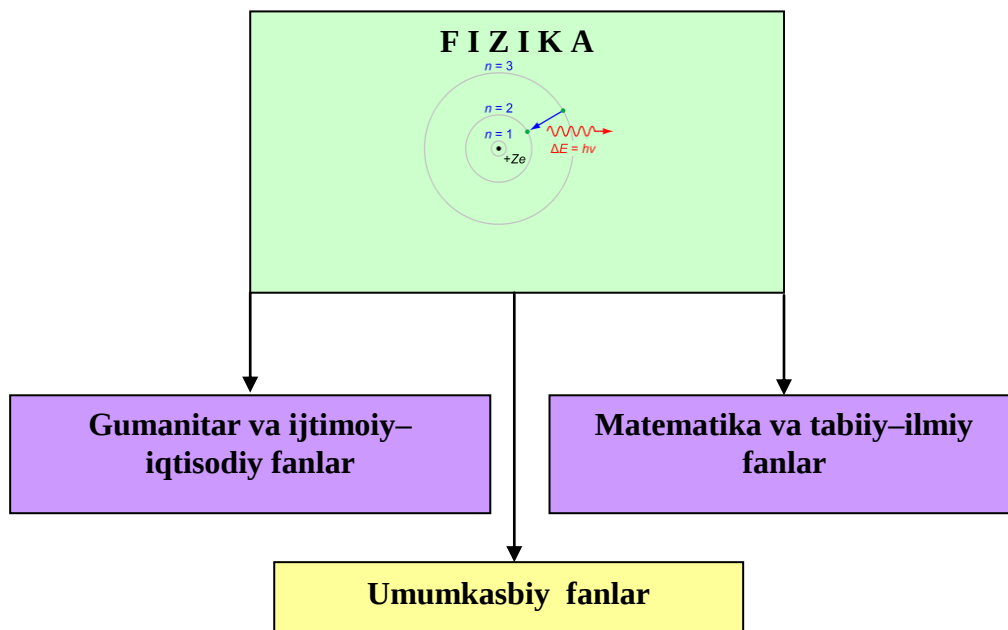


«FIZIKA»
O‘QUV KURSINING MA’RUZA, AMALIY VA
LABORATORIYA MASHG‘ULOTLARIDA O‘QITISH
TEXNOLOGIYALARI

KIRISH	KIRISH SUHBATI. FIZIKA–FAN SIFATIDA UNING PREDMETI VA TADQIQOT METODLARI
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1.1. MA’RUZANI OLIB BORISH TEXNOLOGIYASI	
O‘quv soati: –2 soat	Talabalar soni: – 50
O‘quv mashg‘ulot shakli	Ma’ruza
Ma’ruza rejasi:	1.Fizikaning texnika, ishlab chiqarish va boshqa fanlar bilan aloqasi. 2.Materiya. Modda va maydon. Dialektik nuqtai nazardan fizikaviy hodisalarni to‘g‘ri tushunishning asosi. 3.Tabiiy–ilmiy va texnika haqidagi fanlarning tadqiqotlarida fizikaviy metodlarining roli.
O‘quv mashg‘ulotining maqsadi:	Fizikaning texnika, sanoat sohasidagi va boshqa fanlar bilan aloqasini materiya, modda va maydon tushunchalarini dialektik nuqtai nazardan fizikaviy hodisalarni to‘g‘ri tushunishdan iborat.
O‘qitish metodlari:	Ma’ruza, klastr, aqliy hujum, toifalash jadvali, konseptual jadval, T–jadval va Venna doirasi.
O‘qitish vositalari:	Ma’ruza matni, kompyuter slaydlari, doska, multimediya, proyektor.
O‘qitish shakllari:	Frontal, kollektiv ish.
O‘qitish sharoiti:	Kompyuter bilan ta’minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og‘zaki baholash, savol–javob.

1.1.MA’RUZANING TEXNOLOGIK XARITASI

Ish bosqichlari	O‘qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining mazmuni
1–bosqich.	1.1.Fan nomini aytadi. Ta’lim yo‘nalishi bo‘yicha fizikaga ajratilgan nazariy va amaliy o‘quv soatlar bilan tanishtiradi (1–ilova).	Tinglaydi.

