QB365 Model Question Paper 2

11th Standard CBSE

Reg.No. :

I di ache is mileta and is cated into a sphere, dess monores of lonetta about an xist through centre of mass increase or decrease. I di ache is mileta and is cated into a sphere, dess monores of the equator? I centre of mass more? I centre of mass more? I centre of mass more agant to be kilogram at the pole or at the equator? I centre of mass more? I centre of mass	Time : 02:00:00 Hrs	
i Hard control for the share in does moment of inertia about an aix through centre of mass increase or decrease. 1 I vor particles of masse m ₁ and m ₂ attact each other gravitationally one as thi notion under the influence of the gravitational force? 11 Work one work of the klogram at the pole or at the equator? 13 Work hard means eager to be klogram at the pole or at the equator? 14 Hoos it matter if one uses gaage instead of about the resources in applying Bernoull's equation? Explain. 15 On what factors does the critical speed of fluid flow depend? 16 Why weter is used as an codarient the radiator of cars? 17 Can we boll water inside in the earth statellite? 18 Witch baject will cool fatter when klot is the complete conversion of the tint to work? 19 Why the framework last in the radiator of cars? 10 Witch the moving along an elliptical conversion of the tint to work? 10 Witch the moving along an elliptical conversion of the attint work? 11 Hice on poles melts, then what is the change in duation of day? 12 The speed of the whith wind in a trande is laarningly high. Why? 13 Heart contract to half it radius. What would be the length of the day? 14 A plant moving along an elliptical obtis is clocet to be so at a distance erg and farthest away at a distance of r ₁ . If y ₁ and Y ₂ are tigh linear velocities at these points respectively, then fund the radio v ₁ , w ₁ 14 A plant moving along an elliptical obtis is clocet to be so at a distance erg and farthest away at a distance of r ₁ . If y ₁ and Y ₂ are tigh linear velocities at these points respectively, then fund the radio v ₁ , w ₁ 15 The gravitational force between two spheres or when the distance between the vie totic, if the separation is made 3? 16 Which of the lolowing symptoms is laby to affect an actonaut in space 17 Hous complete the kent is 12 km/s when is the value of the day is under the main the vie totic is the vie totic is at these points and the vie the sphere? 18 A Aldia congates by In mu when a labd W be heged fi	Tot	al Marks : 100
 1) If a cube is melted and is casked into a sphere, does moment of intent about an axis through centre of mass increase or decresse. 1) Two particles of masses m₁ and m₂ attract each other gavitationally and are set in motion under the influence of the gravitational force? 1) Which other does uses gave finded of about the post or at the equator? 1) The spart intent of masses m₂ and m₂ attract each other gavitationally and are set in motion under the influence of the gravitational force? 1) Which object will cost the critical spaced of likel flow depend? 1) The sup of the test inside in the cask of about the post or at the equator? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) Which object will cost faster when kept in open air, the one at 300 ° C or the one of 100 °C? Why? 1) The speed of the whirt wind in a tornado to alarmingly bigh. Why? 12) The speed of the whirt wind in a tornado to alarmingly bigh. Why? 13) Hearn contract to half its radius. What would be the length of the day? 14) A plant moving dong an elliptical othic is closes to the S and at adistance or and farthest aways at a distance of r₂. If Y and Y, are the linear velocities at these points responsible, then that the there and synce 14) Mich of the lendowing symptomes is likely to affect an astronaut in space 15) The gavaritational force between t	Section-A	
 a) Two particles of masses move? Will the centre of mass move? a) Would we have more sugar to be klogram at the pole or at the equator? a) Social we have more sugar to be klogram at the pole or at the equator? b) Social we have more sugar to be klogram at the pole or at the equator? c) on what factors does the critical speed of fluid flow depend? c) on what factors does the critical speed of fluid flow depend? c) on what factors does the critical speed of fluid flow depend? c) on what factors does the critical speed of fluid flow depend? c) on what factors does the critical speed of fluid flow depend? c) more boll water inside in the carth satellit? d) Which beject will cool faster when kept in open air, the one at 300 °C or the one of 100 °C? Why? c) What type of process is a Carnot cycle? c) The speed of the whiri wind in a transdo is alarmingh bigh. Why? c) The speed state to balf is calculated being to the depth of the depth of the ends ov, v₂. c) The speed state to balf is calculated being to the depth of the depth of the ends ov, v₂. c) The speed state to balf is calculated being to the depth of the depth of the depth of the atio v₂, v₂. c) The speed state to balf is calculated being to the depth of the depth of the separation is made 3y? c) The speed state to balf is calculated being to the depth of the depth of the separation is made 3y? c) The speed state to balf is calculated being to the depth of the depth of the separation is made 3y? c) The speed state to balf is calculated being the depth of the depth of the depth of the separation is made 3y? c) The speed state to balf is calculated being the depth of the whit will now depend a state at balkis depth of the	1) If a cube is melted and is casted into a sphere, does moment of inertia about an axis through centre of mass increase or decrease.	1
 A local we have more sugar to the kilogram at the pole or at the equato? A boos it matter if one uses gauge instead of absolute pressures in applying Bernoull's equation? Explain. A boos it matter if one uses gauge instead of absolute pressures in applying Bernoull's equation? Explain. A Why, water is used as an coolant in the radiutor of cars? A water is used as an coolant in the radiutor of cars? A witch object witch local faster thme kept in open at, the one at 300 ° C or the one of 100 °C? Why? A Which object will local faster thme kept in open at, the one at 300 ° C or the one of 100 °C? Why? A Which object will local faster witch kept in open at 300 ° C or the one of 100 °C? Why? A boot specific open mets, then what is the change in duration of day? B there on poles mets, then what is the change in duration of day? The speed of the whiti wind in a tornado is alarmingly high. Why? A plant moving along an elliptical orbit is close to the Sun at a distance r₁ and farthes: away at a distance of r₂. IVY and V₂ are the linear velocities at these points respectively, then find the cattor v₁/v Which of the following symptoms is likely to affect an astronaut in space A wire elongates by I mw when a load W is hanged from it. If the wire goes over a puller and two weights W each are hung at the row ends, then what will be the clongetion of the wire in mn? A blid sphere of radius R made at ameterial to buck modulus B is surrounded by a liquid in a cylindrical container. A massless piston of are a A floats on the surface of the square on the piston compress the liquid. In a cylindrical container. A massless piston of area A floats on the surface of a liguid and cylindrical container. A massless piston of as is 5 = 7.28 × 10² N/M and angle for a float of muse many mentanue de topen? A blid sphere of radiu	2) Two particles of masses m ₁ and m ₂ attract each other gravitationally and are set in motion under the influence of the gravitational force? Will the centre of mass move?	1
