CONTENTS

CHAPTER I

		IN	TRO:	DUCI	ORY						
SECT											PAGE
	Gyroscopes and gyrostats	-	-	-	•	•	-	-	-	-	- 1
2.	Experiment showing the perm	anen	ce of	direc	tion o	f the	axis (ofag	yrost	at	2
	Gyrostatic control of a torped	lo	•	-	-	-	-	-	•	-	- 3
3.	Motor driven gyrostats -	-	-	-	-	-		-	•	•	- 3
3.	Details of an electrical drive	-	-	-	-	-	-	-	-	-	. 3
4.	Effect of a couple applied to:	a free	ly m	ounte	d gyro	stat	-	-	•		- 4
5.	Experiment of a gyrostat hur	g by	a cor	rd	•	•	-	•	-	-	- 5
6.	Behaviour of a gyroscope dee	med 1	unna	tural	-	-	-		-	-	- 5
7.	Elementary gyrostatic pheno	mena	and	their	expla	natior	1	-	-	-	- 6
7.	Precessional motion -	-	-	-	•	-	-	•	-	-	- 7
8.	Two possible precessions in the	he ger	neral	case	-	-	-	-	-	•	- 8
8.	Explanation of the rising and	falli	ng of	a peg	g-top	-	-	-	-		- 9
9.	Bessemer's gyrostatically con	trolle	d sale	oon o	n boa	rd shi	p	-	-	-	- 9
10.	A gyroscope or gyrostat is me	erely	a spi	nning	top	•	-	-	•	-	- 10
10.	Precession kinematically expl	ained	l by t	he ro	lling	of a	body-	cone	on a	spac	8•
	cone	-	•	-		-	-	-	-	-	- 11
11.	Precessional motion of the ea	rth	-	-	-	-	-	-		-	- 11
12.	Motion of body-cone on space	e-con	e_illu	ıstrat	ed by	prece	ession	of th	he equ	ainox	es 12
	The "diameter of the earth's			-			-	•		-	- 13
	Free vibrational motion of a		•	-	-				-	-	- 13
	Free and forced vibrations	-	-	-	-	-	-	-	-	-	- 14
15.	Periodic changes of terrestria	l latit	tude	<u>.</u> ·		-	-	-	-	-	- 16
16.	Stability of an egg-shaped be	ody s	pinni	ng wi	th its	long	axis	vertic	al	-	- 16
	Liquid gyrostats		•	-	-		-	-	-	-	- 16
17.	Stability of the rotational mo	tion	of a l	iquid	inas	sphere	oidal	shell		-	- 17
	Gyrostatic experiments: a									t on	a
	bifilar sling	-	-	-	-		-		•	-	. 19
19.	Gyrostatic experiments: a g	vrost	at on	a tra	v car	ried re	ound	in azi	muth		- 21
	Gyrostatic structure of a rigi			-	•	-				-	- 23
	A gyrostatic spring-balance	-	-	-	-	-	-		. تطسم	-	- 24
	Gyrostatic pendulum -	-		-			-	÷		-	- 25
	Gyrostatic experiments: gyr	rostat	weig	ghted	on o	ne sid	le: n	otor	gyros	stat c	
	a chain suspension -			•					•		- 27
24.	Gyrostat supported on a skat	be .	-	_			- `	_	_	_	- 28
	Gyrostatic bicycle rider -	. '	_	-	-	-	-		-	_	- 29
	A " well-ing gymestat "								_		- 30