Fizika faniga kirish (20 daqiqa)	1.2.Fizika fanidan talabalar bilimini nazorat qilishning reyting tizimi bilan tanishtiradi (2–ilova).	Tinglaydi, yozadi.
	1.3.Fizika kursidagi barcha mavzular bilan talabalarni qisqacha tanishtiradi.	Tinglaydi, yozadi.
	1.4.O‘quv mashg‘uloti mavzusi, maqsadi va o‘quv faoliyati natijalarini aytadi.	Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo‘lim (50 daqiqa)	2.1.Shu mavzu bo‘yicha ma’ruza matnini tarqatadi va mavzu rejasi, tayanch iboralar bilan tanishib chiqishni so‘raydi.	O‘qiydi.
	2.2.Fizika va ilmiy dunyoqarash masalalari tahlil qilinadi (3–6 ilovalar).	Eshitadi.
	2.3.Fizikaning tabiiy ilmiy fanlar (astronomiya, kimyo, biologiya va tabiiy geografiya), aniq, ijtimoiy–iqtisodiy va gumanitar fanlar bilan aloqasi (7–ilova).	Kerakli joylarni yozib oladi.
3–bosqich. Yakunlovchi (10 daqiqa)	3.1.Mavzu bo‘yicha yakunlovchi xulosalar qiladi. Mavzu bo‘yicha olingan bilimlarni qayerda ishlatish mumkinligi ma’lum qiladi (8–9–ilovalar).	Savollar beradi.
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	Eshitadi.

ILOVALAR:

1–Ilova.

O‘QUV MATERIALLARINING TARKIBI:

Fan bo‘yicha o‘quv mashg‘ulotlari va ular uchun ajratilgan vaqt

O‘quv semestri	Hammasi	Auditoriya mashg‘ulotlari					Mustaqil ish
		Jami	Ma’ruza	Amaliy	Laboratoriya	Seminar	
I	178	108	54	18	36	–	70
II	122	72	36	18	18	–	50
JAMI	300	180	90	36	54	–	120