 4) Oce Sit matter if one uses page instead of absolute pressures in applying Bernoulli's equation? Explain. 5) On what factors does the critical speed of fluid flow depend? 6) Why, water is used as an colonatin the radiator of cars? 7) Can we boil water inside in the earth satellite? 8) Which object will cool faster when kept in open air, the one at 300 °C or the one of 100 °C? Why? 9) What the many hand, is up ut restrictions on the complete conversion of heat into work? 10) What type of process is a Canot cycle? 21) If ice on poles melts, then what is the change in duration of day? 13) If aerth contract to half is radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is closes to the Sun at a distance r and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₂/2 15) The excore pared on the earth is 1.12 km/s What is to value for a plane thaving double the radius and right times the mass of the earth? 16) Which of the following symptoms is likely to affect an astronaut in space 17) The sexope speed on the earth is 1.12 km/s What is to value for a plane thaving double the radius and right times the mass of the earth? 18) A wire elongates by I man when a load W is hanged from it. If the wire goes over a polley and two weights W each are hung at the rwo ends, then what will be the dong for on the piston on the piston to compress the liquid, find fractical chainer, Amassies piston of area A floats on the surface of the sparse about on the spins a size of oradius erd to be appressive of cradius erd. S = 7.28 × 10² N/m and angle of otradius and the piston on the piston to compress the liquid, find fractical chainer, an assies piston of area A floats on the surface of the sparse would the mailer piston have to beap? 19) A colid cylineer of radius ta mailer piston have	3) Would we have more sugar to the kilogram at the pole or at the equator?	1
 a) On what factors does the critical speed of fluid flow depend? b) Why, water is used as an colonatin the radiator of cars? c) Why, water is used as an colonatin the radiator of cars? c) The web of water inside in the earth satellite? c) What how the rest in the mean state interpret of the earth of 0¹⁰ C? Why? c) What type of process is a Carnot cycle? c) What how the performance of the web in the interpret of the earth of 0¹⁰ C? Why? c) What type of process is a Carnot cycle? c) What type of process is a Carnot cycle? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is alarmingly high. Why? c) The speed of the whirl wind in a tomado is a submating the distance between their centre is y. What will be the new force, if the separation is made 3y? c) Which of the following symptoms is likely to affect an astronaut in space c) Which of the following symptoms is likely to affect an astronaut in space c) Which of the wind in mm? c) A solid sphere of radius B made of a material of bulk modulus B is surrounded by a light in a cylindrical container. A massless piston of area A floats on the surface of the elogiston	4) Does it matter if one uses gauge instead of absolute pressures in applying Bernoulli's equation? Explain.	1
 6) Why, water is used as an coolarit the radiator of cars? 7) Can we boil water inside in the earth satellite? 8) Which object will cool faster when kept in open air, the one at 300 °C or the one of 100 °C? Why? 9) Which thermodynamic law put restrictions on the complete conversion of heat into work? 10) What type of process is a Carnot cycle? 11) If ice on poles melta, then what is the change in duration of day? 12) The speed of the withi wind in a tormado is alarmingly high. Why? 13) If earth contract to half its radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is close to the sun at a distance or and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms likely to affect an astronaut in space 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 19) A vise diopase by Itm mixer hand of form it. If the wire goes over a putter' and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless place on the surface of the plate or the plate to roop of an antice of the sphere? 20) A liquid droop of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless plate on the surface of the plate or applare mature system of capillarice of radius of the pph	5) On what factors does the critical speed of fluid flow depend?	1
 17. Can we bolt water inside in the earth satellite? 18. Which object will cool faster when kept in open air, the one at 300 °C or the one of 100 °C? Why? 19. Which thermodynamic law put restrictions on the complete conversion of heat into work? 10. What type of process is a Cannot cycle? 21. The speed of the which wind in a tormado is alarmingh high. Why? 22. The speed of the which wind in a tormado is alarmingh high. Why? 23. If earth contract to half its radius. What would be the length of the day? 24. A plant moving along an elliptical orbit is closest to the Sun at a distance r and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the radio v₁/v₂. 25. The gravitational force between two spheres as x when the distance between their centre is y. What will be the new force; if the separation is made 3y? 26. Which of the following symptoms is likely to affect an astronaut in space headsche 17. The scape speed on the earth is 11.2 km/s. What is its value for a planet having double the radius and eight times the mass of the earth? 21. A wire elongates by I mm when a load W is hanged from it. If the wire goes over a puller and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 21. A wire elongates by I mm when a load W is hanged from it. If the wire goes over a puller and two weights W each are hung at the nove ends, then what will be the elongation of the wire in mm? 23. A bolt optical or a mass M is placed on the piston to compress the liquid, find fractional change in teradius of the sphere? 24. A hydraulic automobile lift is designed to louk modulus B is surrounded by a liguid in a cylindrical container. A massless piston of area Afloats on the surface of the elong at the change's in surface energy. 5-0.07Nm⁻¹ 23. A solid didine of an asterial of b	6) Why, water is used as an coolant in the radiator of cars?	1
 8) Which object will cool faster when kept in open air, the one at 300 °C or the one of 100 °C? Why? 9) Which thermodynamic law put restrictions on the complete conversion of heat into work? 10) What type of process is a Carnot cycle? Section-B 11) If ice on poles melts, then what is the change in duration of day? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) The speetively, then find the ratio v₁,v₂ 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2) Which of the following symptoms is likely to affect an astronaut in space headache 17) The escape speed on the earth is 11.2 km/s What is its value for a planet having double the radius and rejth times the mass of the earth? 2) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light din a cylindrical container. A massless piston of area A floats on the surface of the length of radius are in stranding on the change in the radius of the sphere? 20) A liquid drop of radius R made of a material of bulk modulus B is surrounded by a light of radius are of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston on the piston to compress the liquid, find fractional change in the radius of the sphere? 21) A liquid drop of radius and must in summer, rises in a system of caplialete of radius are of cross-section of the piston carrying the load is 425 c	7) Can we boil water inside in the earth satellite?	1
 9) Which thermodynamic law put restrictions on the complete conversion of heat into work? 10) What type of process is a Carnot cycle? Section-B 11) If ice on poles melts, then what is the change in duration of day? 12) The speed of the whiti wind in a tornado is alarmingly high. Why? 13) If earth contract to half its radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is closest to the Sun at a distance r₁ and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₁/v₂ 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms is likely to affect an astronaut in space 17) The escape speed on the earth is 11.2 km/s What is its value for a planet having double the radius and eight times the mass of the earth? 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongate on the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light find fractional change in the radius of the sphere? 20) A liquid drop of radius R made of a material of bulk modulus B is surrounded by a light find fractional change in the radius of the sphere? 21) A logid adom to points analy water in summer, rises in a system of callifacte of radius radius of the sphere? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston of sap is 5 = 7.28 × 10 ° N/m and angle of contact is 0°. Does surface tension alone account for the supply of water to the pot of all trees? 23) A solid cylinder of mass 20 kg rotates about its axis? 	8) Which object will cool faster when kept in open air, the one at 300 0 C or the one of 100 0 C? Why?	1