SKC							PAC	
	A top on a top	-	-	-	•	-	- 3	
27.	Gyrostatic balancing of a monorail carriage		-	-	-	-	- 3	
2 8.	Gyrostatic action in rotating machinery: paddles	ofas	team	\mathbf{er}	-	-	- 3	
29.	Gyrostatic action of the flywheel in a motor-car	•	•	-	•	-	- 3	
30.	Gyrostatic action of turbines, aeroplane propellers,	, etc.	•	-	•	-	- 3	
31.	Gyrostatic control of the rolling of a ship -	-	•	-	-	•	- 3	5
	CHAPTER II							
	DYNAMICAL PRINCI	PLES						
1.	Kinematics of a body turning about a fixed point	-	-	-	-	-	- 3	9
	Angular momentum [A.M.]	-		_	-	-	- 4	
3.	Relations of components of A.M. to the momental e	ellipso	id	-	_	-	- 4	
	Kinetic energy of a rigid body turning about a fixe			_			- 4	
	A.M. and kinetic energy	-		_	_	_	- 4	
	Motion of rotation combined with motion of transl			_	_	_	- 4	
	Time-rate of change of A.M. Equations of motion		_		-	-	- 4	
	77 4 6	-		_	-	•		
9	Example: A symmetrical top turning about a fixe			-	-	-	- 4	
10.	A body turning about a fixed point: more general	u por	11. 12	- •		-	- 4	
11.	Relations between fixed and moving axes -	equa	tions	ior i	movir	ng ax		
11. 19	Simple rules for ferming countier of wetiers for	•	-	-	-	-	- 4	
	Simple rules for forming equation of motions for m	ioving	g axes		•	-	- 5	
	An illustration of these rules -	-	-	-	-	-	- 5	
14.	Passage from one set of axes to another set	•	-	-	-	-	- 5	4
15.	Example: A top spinning under gravity forces	-	-	-	-	-	- 5	5
	Euler's equations for a rigid body under gravity for	rces	-	-	-	-	- 5	6
	Steady motion of a symmetrical top			-	-	-	- 5	7
18.	Different cases of steady motion. Direct and retro	ograd	prec	essio	n. St	tabilit	ty 5	9
	CHAPTER III							
	ELEMENTARY DISCUSSION OF GY	ROS'	ГАТІ	C AC	TIOI	N		
	Elementary explanation of the motion of a top	-	-	-	-	-	- 6	2
2.	A top made with a hollow rim containing balls	-	-	-	-	-	- 6	3
3.	Mode of production of precessional motion. Calcu	lation	of fo	rces.	Gyr	ostat	ie	
	couple and "gyrostatic resistance" -	-		-	•		- 6	4
	Deduction of the principal equation of motion	-	-	-	-	-	- 6	7
5.	Elementary quantitative analysis of the motion of	a top	•	-	-	•	- 6	
	CHAPTER IV							
	SYSTEMS OF COORDINATES AND THEIR I		ATIO	NS.	SPA	CE-C	ONE	
1.	Relations of systems of coordinates	_	_	_	_		H	7
	mi 13 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	:	_	-	-	•	- 7	
			-	-	-	-	- 7	
	Instantaneous axis, axis of figure and axis of result			-	-	-	- 7	
	Kinematics of precession. Space-cone and body-co	one	-	-	-	-	- 7	
o.	Space-cone and body-cone in different cases -	-	-	-	-	-	- 7	7

CHAPTER V

THE SIMPLER THEORY OF TOPS AND GY	ROST	ATS	;	
SECTION				P
1. Gyrostats. Equations of motion	•	-	· -	
2. Examples: A gyrostat under a constant couple. Gyrostati	c actic	n or	a bo	dy
of any form: e.g. an aeroplane propeller	-	-	•	-
3. Symmetrical equations of motion	-	-	-	-
4. Motion of a top reduced to motion of a particle	-	-	-	-
5. Effect on the precession of increasing or diminishing the applied	ed cou	ple.	Hur	y -
, ,	•	-	-	-
6. Greenhill's graphical construction for tracing the effect of cha	inge o	f cor	ıple	-
7. Reaction of a ring-guide or space-cone on a top	-	-	-	-
8. Explanation of the clinging of the axle of a top to a curved	guide	-	-	-
9. Stability of the motion of a top or gyrostat	•	-	-	-
10. Rise and fall of a top	_	-	-	
11. Path of a point on the axis of a top. Cusps on the path	-	_	_	_
12. Occurrence of loops on the path	-	-	_	_
13. Motion of the axis between two close limiting circles	_	_		_
14. Tops rising and falling through a small range. "Strong" a	nd " p	rea l	" tor	s -
15. Routh's graphical construction for rise and fall of a top -	<u>-</u>	-	100	
16. Rise and fall of a top started with initial precession	-	-	-	
17. Motion under various starting conditions	-	•	•	
17. historia under various starting conditions	-	-	-	-
FURTHER DISCUSSION OF THE RISE AND FALL THE INITIAL PRECESSION IS NOT 2		T(OP W	HEN
	212100		*	
1. More exact discussion of rise and fall through a small range	•	-	•	-
2. Determination of period of rise and fall	-	-	-	
3. Error involved in approximations to the motion of a top	-	-	-	•
4. Theory of the upright or sleeping top	-			-
5. Stability of an upright top. Graphical representation -		-	-	
	-	-	-	-
6. Analytical discussion of the stability of an upright top -		-	- - -	
7. Time of passage of axis of weak top from limiting circle to a		- - ssibl	- - e pos	
 6. Analytical discussion of the stability of an upright top - 7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top - 		- - ssibl	- - e pos	
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top		ssibl	e pos	
7. Time of passage of axis of weak top from limiting circle to a8. Calculation of azimuthal motion for a weak top		ssibl	e pos	
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top	ny po - - -	•	e pos	
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top	ny po - - -	•	- - e pos	- - - - ition - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top	ny po - - -	•	e pos	- - - - ition - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr 13. Discussion of the motion of an upright top	ny po - - -	•	e pos:	- - - ition - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr	ny po - - -	•	e pos	- - - ition - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top	ny po - - -	•	e pos:	- - - - - - - - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr 13. Discussion of the motion of an upright top 14. Estimate of error in approximation to the motion - 15. Explanation of an apparent anomaly	ny po - - -	•	e pos:	- - - - - - - - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr 13. Discussion of the motion of an upright top 14. Estimate of error in approximation to the motion - 15. Explanation of an apparent anomaly	inciple	es	•	- - - - - - - - - - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr 13. Discussion of the motion of an upright top 14. Estimate of error in approximation to the motion - 15. Explanation of an apparent anomaly	inciple	es	•	- - - - - - - - - - - -
7. Time of passage of axis of weak top from limiting circle to a 8. Calculation of azimuthal motion for a weak top 9. Periodic motion of a weak top 10. Determination of azimuthal displacement for a weak top 11. Path of a point on the axis of a weak top 12. Equations of motion of an upright top derived from first pr 13. Discussion of the motion of an upright top 14. Estimate of error in approximation to the motion 15. Explanation of an apparent anomaly 16. Stable cases of the motion of an upright top 17. Azimuthal turning of a nearly upright top 18. Stable motion of a nearly upright top between two close limi	inciple	es - - - rcles	•	- - - - - - - - - - - - -

