frac{4}{3}}$ gh (b) $\sqrt{\frac{10}{7}}$ gh (c) The time period of a satellite orbiting Earth in a (a) Radius of the orbit (b) (c) Both the mass and radius of the orbit (d) Neither the mass nor the radius of its orbit (d) Neither the mass nor the radius of its orbit (d) Neither the mass nor the radius of its orbit (d) Neither the mass nor the radius of its orbit (d) Neither the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Neither the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor the radius of its orbit (d) Return the mass nor	An object of mass m begins to move on the plane inclined a friction of inclined surface is $\mu_s$ . The maximum static friction of a mg (b) $\mu_s$ mg (c) $\mu_s$ mg sine. The potential energy of a system increases, if work is done (a) by the system against a conservative force (b) by the system against a non-conservative force (c) upon the system by a conservative force (d) upon the system by a non-conservative force. Two equal masses $m_1$ and $m_2$ are moving along the same single ms. Frespectively. If the collision is elastic, then calculate $m_1$ and $m_2$ , respectively. If the collision is elastic, then calculate $m_1$ and $m_2$ , respectively. If the collision is elastic, then calculate $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ , respectively. If $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_2$ and $m_3$ are moving along the same single ms. In $m_1$ and $m_2$ are moving along the same single ms. In $m_2$ and $m_3$ are moving along the same single ms. In $m_3$ and $m_4$ are moving along the same single ms. In $m_4$ and $m_4$ are moving along the same single ms. In $m_4$ and $m_4$ are moving along the same single ms. In $m_4$ and $m_4$ are moving along the	An object of mass m begins to move on the plane inclined at an ang friction of inclined surface is $\mu_s$ . The maximum static friction experient (a) mg (b) $\mu_s$ mg (c) $\mu_s$ mg sin $\theta$ (d) The potential energy of a system increases, if work is done (a) by the system against a conservative force (b) by the system against a non-conservative force (c) upon the system by a conservative force (d) upon the system by a non-conservative force Two equal masses $m_1$ and $m_2$ are moving along the same straight light $-9$ ms $^{-1}$ respectively. If the collision is elastic, then calculate the vertical hand $m_2$ , respectively (a) $-4$ ms $^{-1}$ and $10$ ms $^{-1}$ (b) $10$ ms $^{-1}$ and $0$ ms $^{-1}$ A couple produces, (a) pure rotation (b) pure translation (c) rotation and translation (d) no motion The speed of a solid sphere after rolling down from rest without slight high high $\sqrt{\frac{4}{3}}$ gh (b) $\sqrt{\frac{10}{7}}$ gh (c) $\sqrt{2}$ gh (d) The time period of a satellite orbiting Earth in a circular orbit is independent of the mass and radius of the orbit (d) Neither the mass nor the radius of its orbit The kinetic energy of the satellite orbiting around the Earth is (a) equal to potential energy (b) less than potential (c) greater than kinetic energy (d) zero If the external torque acting on the body is zero, the component of a axis of rotation is (a) zero (b) constant (c) 1 (d)	An object of mass m begins to move on the plane inclined at an angle $\theta$ . The friction of inclined surface is $\mu_s$ . The maximum static friction experienced by the (a) mg (b) $\mu_s$ mg (c) $\mu_s$ mg $\sin\theta$ (d) $\mu_s$ mg correction of inclined surface is $\mu_s$ . The maximum static friction experienced by the (a) mg (b) $\mu_s$ mg (c) $\mu_s$ mg $\sin\theta$ (d) $\mu_s$ mg correction in the potential energy of a system increases, if work is done (a) by the system against a conservative force (b) by the system against a non-conservative force (c) upon the system by a conservative force (d) upon the system by a non-conservative force (d) upon the system by a non-conservative force (e) upon the system by a non-conservative force (force) (g) upon the system by a non-conservative force (h) upon the system by a non-conservative force (h) upon the system by a non-conservative force (h) upon the system by a conservative force (h) upon the system by a non-conservative force (h) upon the system by a conservative force (h) upon the system by a conservative force (h) upon the system by a conservative force (h) upon the system against a non-conservative force (h) upon the system by a conservative force (h) upon the system by a sense straight line with vertical energy (h) upon the system by a non-conservative force (h) upon the system by a non-conservative force (h) upon the system by a sense straight line with vertical energy (h) upon the	An object of mass m begins to move on the plane inclined at an angle $\theta$ . The coefficient friction of inclined surface is $\mu_s$ . The maximum static friction experienced by the mass is (a) mg (b) $\mu_s$ mg (c) $\mu_s$ mg sin $\theta$ (d) $\mu_s$ mg cos $\theta$ . The potential energy of a system increases, if work is done (a) by the system against a conservative force (b) by the system against a non-conservative force (c) upon the system by a conservative force (d) upon the system by a non-conservative force (d) upon the system by a non-conservative force Two equal masses $m_1$ and $m_2$ are moving along the same straight line with velocities $5$ main and $m_2$ , respectively. If the collision is elastic, then calculate the velocities after the color $m_1$ and $m_2$ , respectively (a) $-4$ ms $^4$ and $10$ ms $^4$ (b) $10$ ms $^4$ and $0$ ms $^4$ (c) $-9$ ms $^4$ and $5$ ms $^4$ (d) $5$ ms $^4$ and $1$ ms $^4$ A couple produces, (a) pure rotation (b) pure translation (c) rotation and translation (d) no motion The speed of a solid sphere after rolling down from rest without sliding on an inclined vertical height h is, (a) $\sqrt{\frac{4}{3}}$ gh (b) $\sqrt{\frac{10}{7}}$ gh (c) $\sqrt{2}$ gh (d) $\sqrt{\frac{1}{2}}$ gh The time period of a satellite orbiting Earth in a circular orbit is independent of (a) Radius of the orbit (b) The mass of the satellite (c) Both the mass and radius of the orbit (b) In the mass of the satellite orbiting around the Earth is (a) equal to potential energy (b) less than potential energy (c) greater than kinetic energy (d) zero If the external torque acting on the body is zero, the component of angular momentum a axis of rotation is (a) zero (b) constant (c) 1 (d) $\frac{1}{2}$			