 10) What type of process is a Carnot cycle? Section-B 1) If ice on poles melts, then what is the change in duration of day? 2) The speed of the whird wind in a tornado is alarmingly high. Why? 2) If earth contract to half its radius. What would be the length of the day? 2) If earth contract to thalf its radius. What would be the length of the day? 2) If earth contract to half its radius. What would be the length of the day? 2) A plant moving along an elliptical orbit is closet to the Sun at a distance r₁ and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₁, v₂ 2) The gravitational force between two spheres as when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2) The gravitational force between two spheres as when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2) The gravitational force between two spheres as when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2) The gravitational force between two spheres as when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2) A solid sphere of radius k made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface of the elongation of the wire in mm? 2) A liquid drop of radius k made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the ot of all trees? 2) A high-drulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425	9) Which thermodynamic law put restrictions on the complete conversion of heat into work?	1
Section-B 11) If ice on poles melts, then what is the change in duration of day? 2 12) The speed of the whirt wind in a tormado is alarmingly high. Why? 2 13) If earth contract to half its radius. What would be the length of the day? 2 14) A plant moving along an elliptical orbit is closet to the Sun at a distance r, and farthest away at a distance of r ₂ . If V ₂ and V ₂ are the linear velocities at these points respectively, then find the ratio v ₁ /v ₂ . 2 15) The gravitational force between two spheres as x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2 16) Which of the following symptoms is likely to affect an astronaut in space 2 headache 11) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 2 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light of a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to the piston to compress the liquid, fluid fractional change in the radius of the sphere? 2 20) A liquid drop of radius R made of a maximum mass of 300kg. The area of cross section of the piston carrying the load is 425 cm ² . What maximum pressure would the smaller piston have to bear? 2 21) A solid clinder of	10) What type of process is a Carnot cycle?	1
 11) If ice on poles melts, then what is the change in duration of day? 12) The speed of the whirt wind in a tornado is alarmingly high. Why? 13) If earth contract to half its radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is closes to the Sun at a distance to and fathest away at a distance of r₂. if V₁ and V₂ are the linear velocities at these points 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms is likely to affect an astronaut in space 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the two ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a ligit in a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to compress the liquid, find fractional change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 to ³-m. The surface tension of as pis S = 7.28 × 10² N/m and angle of contact is 6³. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maxium as of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotate	Section-B	
 12) The speed of the whird wind in a tornado is alarmingly high, Why? 13) If earth contract to half its radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is closet to the Sun at a distance r₁ and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₁/v₂ 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms is likely to affect an astronaut in space 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface of the liquid. Men a mass M is placed on the piston to compress the liquid, flor fractional change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The say in trees, which consists mainly water in summer, rises in a system of capillaries of radius r2.5 × 10⁻⁵m. The surface tension of sap is S = 7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm².What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6	11) If ice on poles melts, then what is the change in duration of day?	2
 13) If earth contract to half its radius. What would be the length of the day? 14) A plant moving along an elliptical orbit is closet to the Sun at a distance r₁ and farthest away at a distance of r₂. If V₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₁, v₂ 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms is likely to affect an astronaut in space headache 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light din a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to compress the liquid, find fractional change in the radius of the sphere? 20) A liquid drop of radius Arm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of ratios. To ⁵/₂. The surface tension of sap is S = 7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kin	12) The speed of the whirl wind in a tornado is alarmingly high. Why?	2
 14) A plant moving along an elliptical orbit is closet to the Sun at a distance r, and farthest away at a distance of r₂. If Y₁ and V₂ are the linear velocities at these points respectively, then find the ratio v₁/v₂ 15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 16) Which of the following symptoms is likely to affect an astronaut in space headache 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a putley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a ligited in a cylindrical container. A massless piston of area A floats on the surface of the ligitu, When a mass M is placed on the piston no the piston to compress the ligitud, find fractional change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁹ m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0^o. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displac	13) If earth contract to half its radius. What would be the length of the day?	2
15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y? 2 16) Which of the following symptoms is likely to affect an astronaut in space 2 headache 2 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 2 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 2 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface of the liquid. find fractilonal change in the radius of the sphere? 2 20) A liquid drop of radius Amm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm ¹ 2 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10 ° m. The surface tension of sap is S =7.28 × 10 ° N/m and angle of contact is 0°. Does surface to nion alone account for the supply of water to the pot of all trees? 2 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm ² .What maximum pressure would the smaller piston have to bear? 2 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m	14) A plant moving along an elliptical orbit is closet to the Sun at a distance r ₁ and farthest away at a distance of r ₂ . If V ₁ and V ₂ are the linear velocities at these points respectively, then find the ratio v ₁ /v ₂	2