CONTENTS

CHAPTER VII

	GYROSTATS AND VARIOUS PHYSICAL APPLICATIONS OF	F GYR	OSTATS
SEC			P
	Gyrostats		- 1
	Reaction of a top or gyrostat on its support		- 1
	The Serson-Fleuriais top for giving an artificial horizon -		- 1
	Gyrostatic observation of the rotation of the earth. Foucault's m		- 1
	Gyrostatic balance and gyrostatic dipping needle of Lord Kelvin		- 1
	Gilbert's barogyroscope		- 1
7.	Gyrostat, with axis vertical, stable or unstable according to direct	ction of	azi-
	muthal turning		- 1
	Top supported by a string		- 1
	Gyrostatic action of the wheels of vehicles, etc. Monorail cars		- 1
	Gyrostatic action of the paddles and screws of steamers -		- 1
11.	Gyrostatic action of turbines		- 1
12.	Steering of a bicycle or of a child's hoop	- -	- 1
13.	One spinning top supported by another. Steady motion -		- 1
14.	Drift of a projectile		- 1
15.	Turning action on a body moving in a fluid		- 1
	Turning action of the water on a ship. Why a ship carries a weat	her helm	. 1
	Centre of effort of resistance of a fluid		- 1
18.	Stability of a projectile in a fluid		- 1
	Motion of a rigid body with altazimuth suspension and containing	a gyrost	
	(1) flywheel clamped		- 1
20.	Gyrostat with altazimuth suspension: (2) flywheel unclamped		- 1
	Gyrostatic pendulum hung by an untwistable wire or a universal joi	nt.	- 1
7	CHAPTER VIII TIBRATING SYSTEMS OF GYROSTATS. SUGGESTIONS OF		STATIC
	EXPLANATION OF PROPERTIES OF MATTER	₹.	
1.	Gyrostatic spring		- 10
	A gyrostat hung by a steel wire		- 10
	A gyrostat with two freedoms doubly unstable without spin -	. .	- 10
	A gyrostatic system with two freedoms doubly stable without spin		- 1'
	Illustrations of the effect of spin on stability		- 1'
	A gyrostatic system illustrating doubly stable and doubly unstable a		
	Gyrostatic control of the rolling of a ship. Gyrostat frame clampe		- l'
	Gyrostatic controller of the rolling of a ship. Gyrostat frame uncle		- 1'
	Gyrostatic controller and ship under forced vibration -	-	- 1'
	Theory of two interlinked systems which are separately unstable		
	in presence of dissipative forces	, Deadi	. 18
	in prosono of ansipulto forces	•	- 10
	CHAPTER IX		
	THE MODION OF CITATIO OF CVD COMMING TIN	TTO	
	THE MOTION OF CHAINS OF GYROSTATIC LIN	KS.	
	MAGNETO-OPTIC ROTATION		
1.	Problem of a stretched chain of gyrostats		- 18
9	Steady vibrational motion of a gyrostatic chain under tension or u		

	CONTENTS		xiii
 Gyrostatic chain: more gener A vertical gyrostatic chain un Gyrostat hung by a thread Elastic medium loaded with s Magneto-optic rotation: dyn 	der gravity		- 187 - 189 - 191 - 192 - 192 - 196 - 197
	CHAPTER X		
	PRECESSION AND NUTATI ON OF THE NODES OF THE		
 Potential of gravitation - Calculation of attractive force Couples applied to the earth Solar couple on the earth Mean angular speed of preces Precession due to lunar attra Precession of the equinoxes: 	by the attraction of the sun and sistence of the sun and sistence of the sun and short of the sun and short of the sun and space-cone instant to instant to instant the variable parts of θ and ψ the equator and the moon's orbit ession of the nodes of the moon's of the earth on the motion of the	moon	- 199 - 201 - 202 - 204 - 206 - 207 - 209 - 212 - 214 - 216 lence 217 - 219 - 221
	CHAPTER XI		
THE FREE PRECESSIO	N OF THE EARTH. FURTH	IER DISCU	SSION
 Influence of the internal cons Results of elastic solid theory Period of free precession for Rise or fall of the earth's sur Positions of the earth's prince 	e, instantaneous axis, and axis of stitution of the earth	\frac{1}{2} - \frac{1}{2}	- 228 - 228 - 229 - 230