 $p = \sqrt{2m \text{ (KE)}}$  (b)  $p = \sqrt{KE}$  (c)  $p = \sqrt{2 \text{ mgh}}$  (d)  $p = \sqrt{2m}$ 

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## PART - II

**Note**: Answer **any six** questions. Question No. **18** is **compulsory**.

6x2=12

- 16. How will you measure the diameter of the Moon using parallax method?
- 17. How do you deduce that two vectors are perpendicular?
- 18. If a stone of mass 0.25 kg tied to a string executes uniform circular motion with a speed of 2 ms<sup>-1</sup> of radius 3 m, what is the magnitude of tensional force acting on the stone?
- 19. State Newton's Universal law of gravitation.
- 20. What is the difference between sliding and slipping?
- 21. Define gravitational potential.
- 22. Define Power. Give its unit.
- 23. What is the significance of moment of inertia?
- 24. What is the meaning by pseudo force?

## PART - III

Note: Answer any six questions. Question No. 28 is compulsory

6x3=18

- 25. State the rules for rounding off.
- 26. State Newton's three laws.
- 27. Write the differences between conservative and Non-conservative forces.
- 28. A weight lifter lifts a mass of 250 kg with a force 5000 N to the height of 5 m.
  - (a) What is the work done by the weight lifter?
  - (b) What is the work done by the gravity?
  - (c) What is the net work done on the object?
- 29. Explain in detail the geostationary and polar satellites.
- 30. Derive the equation for work done by torque.
- 31. Discuss the properties of scalar product.
- 32. Using free body diagram, show that it is easy to pull an object than to push it.
- 33. Compare the kinetic equations for linear motion and kinematic equations for angular motion.

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PART - IV

**Note** : Answer **all** the questions.

5x5=25

34. (a) Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.

**OR** 

- (b) Explain in detail the various types of errors.
- 35. (a) Derive the expression for centripetal acceleration of a particle in uniform circular motion.

**OR** 

- (b) State and prove Work Energy theorem.
- 36. (a) Derive the equation for escape velocity.

OR

- (b) Show that in an inclined plane, angle of friction is equal to angle of repose.
- 37. (a) (i) What are the uses of dimensional analysis.
  - (ii) Check the correctness of the equation  $\frac{1}{2}$  mv<sup>2</sup> = mgh using dimensional analysis method.

**OR** 

- (b) Arrive at an expression for elastic collision in one dimension and discuss various cases.
- 38. (a) Obtain an expression for kinetic energy in rotation. Give the relation between rotational kinetic energy and angular momentum.

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(b) Explain the variation of g with altitude.

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