16) Which of the following symptoms is likely to affect an astronaut in space 2 headache 2 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 2 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 2 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light in a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to compress the liquid, find fractional change in the radius of the sphere? 2 20) A liquid drop of radius Amm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm ⁻¹ 2 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10 ⁻⁵ m. The surface tension of sap is S =7.28 × 10 ⁻² N/m and angle of contact is 0 ⁰ . Does surface tension alone account for the supply of water to the pot of all trees? 2 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm ² .What maximum pressure would the smaller piston have to bear? 2 23) A solid cylinder of mass 20 kg rotates about its axis? 2 2 24) A particle on a rotating disc have initial and final angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kineti	15) The gravitational force between two spheres os x when the distance between their centre is y. What will be the new force, if the separation is made 3y?	2
headache 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 2 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 2 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a ligiud in a cylindrical container. A massless piston of area A floats on the surface of the ligiud. When a mass M is placed on the piston to compress the liqiud, find fractional change in the radius of the sphere? 2 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm ⁻¹ 2 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10 ⁻⁵ m. The surface tension of sap is S =7.28 × 10 ⁻² N/m and angle of contact is 0 ⁰ . Does surface tension alone account for the supply of water to the pot of all trees? 2 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm ² . What maximum pressure would the smaller piston have to bear? 2 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 2 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case,	16) Which of the following symptoms is likely to affect an astronaut in space	2
 17) The escape speed on the earth is 11.2 km/s.What is its value for a planet having double the radius and eight times the mass of the earth? 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light in a cylindrical container. A massless piston of area A floats on the surface of the liqud. When a mass M is placed on the piston on the piston to compress the liquid, find fractilonal change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁹ m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of di	headache	
 18) A wire elongates by I mm when a load W is hanged from it. If the wire goes over a putley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm? 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a light in a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston on the piston to compress the liquid, find fractitional change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁵m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution.Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted st	17) The escape speed on the earth is 11.2 km/s. What is its value for a planet having double the radius and eight times the mass of the earth?	2
 19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to compress the liquid, find fractilonal change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁵m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa² Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in f	18) A wire elongates by l mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the rwo ends, then what will be the elongation of the wire in mm?	2
 liquid. When a mass M is placed on the piston on the piston to compress the liquid, find fractiional change in the radius of the sphere? 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁵m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter 0.5 mm and the wide en are	19) A solid sphere of radius R made of a material of bulk modulus B is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface o	the 2
 20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm⁻¹ 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁵m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa² Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil? 	liqiud. When a mass M is placed on the piston on the piston to compress the liqiud, find fractiional change in the radius of the sphere?	
 21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10⁻⁵m. The surface tension of sap is S =7.28 × 10⁻² N/m and angle of contact is 0⁰. Does surface tension alone account for the supply of water to the pot of all trees? 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution.Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	20) A liquid drop of radius 4mm breaks into 1000 identical drops. Find the change in surface energy. S=0.07Nm ⁻¹	2
 22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm². What maximum pressure would the smaller piston have to bear? 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa² Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	21) The sap in trees, which consists mainly water in summer, rises in a system of capillaries of radius r=2.5 × 10 ⁻⁵ m. The surface tension of sap is S =7.28 × 10 ⁻² N/m and a of contact is 0 ⁰ . Does surface tension alone account for the supply of water to the pot of all trees?	ngle 2
 23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder? What is the magnitude of angular momentum of the cylinder about its axis? 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution.Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	22) A hydraulic automobile lift is designed to lift cars with a maximum mass of 300kg. The area of cross-section of the piston carrying the load is 425 cm ² . What maximum pressure would the smaller piston have to bear?	2
 24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement. 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution.Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	23) A solid cylinder of mass 20 kg rotates about its axis with angular speed of (100 rad/s). The radius of cylinder is 0.25m. What is the kinetic energy of rotation of cylinder What is the magnitude of angular momentum of the cylinder about its axis?	? 2
 25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement. 26) Define period of revolution.Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	24) A particle on a rotating disc have initial and final angular position are -2rad, +6rad. In which case, particle undergoes a negative displacement.	2
 26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite. 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	25) A particle on a rotating disc have initial and final angular position are -4rad, -8rad. In which case, particle undergoes a negative displacement.	2
 27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the shearing stress on the rivet is not to exceed 6.9x10⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil? 	26) Define period of revolution. Derive an expression of the period of revolution or time period of satellite.	2
shearing stress on the rivet is not to exceed 6.9x10 ⁷ Pa? Assume that each rivet is to carry onequarter of the load. 28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil?	27) Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exerted by the riveted strip if the	2 <u>2</u>
28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at the narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil?	shearing stress on the rivet is not to exceed 6.9x10 ⁷ Pa? Assume that each rivet is to carry onequarter of the load.	
	28) Anvils made of single crystals of diamond, with the shape as shown in figure are used to investigate the behaviour of materials under very high pressure. Flat faces at narrow end of the anvil have a diameter of 0.5 mm and the wide en are subjected to a compressional force of 50000 N. What is the pressure at the tip of the anvil?	the 2