CONTENTS

CHAPTER XII

CALCULATION	\mathbf{OF}	THE	PATH	OF	THE	AXIS	\mathbf{OF}	Α	TOP	\mathbf{BY}
		THE TANK	OMIC TI	ATTENT?	COL	a				

	ELLIPTIC INTEGRALS		
	TION		PAGI
	Euler's parameters	-	- 239
	Quaternion property of Euler's parameters	-	- 240
	Klein's parameters	-	- 24]
	Expression of Klein's parameters by elliptic integrals	-	- 242
5.	Relations of elliptic integrals. Expression of time of motion by	an ellip	
	integral	-	- 242
	Relations of elliptic integrals	•	- 244
7.	Formulae for the numerical calculation of elliptic integrals of the	e first	
	second kinds	-	- 245
	Landen's transformation	-	- 246
	Convergent series for elliptic integrals	•	- 248
	Jacobi's Θ -functions. Expression in q -series		- 248
11.	Calculation of complete elliptic integrals by q-series. Numerical exa	ample	- 249
	Numerical calculation for an actual top	-	- 251
13.	Actual top: different speeds of rotation	•	- 252
	Numerical determination of the axes of an actual top to the vertical Numerical examples of the motion of a top		- 253
	Numerical examples of the motion of a top Calculation of complete and incomplete elliptic integrals of the secon		- 253
	Numerical examples	ia kina	- 254
	Formulae for the azimuthal angle ψ	•	- 255
	Elliptic integral expressions for the angles ψ and ϕ	•	- 257 - 258
	Numerical calculation of time in terms of the angle θ , for an actual θ		- 259
	Numerical calculation of elliptic integrals of the third kind	. qu	- 261
	Numerical calculation of ψ for any step in time	_	- 262
22.	Trumorrous outstands of y for the j week in the same		- 202
	CHADDED WIII		
	CHAPTER XIII		
	LIQUID GYROSTAT. MISCELLANEOUS INVESTIGAT	TIONS	
,	Liquid gyrostats. Rotation of an ellipsoidal case filled with liquid		904
	Liquid gyrostats: theoretical discussion	•	- 264 - 266
	Limits of instability of a prolate liquid ellipsoid of revolution -	-	- 267
	A cylinder moving in an infinite perfect fluid which circulates round it	. (1) 00	
7.	of no forces	. (1) 00	- 269
5	A cylinder moving in an infinite perfect fluid with circulation: (2) of	ase of e	
0.	traneous forces	-	- 271
ß	Drift of a rotating projectile: case of a golf ball		- 272
	Drift of an elongated fast spinning projectile	_	- 274
	Action of friction	-	- 275
9.	Graphical representation of the motion	_	- 276
10.	Position of centre of effort for an air-ship	_	- 278
11.	Motion of a perforated solid in a perfect fluid. Use of Lagrange's eq	uations	- 278
12.	Motion of a ring in a perfect fluid. Equation of energy	•	- 279
13	Impulse of the motion of a solid in a fluid	-	- 280
14.	Equations of motion of a solid in a perfect fluid: proof (a) by first	principle	
	(b) by the method of Lagrange		- 280
15.	Vibrations of a ring moving in a fluid. Quadrantal pendulum -	-	- 282

	CONTENTS			xv
SECTI	М			PAGE
	Elliptic integral discussion of finite oscillations		•	283
17.	Graphical representation of the motion of a ring in a fluid -		•	284
18.	Stability of a body rotating in a fluid		-	285
	CHAPTER XIV			
	EFFECTS OF AIR FRICTION AND PRESSURE. BOOM	IERA]	NGS	
	Air friction on a rotating body: (1) no other applied forces -		· -	287
	Discussion of results of theory		-	288
3.	Air friction on a rotating body: (2) an ordinary top under gravity	-		288
4.	Discussion of cases: (1) t small, (2) t great		. -	289
5.	Calculation of the small terms in the equations. Discussion of case	es -	. -	290
	Motion of a flat disk. The boomerang			291
7.	General explanation of the motion of a boomerang. Specification	of force	es -	292
8.	Trajectory of a light disk in its own plane			293
	Returning boomerangs. Propeller action of twist of the arms			293
	Difficulties of a complete theory. Approximate constants of the r		-	294
11.	Motion with change of direction of the plane of motion	-		295
12.	Effect of twist and "rounding" of the boomerang. Multiple loops	s in the	path	295
	HE SPHERICAL PENDULUM. MOTION OF A PARTICLE OF REVOLUTION			
	A top turning about a fixed point and destitute of A.M. about its a	xis of	figure	
	Calculation of the azimuthal motion			299
3,	Azimuthal angle described by pendulum from one limiting circle	to the	other	
	exceeds $\frac{1}{2}\pi$ and is less than π			300
4.	Azimuthal speed very great: the limiting circles are nearly coincid	lent wi	th the	
J	equatorial circle	-		302
	Pendulum nearly vertical. Theorem of Bravais	-		302
	Pendulum nearly vertical. Theorem of Lagrange			303
	The azimuthal angle from one limiting circle to the other proved le			304
	Possibility of motion of rise and fall on a surface of revolution wit		vertic	
	Motion on a developable surface is replaceable by motion in plano		• •	305
	Motion of a particle between two close circles on a surface of revol		-	307
	Spherical pendulum: initial motion in the plane of the equatorial of			308
	A simple pendulum oscillating through a finite range			309
	Discussion of the force along the supporting cord or rod of a simp	ie penc	ıuıum	311
	Graphic representation of finite pendulum motion	-		312
	A simple pendulum making complete revolutions	- :	 	313
10.	Spherical pendulum: reaction of the surface on a particle move	ing on	it, or	
17	force applied at the point of support	- ,	•	314
11.	Motion of the bob of a spherical pendulum referred to recta	ngular	axes.	
10	Discussion of the motion by Weierstrassian elliptic functions	-	- •	316
	Calculation of θ in terms of t	•		317
	Calculation of the azimuthal angle by means of Lamé's equation	•	•	318 320
	Calculation of azimuthal motion continued Direct determination of azimuthal motion	•	- ·	320
	- * * * * * * * * * * * * * * * * * * *	-		040