29) At what temperature, if any, do the following pairs of scales gives the same reading? Fahrenheit and Kelvin.

³⁰⁾ A monoatomic ideal gas($\gamma = \frac{5}{3}$)initially at 17 ⁰ C is suddenly compressed to one-eight of its original volume.	2
Find the final temperature after compression.	
Section-C 31) In a hydrogen atom, electron revolves in a circular orbit of radius $0.53A^{\circ}$ with a velocity of $2.2 \times 10^6 m/s$ with an angle 30° . If the mass of electron is $9 \times 10^{-31} kg$. Find its angular momentum	5
32) An Flongated Wire	5
If a wire of length 4 m and crosssectional area of 2m ² is stretched by a force of 3KN, then determine the change in length due to this force. Given Young's modulus of material of wire 110x10 ⁹ N/m ² .	5
33) In given pulley mass system, mass m ₁ = 500 g, m ₂ = 460 g and the pulley has a radius of 5 cm. When released from rest, heavier mass falls through 7.50 cm in 5 s. There is no slippage between pulley and string.	5
What is magnitude of pulley's angular acceleration?	
34) A man stands on a rotating platform with his arms stretched horizontally holding a 5 kg weight in each hand. The angular speed of the platform in 30 rpm. The man then brings his arms close to his body with the distance of each weight from the axis changing from 90 cm to 20 cm. The moment of inertia of the man together with the platform may be taken to be constant and equal to 7.6 kg-m ² . What is his new angular speed? (Neglect friction)	5
35) A silica glass rod has a diameter of 1 cm and is 10 cm long. The ultimate strength of glass is 50x10 ⁶ Nm ⁻² . Estimate the largest mass that can be hung from it without	5
breaking it. Take g=10Nkg ⁻¹	
36) Two long metallic strips are joined together by two rivets each of radius 0.1cm (see Fig.).Each rivet can withstand a maximum shearing stress of 3.0x 108Nm ⁻² .Calculate the maximum tangential force a strip can exert.	5
37) Glycerine flows steadily trough a horizontal tube of length 1.5 m and radius 1.0 cm. If the amount of glycerine flowing per second at one end is 4.0x10 ⁻³ kg/m ³ and viscosity of glycerine = 0.83 Pa-s). (You may also like to check, if the assumption of laminar flow in tube is correct).	5
38) A circular disc made by iron is rotating about its axis of rotation with a uniform angular speed <i>a</i>	5
Determine the change in the linear speed of particle at the rim in percentage. The disc of rim is slowly heated from 20° C to 50° C keeping the angular speed uniform. Give that coefficient of linear expansion for the material of iron is 1.2×10^{-5} °C ⁻¹	
39) A Carnot cycle is performed by 1 mole of air (r = 1.4) initially at 327° C. Each stage represents a compression or expansion in the ratio 1:6 Calculate the lowest temperature Take R = 8.31 J/ mol ^{-K}	5
40) The efficiency of a Carnot engine is 1/2. If the sink temperature is reduced by 100o C, then engine efficiency becomes 2/3. Find Explain, why a Carnot engine cannot have 100% efficiency?	5