SECT				PAGE 321
	Proof of Bravais's theorem by elliptic functions Special cases of the spherical pendulum -	•	•	323
	Motion of a particle on a concave surface of revolution -		_	325
	Motion of a particle on a paraboloid with axis vertical		_	326
	Cases integrable by elliptic functions		_	328
	A ball rolling on a concave spherical surface			328
	Reaction of the surface on the rolling ball		Ī	330
	10000000 01 010 0011000 011 0110 10111115 0011			000
	APPENDIX TO CHAPTER XV			
	Comparison of photographs of the paths of an actual pendulun	ı with	the	
	theoretical paths	-	-	331
	CHAPTER XVI			
		37 337 EF	דמום	
	DYNAMICS OF A MOVING FRAME CONTAINING A FL	X VV II.	بانانا	
	General equations for moving origin and axes	•	-	332
	Expanding or contracting bodies. Mean axes		-	334
	Expanding or contracting body unacted on by force	-	-	338
	Rigid body containing a flywheel and turning about an axle		-	339
	Gilbert's barogyroscope		-	342
	Relative equilibrium of a rigid body: oscillations about steady mot	ion -	-	343
	Watt's steam engine governor		-	343
	Watt's governor: elliptic function discussion -		-	345
	Watt's governor: case in which the arms reach the upward vertical		-	346
	Example: a liquid filament in a revolving vertical circular tube		-	347
тт.	Example: a ball containing a gyrostat and rolling without slip horizontal table	phing	on a	940
10	A rolling ball containing a gyrostat. Track on the table	-	•	$\frac{349}{351}$
14. 12	A rolling ball containing a gyrostat		-	353
14	A rolling ball containing a gyrostat		-	354
15.	A rolling ball containing a gyrostat. Small oscillations about st	rainht.	line	004
-0.	motion	. angiio	-	354
16.	A rolling ball containing a gyrostat. Method of solution by direct	t refer	ence	001
	to first principles		-	356
17.	Example: A cylinder containing a gyrostat and rolling on a horize	ontal r	lane	357
	From Front 11 of 2-1402 to 101111111111111111111111111111111111	omen I	10110	00,
	CHAPTER XVII			
	MOTION OF AN UNSYMMETRICAL TOP			
1	General equations of motion			358
	Stability of a body spinning about a nearly vertical axis			359
	General case: lines of curvature of the surface at contact not par-	allal ta	the.	909
υ.	principal axes through the centroid		, unc	361
4	Motion of stone celts. A body spins steadily in one direction on a	horiza	ntal	901
x.	table, unsteadily in the other direction		- - - -	363
5.	Experiments with a top supported on an adjustable curved surface			363
	Effect of oscillations in producing azimuthal turning of the body			365
	Summary of results		-	366
	· · · · · · · · · · · · · · · · · · ·			

	CONTENTS	xvii
SECT	TON	PAGE
	Hess's particular solution of the problem of an unsymmetrical top -	366
9.	Other particular solutions	- 368
10.	Tshapliguine's integral	. 369
11.	The principal invariants of an unsymmetrical top	369
12.	The Hess-Schiff equations of motion of a top	370
13.	The Hess-Schiff equations are inapplicable to a symmetrical top under gravity	372
14.	The instantaneous axis is fixed in the body and the resultant angular speed is	3
	constant. Staude's cone	. 372
15.	Case of resultant A.M. of constant amount	. 373
16.	Case in which $S=0$. 373
17.	Motions when $S=0$	374
18.	Motion when S=0. Pendulum motions	375
19.	Motion when S=0. Distinction between cases	376
	Steady motion of an unsymmetrical top. Vibrations about steady motion	376
	A homogeneous ellipsoid spinning on a horizontal plane	377
22.	Stability of any solid with a principal axis normal to the horizontal surface	379
	CHAPTER XVIII	
	THE RISING OF A SYMMETRICAL TOP SUPPORTED ON A HORIZONTAL SURFACE	
1.	A top supported on a rounded peg	382
	Varying motion of a top on a rounded peg	384
	A top supported on a circular edge round the axis of figure	385
	A top on a rounded peg and containing a flywheel	386
	Problem of a disk or hoop on a horizontal plane	388
	A coin spinning on a table	389
	A disk rolling on a table: calculation from first principles	391
	Rising of a top when spinning on a rounded peg: elementary discussion	391
	Centre of gravity of a top raised by friction	394
	Condition of minimum kinetic energy	395
	Minimum kinetic energy is a necessary but not a sufficient condition for the	
***	erection of a top	396
12.	Summary of conditions for the rising of a top	398
	Numerical examples	399
	Example: A top in form of a sphere loaded symmetrically about a diameter	400
	A uniform sphere loaded symmetrically	401
	A heterogeneous sphere with centre of gravity at the centre of figure	401
	Further examples	- 402
	Energy relations for a top spinning about a fixed point, and taking up steady	
	motion	402
	CHAPTER XIX	
	GENERAL DYNAMICS OF GYROSTATIC AND CYCLIC SYSTEMS	
1.	General equations of dynamics. Holonomous and not holonomous systems -	404
	Generalised coordinates	405
	Lagrange's equations of motion	406
	Conditions fulfilled by generalised coordinates	407
	Proof of Euler's equations by vectors	408
٠.		