Section-A	
1) Moment of inertia of a sphere is less than that of a cube of same mass.	1
2) Since gravitational force is an internal force, therefore the centre of mass would not move	-
3) · · · · · · · · · · · · · · · · · · ·	
$mg_p = m \ g_e^{\text{since}}, g_p > g_e^{\text{since}}, m > m. \text{ so, we shall have greater mass of sugar at the equator.}$ $4)$	1

No, it does not matter if one uses gauge instead of absolute pressures in applying Bernoulli's equation unless the atmospheric pressure at the two points where, Bernoulli's equation is applied are significantly different.

5) The critical speed of a fluid depends on (a) diameter of tube, (b) density of fluid, (c) coefficient of viscosity of the fluid.

6) Because, specific heat of water is very high due to this it absorbs, a large amount of heat. This helps in maintaining the temperature of the engine low.
 7) No, the process of transfer of heat by convection is based on the fact that a liquid becomes lighter .on becoming hot and rise up. In condition of weightlessness, this is not possible. So, transfer of heat by convection is not possible in the earth satellite.

1

1

1

1

1

1

2

8)

The object at 300 0 C will cool faster than the object at 100 0 C. This is in accordance with Newton's law of cooling. As we know, rate cooling of an object α temperature between the object and its surroundings.

9) According to second law of thermodynamics, heat energy cannot converted into work completely.

10) Carnot cycle is a reversible cyclic process through which heat is converted into mechanical work.

Section-B

11)

Molten ice from poles into ocean and so mass is going away from axis of rotation. So, moment of inertia of earth increases and to conserve angular momentum, angular velocity (ω) decreases. So, time period of rotation increases ($T = 2\pi/\omega$). So, net effect of global warming is increasing in the duration of day.

12)

In a whirl wind, the air from nearby region gets concentrated in a small space thereby decreasing the value moment of inertia considerably. Since Ia= constant, due to decrease in moment of inertia, the angular speed becomes quite high.

13)

The moment of inertia
$$\left(I = \frac{1}{2}MR^2\right)$$
 of the earth about its own axis will become one-fourth and so its angular velocity will become four times $(L = I\omega = constant)$

Hence, the time period will reduce to one-fourth ($T = 2\pi/\omega$), i.e. 6 hours.

14) From the law of conservation of angular momentum

$$mr_1v_1 = mr_2v_2 \implies r_1v_1 = r_2v_2 \text{ or } \frac{v_1}{v_2} = \frac{r_2}{r_1}$$

15) $Fa\frac{1}{2}$ So, if r is increased by a factor of 3, F will be reduced by a factor of 9. Thus, the new force will be x/9.

16)

Headache is due to mental strain. It will persist whether a person in an astronaut in space or he is on earth. It means headache will have the same effect on the astronaut in space as on a person on earth.

17) (escape speed on a planet) =
$$\sqrt{\frac{GM_p}{R_p}}$$

(escape speed on the earth) = $\sqrt{\frac{GM_e}{R_p}}$

Clearly,
$$\frac{v_p}{v_e} = \sqrt{\frac{M_p}{M_e} \times \frac{R_e}{R_p}} = \sqrt{8 \times \frac{1}{2}} = 2v_p = 2v_e = 22.4 km/s$$

18) According to Hooke's law

Modulus of elasticity, $E = \frac{W}{A} \times \frac{L}{I}$

where, L = original length of the wire

A = crosssectional area of the wire

Elongation $\Delta l = \frac{WL}{E}$

On either side of the wire, tension s W and length is l/2

$$\Delta l = \frac{WL/2}{AE} = \frac{WL}{2AE} = \frac{WL}{2AE}$$

Fotal elongation in the wire
$$=\frac{1}{2}+\frac{1}{2}=1$$

19)

Jually ap. When mass M is placed on the piston, the excess pressure, p=Mg/A. As the pressure is equally applicable from all the direction on the sphere, hence there will be decrease in volume due to decrease in raius sphere. Volume of the sphere, V = $\frac{3}{4}\pi R^3$