ECTI			
	Generalised momenta. Hamilton's dynamical equations. Canonical eq	uati	ons
	Systems which are not holonomous	-	-
	Conditions necessary for the usual form of Lagrange's equations	-	-
	Equations of motion for systems which are not holonomous -	-	•.
	Ignoration of coordinates for group of constant momenta	-	-
	Ignoration of coordinates. Formation of equations of motion -	-	-
	Routh's rule for ignoration of coordinates. Gyrostatic terms -	-	-
13.	Cyclic systems. Kinetic potential	-	•-
14.	Reversibility of the motion of a system	-	-
15.	Stability of the motion of a cyclic system	-	-
16.	Visible and concealed coordinates. Nature of potential energy -	-	-
17.	Case of a group of constant velocities	-	-
18.	Relative potential energy. Stability of relative equilibrium	-	-
	Illustrations of the general equations of motion. Motion of a partic	le iı	ı a
	plane curve	-	_
20.	Illustrations of the general equations of motion. Gyrostatic pendulum		
	Discussion of the gyrostatic pendulum		-
	A gyrostatic pendulum oscillating through a small range	-	
	Motion of a hoop or disk treated by modified Lagrangian equations	_	_
	Hamilton's principal function. Integration of the canonical equations	-	_
	Jacobi's theorem of the complete integral of the canonical equations	_	_
	Case in which H does not contain t	_	-
		- hv	the
ZI.	A top on a horizontal plane without friction. Jacobi's solution	Бу	ше
	Hamilton-Jacobi method	•	•
	CHAPTER XX		
	•		
1	THEORY OF GYROSTATIC DOMINATION	_	
	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	-	-
2.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		
2. 3.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		- -
2. 3. 4.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	-	- -
2. 3. 4. 5.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		
2. 3. 4. 5. 6.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		
2. 3. 4. 5. 6. 7.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion Cycloidal systems containing flywheels Effect of repeated roots of the determinantal equation on stability Motional forces. Dissipation function Motional forces zero. Gyrostatic systems Example: Gyrostatic pendulum, two freedoms Gyrostatic systems with three freedoms. Electric and magnetic analog Gyrostatic domination. Large and small roots of the determinantal eq Gyrostatic systems with four freedoms		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion		-
2. 3. 4. 5. 6. 7. 8.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion Cycloidal systems containing flywheels Effect of repeated roots of the determinantal equation on stability Motional forces. Dissipation function Motional forces zero. Gyrostatic systems Example: Gyrostatic pendulum, two freedoms Gyrostatic systems with three freedoms. Electric and magnetic analog Gyrostatic domination. Large and small roots of the determinantal eq Gyrostatic systems with four freedoms	uatio	- - - - on -
2. 3. 4. 5. 6. 7. 8. 9.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio	- - - - on -
2. 3. 4. 5. 6. 7. 8. 9.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio - A T	on -
2. 3. 4. 5. 6. 7. 8. 9.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio - A T	on -
2. 3. 4. 5. 6. 7. 8. 9.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio - A T	on -
2. 3. 4. 5. 6. 7. 8. 9. 1. 2. 3.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio - A T	on -
2. 3. 4. 5. 6. 7. 8. 9. 1. 2. 3. 4.	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	uatio - A T	on -
2. 3. 4. 5. 6. 7. 8. 9. 1. 2. 3. 4. 5	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	A 7	COP
2. 3. 4. 5. 6. 7. 8. 9. 1. 2. 3. 4. 5	THEORY OF GYROSTATIC DOMINATION Cycloidal motion	A 7	COP

	CONTENTS			xix
SECT	ION			PAGE
	Herpolhodes	-	-	451
	Variation of the radius vector of the herpolhode with time	-	-	452
	Differential equation of the herpolhode	-	-	453
10.	Radius of curvature of the herpolhode	-	-	454
	Special case of the herpolhode	-	-	455
	Stability of the motion of a symmetrical body under no force -	-	-	455
13.	Space-cone and body-cone according as C is the greatest or the least m	omeı	1t	
	of inertia	-	-	456
	Illustration of the stability of a body under no forces	-	-	457
	Stability of a top under no forces. Diabolo	-	÷	458
	Stability when the body under no forces is unsymmetrical -	-	-	459
	Extension of Poinsot's theory to the motion of a top	-	-	460
	The outer extremity of the I.A. for a top lies on a fixed spherical surface	-	-	461
19.	Reduction of the locus of the extremity of the I.A. to a plane -	-	-	462
	The locus of the extremities of the I.A. for the top is a polhode	-	-	463
	Case of an unspherical top	-	-	464
	Passage from one Poinsot movement to another	-	-	465
	Passage back from the second movement to the first	-	-	466
	Body-cone and space-cone for associated movements	-	•	467
	The polhode for a top as the intersection of two surfaces of the second de			468
	Relation of the curve of intersection of the two surfaces to a family of co	nfoca	als	469
	Determination of the parameters of the confocals	-	-	470
	Motion of the axis of a top represented by a deformable hyperboloid	-	-	472
	Forces acting on the body carried by the body-cone	-	-	473
	Determination of the constants of the surfaces	-	-	474
	Determination of constants for the associated motion	-	-	475
	Deformation of the hyperboloid of one sheet as the top moves	-	-	476
	Summary of results	-	•	477
	Calculation of the motion of the axis. Different forms of the energy equ	ation	1	478
	Calculation of t in terms of $\cos \theta$	-	-	480
	Path of the extremity of the vector representing the resultant A.M	-	-	480
31.	Hodograph for the motion of a top	-	-	482
	CHAPTER XXII ANALOGY BETWEEN A BENT ROD AND THE MOTION OF WHIRLING OF SHAFTS, CHAINS, ETC.	А ТО	OP.	
	Flexure of a thin bar: analogy to the motion of a top	-	- .	483
	Equations of equilibrium	-	· -	484
	Case of bending in one plane	-	-	487
4.	Bending in one plane represented by pendulum motion	-	-	486
	A thin bar bent into a helix is analogous to a top in steady motion	-	-	489
6.	A helix held in equilibrium by a couple or by axial force	-	-	492
	A gyrostat on an overhanging flexible shaft. Equilibrium of the shaft	-	-	493
	Determination of the gyrostatic couple	-	-	494
9.	A rotor carried midway between the two bearings of a flexible shaft	-	-	495
	The free period of an oscillatory disturbance of a rotating shaft -	-	-	497
	Quasi-rigidity of a moving chain. Equations of motion	-	-	498
12.	A bend in a moving chain is not carried along the chain by the moving lin	nks	-	499