 $1000 \times \frac{4}{2}\pi r^3 = \frac{4}{2}\pi R^3$

Differentiating it , we get,

 $\Delta V = \frac{4}{3}\pi (3R^2)\Delta R = 4\pi R^2 \Delta R \frac{\Delta V}{V} = \frac{4\pi R^2 \Delta R}{\frac{4}{3}\pi R^3}$ We know that, $B = \frac{P}{dV/V} = \frac{Mg}{A} \frac{3\Delta R}{R}$ or $\frac{\Delta R}{R} = \frac{Mg}{3BA}$

20) Volume of 1000 small drops = volume of a large drop

$$r = \frac{R}{10}$$

Surface area of large drop = $\frac{4}{3}\pi R^2$

Surface area of 1000 drop = $4\pi \times 1000r^2$ = $40\pi R^2$ Increase in surface area = $(40-4)\pi R^2 = 36\pi R^2$ The increase in surface energy =Surface tension × increase in surface area

```
=36\pi R^2 \times 0.07 = 36 \times 3.14(4 \times 10^{-3})^2 \times 0.07
=1.26 \times 10<sup>-4</sup> J
```

```
21)
```

Given, radius (r) = 2.5×10^{-5} mSurface t6ension(S) = 7.28×10^{-2} N/mAngle of contact (θ) = 0^{0} density of water (ρ) = 10^{3} kg/m³The maximum height which sa, But, the height of many trees are more than 0.59m, therefore, the rise of sap in all trees is not possible through capillarity action alone.

2

2

2

2

2

2

2

2

2

22) Given, maximum mass that can be lifted (m)=3000 kg $\,$

Area of cross-section (A)=425 cm^2 =4.25 × 10⁻² m^2

 \therefore Maximum pressure on the bigger piston

$$p = \frac{F}{A} = \frac{mg}{A} = \frac{3000 \times 9.8}{4.25 \times 10^{-2}} = 6.92 \times 10^5 Pa$$

According to Pascal's law, the pressure applied on an enclosed liquid is transmitted equally in all directions.

2

2

2

2

2

2

2

2

2

5

 \therefore Maximum pressure on smaller piston = maximum pressure on bigger piston

$$p = p = 6.92 \times 10^5 Pa$$

23) Moment of inertia of cylinder about its own axis = $\frac{1}{2}MR^2$

$$=\frac{1}{2} \times 20 \times (0.25)^2 kg - m^2$$

= 0.625 kg-m²

Kinetic energy of rotating cylinder

 $= \frac{1}{2}I\omega^2 = \frac{1}{2}(0.625)(100)^2J = 3125J$ Angular momentum of cylinder about its own axis

 $= I\omega = 0.625 \times 100 = 62.5 \quad kg - m^2/s$

24) Angular displacement is

 $\Delta \theta = \theta_f - \theta_i = 6 - (-2) = 8rad$

25) Angular displacement is

 $\Delta \theta = \theta_f - \theta_i = -8rad - (-4rad) = -4rad$

26) Period of a revolution of a satellite is the time taken by the satellite to complete one revolution round the earth. It is denoted by T.

$$T = \frac{Circumprence}{Orbital velocity}$$
or
$$T = \frac{2\pi}{v_o}$$
(i $r = R + H$)
or
$$T = 2\pi(R + h)\sqrt{\frac{R+h}{GM}}$$
(i $r = R + H$)
or
$$T = 2\pi\sqrt{\frac{(R+h)^2}{GM}}$$
Also,
$$T = 2\pi\sqrt{\frac{(R+h)^2(R+h)}{GM}}$$
or
$$T = 2\pi\sqrt{\frac{(R+h)^2}{GM}}$$
if
$$T = 2\pi\sqrt{\frac{(R+h)^3}{gR^2}}$$
if
$$T = 2\pi\sqrt{\frac{(R+h)^2}{gR^2}}$$

Radius r = $\frac{D}{2} = 3mm = 3 \times 10^{-3}m$

Maximum shearing stress on eac river = 6.9x10⁷ Pa

Let w be the maximum load that can be subjected to the riveted strip. As each rivet carry one-quarter of the load.

Therefore, load on each rivet = $\frac{w}{4}$

 $\therefore \quad 6.9 \times 10^7 = \frac{w/4}{\pi r^2} or \qquad w = 6.9 \times 10^7 \times 4\pi r^2 or \qquad w = 6.9 \times 10^7 \times 4 \times 3.14 \times (3 \times 10^{-3})^2 \qquad \qquad = 6.9 \times 4 \times 3.14 \times 9 \times 10 = 7.8 \times 10^3 \quad N = 10^3 \times 10^$

28) Given, compressional force, F=50000 N

Diameter, D=0.5 mm = 5 × 10⁻⁴ m Radius, r= $\frac{D}{2}$ = 2.5 × 10-4m Pressure at the tip of the anvil (p) = $\frac{Force}{Area}$ $p = \frac{F}{\pi r^2} = \frac{50000}{(2.5 \times 10^{-4})^2} = 2.5 \times 1011 \text{ Pa}$

30) 887⁰C

Section-C

31) Given, $r = 0.53A^{\circ} = 0.53 \times 10^{-10} m\theta = 30^{\circ}, L = ?L = mvrsin\theta = 9 \times 10^{-31} kg \times 2.2 \times 10^{6} \times 0.53 \times 10^{-10} \times sin 30^{\circ} = 5.247 \times 10^{-3} kg - m^{2}/s$