 $\mathbf{x}\mathbf{x}$

14. A revolving chain under no forces. General case 15. A revolving chain in a plane containing the axis of rotation 16. Revolving chain with independent tangential motion 17. Calculation of the vectorial angle for the case of 15 18. Integration by elliptic functions CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure; motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained by two vertical planes parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A sphere started spinning about an axis parallel to the earth's axis, and constr		
14. A revolving chain under no forces. General case 15. A revolving chain in a plane containing the axis of rotation 16. Revolving chain with independent tangential motion 17. Calculation of the vectorial angle for the case of 15 18. Integration by elliptic functions CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope mounted on the earth 3. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostate contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, start		
16. A revolving chain in a plane containing the axis of rotation 16. Revolving chain with independent tangential motion 17. Calculation of the vectorial angle for the case of 15 18. Integration by elliptic functions CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The are described by a point on the axis of a rapidly spinni		
16. Revolving chain with independent tangential motion 17. Calculation of the vectorial angle for the case of 15 18. Integration by elliptic functions CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope with its axis of spin a generator of a cone fixed on the earth 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyroscope in a spherical case hung by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top suppo	15.	A revolving chain in a plane containing the axis of rotation
CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The are described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum experiment 29. Revolving balance show		
CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope with its axis of spin a generator of a cone fixed on the earth 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 10. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 11. A body supported at its centroid and under the action of a constant couple 12. A spherical gyrostat contained within a rolling sphere 13. The ordinary problem of a rapidly spinning top, started by unwinding a string 14. The arc described by a point on the axis of a rapidly spinning top 15. A top supported on a horizontal plane without friction 16. Motion relative to the earth 17. Theory of Foucault's pendulum experiment 18. Analogy of Foucault's pendulum experiment		• • .
CHAPTER XXIII EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth		0
EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION 1. A gyroscope mounted on the earth		==vogawio= by output removes
1. A gyroscope mounted on the earth 2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum experiment 29. Revolving balance showing the earth's rotation. Experiment of		CHAPTER XXIII
2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum to a gyrostatic pendulum 28. Analogy of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Expe		EXAMPLES OF GYROSTATIC ACTION AND ROTATIONAL MOTION
2. A gyroscope with its axis of spin a generator of a cone fixed on the earth 3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum to a gyrostatic pendulum 28. Analogy of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Expe	1.	A gyroscope mounted on the earth
3. A gyroscope on gimbal rings. Equation of energy 4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A oylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
4. Differential equations of motion for Example 3 5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 19. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum experiment 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		9 .
5. A gyroscope in a spherical case hung by a string 6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane - 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
6. A gyrostat suspended by a string 7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		•
7. Constraining couple required for the rolling of a body-cone on a space-cone 8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane 10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
8. Pseudo-elliptic case of the motion of a top 9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane - 10. A cylinder rolling on the circular edge of one end - 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface - 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface - 13. A sphere rolling on a vertical plane which turns about a vertical axis - 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis - 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line - 16. A heavy flywheel with an added eccentric weight carried round in uniform precession - 17. A top constrained by two vertical planes parallel to the axis - 18. Stability of a ring of wire spinning on the top of a sphere - 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves - 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian - 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere - 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top - 25. A top supported on a horizontal plane without friction - 26. Motion relative to the earth - 27. Theory of Foucault's pendulum experiment - 28. Analogy of Foucault's pendulum to a gyrostatic pendulum - 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		OF 1 0 0
9. A symmetrical shell containing a gyrostat and rolling on a horizontal plane - 10. A cylinder rolling on the circular edge of one end - 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface - 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface - 13. A sphere rolling on a vertical plane which turns about a vertical axis - 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis - 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line - 16. A heavy flywheel with an added eccentric weight carried round in uniform precession - 17. A top constrained by two vertical planes parallel to the axis - 18. Stability of a ring of wire spinning on the top of a sphere - 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves - 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian - 21. A body supported at its centroid and under the action of a constant couple - 22. A spherical gyrostat contained within a rolling sphere - 23. The ordinary problem of a rapidly spinning top, started by unwinding a string - 24. The arc described by a point on the axis of a rapidly spinning top - 25. A top supported on a horizontal plane without friction - 26. Motion relative to the earth - 27. Theory of Foucault's pendulum experiment - 28. Analogy of Foucault's pendulum experiment - 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
10. A cylinder rolling on the circular edge of one end 11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface 12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		± •
11. A hollow cone revolving about a vertical generator: motion of a sphere on the surface		• • • • • • • • • • • • • • • • • • • •
surface		·
12. A horizontal circular disk turning about its axis of figure: motion of a sphere on the surface		<u> </u>
on the surface 13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös	12.	
13. A sphere rolling on a vertical plane which turns about a vertical axis 14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		9 .
14. The vertical plane and sphere of 13 when the plane turns also about a normal axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös	13.	
axis 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		•
 15. A rigid body turning about a principal axis while another principal axis lies in a plane through the former and a fixed line		• •
in a plane through the former and a fixed line 16. A heavy flywheel with an added eccentric weight carried round in uniform precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös	15.	
16. A heavy flywheel with an added eccentric weight carried round in uniform precession		
precession 17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös	16.	
17. A top constrained by two vertical planes parallel to the axis 18. Stability of a ring of wire spinning on the top of a sphere 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves		
 Stability of a ring of wire spinning on the top of a sphere A gyrostat spinning freely between two rods the (vertical) plane of which revolves 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian A body supported at its centroid and under the action of a constant couple A spherical gyrostat contained within a rolling sphere The ordinary problem of a rapidly spinning top, started by unwinding a string The arc described by a point on the axis of a rapidly spinning top A top supported on a horizontal plane without friction Motion relative to the earth Theory of Foucault's pendulum experiment Analogy of Foucault's pendulum to a gyrostatic pendulum Revolving balance showing the earth's rotation. Experiment of Eötvös 	17.	*
 19. A gyrostat spinning freely between two rods the (vertical) plane of which revolves		· · · · · · · · · · · · · · · · · · ·
revolves		
 20. A sphere started spinning about an axis parallel to the earth's axis, and constrained to keep the axis of spin in the meridian		, , , ,
strained to keep the axis of spin in the meridian 21. A body supported at its centroid and under the action of a constant couple - 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum - 29. Revolving balance showing the earth's rotation. Experiment of Eötvös -	20.	
21. A body supported at its centroid and under the action of a constant couple 22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
22. A spherical gyrostat contained within a rolling sphere 23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös	21.	
23. The ordinary problem of a rapidly spinning top, started by unwinding a string 24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
24. The arc described by a point on the axis of a rapidly spinning top 25. A top supported on a horizontal plane without friction 26. Motion relative to the earth 27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös -		
25. A top supported on a horizontal plane without friction	24	The arc described by a point on the axis of a repidly spinning ton
26. Motion relative to the earth		
27. Theory of Foucault's pendulum experiment 28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
28. Analogy of Foucault's pendulum to a gyrostatic pendulum 29. Revolving balance showing the earth's rotation. Experiment of Eötvös -		·
29. Revolving balance showing the earth's rotation. Experiment of Eötvös		
Index	40	. Lievorving balance showing the earth's rotation. Experiment of Ectyos
		INDEX