32) Given area of cross section A=2m²

Force F=3kN=3x10³ N Length L=4m Young's modulus Y=110x10⁹N/m² Change in length, $\Delta L = ?$ Apply, $Y = \frac{FL}{A\Delta L}$ $\Delta L = \frac{Fl}{AY} = \frac{3 \times 10^3 \times 4}{2 \times 110 \times 10^9} = 0.0545 \times 10^{-6} m$ ⇒

 $\Delta L = 54.5 \times 10^{-3} mm$

5

5

5

5

5

33) $\alpha = 1.20 \text{ rad/s}^2$

34) Moment of inertia of man and platform system

I_i = 7.6 kg-m²

Change in moment of inertia of man and platform system when he stretches his hands to a distance of 90 cm = $2 \times mr^2 = 2 \times 5 \times (0.9)^2$

= 8.1 kg-m²

 $I_i = I + 8.1 = 7.6 + 8.1 = 15.7 \text{ kg}\text{-m}^2$

Initial angular velocity, $\omega_i = 30 rpm$

Initial angular momentum of system,

 $L_i = I_i \omega_i = 15.7 kg - m^2 \times 30 rpm$

When man folds his hands to a distance of 20 cm,

Moment of inertia of man=2 \times mr^2 = 2 \times 5 \times $(0.2)^2$ = 0

$$0.4 kg - m^2$$

So, final moment of inertia of man and platform system

= 7.6 + 0.4 = 8 kg-m²

Final angular momentum of system

$$L_f = I_f \omega_f = 8 \times \omega_f$$

Equating initial and final values

$$L_i = L_f$$

$$\Rightarrow \qquad \omega_f = \frac{15.7 \times 30}{8}$$
= 58.88 rpm.

35) 392.5kg

36) Let F be the tensile force applied. Since, each rivet shares the stretching force equally, so the shearing force on each rivet = F/2. sh sring stress If A is the area of each rivet, then shearing stress on each rivet= $\frac{F}{2A}$. Now, maximum shearing stress on each strip = 3.0 \times 108 Nm-2

i.e. $\frac{F_{max}}{2A} = 3.0 \times 10_8 \text{ Nm}_{-2}$ where, F_{max} is maximum tangential force. or F_{max} = 3.0 × 10⁸ × 2A = 6.0 × 10⁸ × πr^2 ∴ r = 0.1 cm \Rightarrow 0.1 \times 10⁻² $\textbf{r=1}\times\textbf{10}^{-3}\text{ m}$ $\Rightarrow F_{max} = 6.0 \times 10^8 \times \frac{22}{7} \times (1 \times 10^{-3})^2$ =1885 N

37) Given, length of the tube (l)=1.5 m Radius of the tube(r) = $1.0 \text{ cm} = 1 \times 10^{-2} \text{ cm}$ Mass of glycerine flowing per second = $4x 10^{-3} \text{ kg/s}$ Density of glycerine, ρ = 1.3 x 10^3 Kg/ $\rm m^3$ Viscosity of glycerine , $\eta = 0.83$ Pa - sVolume of glycerine flowing per second, $V = \frac{m}{a}$

$$\left[\because density = \frac{Mass}{Volume} \right]$$

= $\frac{4 \times 10^{-3}}{1.3 \times 10^{3}} m^3/s = \frac{4}{1.3} \times 10^{-6} m^3/s$

According to Poiseuille's formula, the rate of flow of liquid through a tube

$$V = \frac{\pi}{8} \frac{pr^4}{\eta l}$$

Where, p is the pressure difference between the two ends of the tube. or $p = \frac{8\eta l'}{\pi r^4} = \frac{8 \times 0.83 \times 1.5 \times 4 \times 10^{-6}}{3.14 \times (1 \times 10^{-2})^4 \times 1.3} = 976$ Pa To check the laminar flow in tube, the value of Reynold's number should be less than 2000.

Reynold's number, $R_e = \frac{\rho D v_c}{\eta}$

=

where, v_c is the critical velocity and D is the diameter of the tube.

Critical velocity,
$$v_{c} = \frac{volume - young - out - per - second}{Area - of - cross-section}$$

 $= \frac{m/\rho}{A} = \frac{m}{p\pi r^{2}} [: A = \pi r^{2}]$
 \therefore Reynold's number, $R_{e} = \frac{\rho D}{\eta} \times \frac{m}{p\pi r^{2}}$
 $= \frac{2r \times m}{\eta \pi r^{2}} = -\frac{2m}{\pi \eta} = \frac{2 \times 4 \times 10^{-2}}{3.14 \times 10^{-2} \times 0.83} = 0.31$
As $R_{e} < 2000$, therefore. flow of glycerine is laminar.
38) 3.6×10^{-2}
39) 20° C
40) As efficiency, $\eta_{2} \Rightarrow 1 - \frac{T_{2}}{T_{1}}$
It equals to 1 only when $\frac{T_{2}}{T_{1}} = 0$ or $T_{2} = 0K$
But absolute zero is not possible.

.....

5

5

5

5