FAN BO‘YICHA TALABALAR BILIMINI NAZORAT QILISH

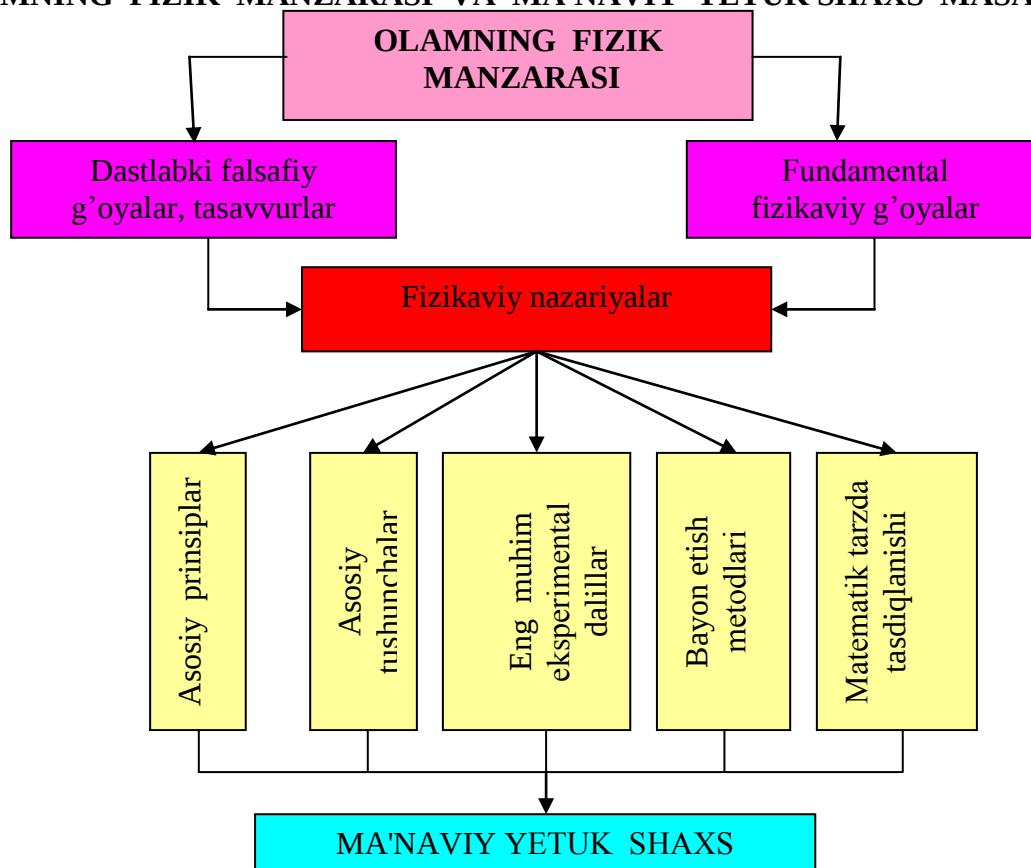
Reyting ballar hisobi jadvali

Maksimal ball – 100

Saralash ball – 55

№	Nazorat turi	Nazorat soni	Bir nazorat uchun ball	To‘plagan ball	Izoh
I–joriy nazorat:					
1	Laboratoriya mashg‘ulotlaridan to‘plagan bali	7	2	14	
2	Amaliy mashg‘ulotlaridan to‘plagan bali	5	2	10	
3	Mustaqil ish: –referat tayyorlab topshirgani uchun – mustaqil konspekti yuzasidan og‘zaki so‘rov	2 2	4 4	8 8	
	JN uchun jami:	16		40	
II–oralik nazorat:					
4	Birinchi oraliq nazorat	1	15	15	
5	Ikkinchi oraliq nazorat	1	15	15	
	ON uchun jami:	2		30	
III–yakuniy nazorat:					
6	yaakuniy yozma ish	1		30	
	yaan uchun jami:			30	
	JAMI:			100 ball	

OLAMNING FIZIK MANZARASI VA MA'NAVIY YETUK SHAXS MASALASI



MODDIY OLAM

	Fazoviy o'lchamlar	Elementlarning asosiy tuzilishi	O'zaro ta'sirlarning asosiy turlari
Mikroolam	$< 10^{-8} m$	Molekulalar. Atomlar. Elementar zarrachalar.	Elektromagnit. Kuchli. Kuchsiz.
Makroolam	$10^{-8} m - 10^{20} m$	Yerdagi jismlar. Yer va boshqa sayyoralar. Yulduzlar. Gravitasion va elektromagnit maydonlar.	Gravitasion. Elektromagnit.
Megaolam	$> 10^{20} m$	Galaktikalar. Gravitasion va elektromagnit maydonlar.	Gravitasion. Elektromagnit.

FIZIKAVIY NAZARIYA ASOSLARI

Nazariya	Fazo sohasi	Ob'yekt Turlari	O'zaro ta'sir turlari	Hodisa va jarayon turlari
Mexanika	$10^{25} - 10^{-8} m$ (shartli)	Yulduzlar, planetalar, yerdagi jismlar	Gravitatsion, elektromagnit	Makro jismlarning fazodagi harakati: yulduzlar, sayyoralar, kemalar, samolyotlar va boshqalar.
Elektrodinamika	$10^{25} - 10^{-17} m$ (shartli)	Maydon, to'liqlar, zaryadlar	Elektromagnit	Elektr maydonning mavjudligi. Elektromagnit to'liqlarning tarqalishi. Yorug'lik. Elektr toki. Magnit maydon.
Kvant mexanikasi	$10^{-8} - 10^{-13} m$	Atomlar, atom va molekulalarda elektronlar	Elektromagnit	Atom sistemalarining kvant energiyalari. Yorug'likning nurlanishi va yutilishi. Mikrozarralarning o'zaro ta'siri.
Kvant elektrodinamika	$10^{-8} - 10^{-18} m$	Elektronlar, Fotonlar	Elektromagnit	Fotonlar va elektronlarning o'zaro ta'siri: jismlarning issiqlik nurlanishi. Kompton effekti va boshqalar.
Kuchli va kuchsiz o'zaro ta'sirlar nazariyasi	$10^{-13} - 10^{-18} m$	Elementar zarrachalar	Kuchli va kuchsiz o'zaro ta'sirlar	Elementar zarrachalarning o'zaro almashinishi.

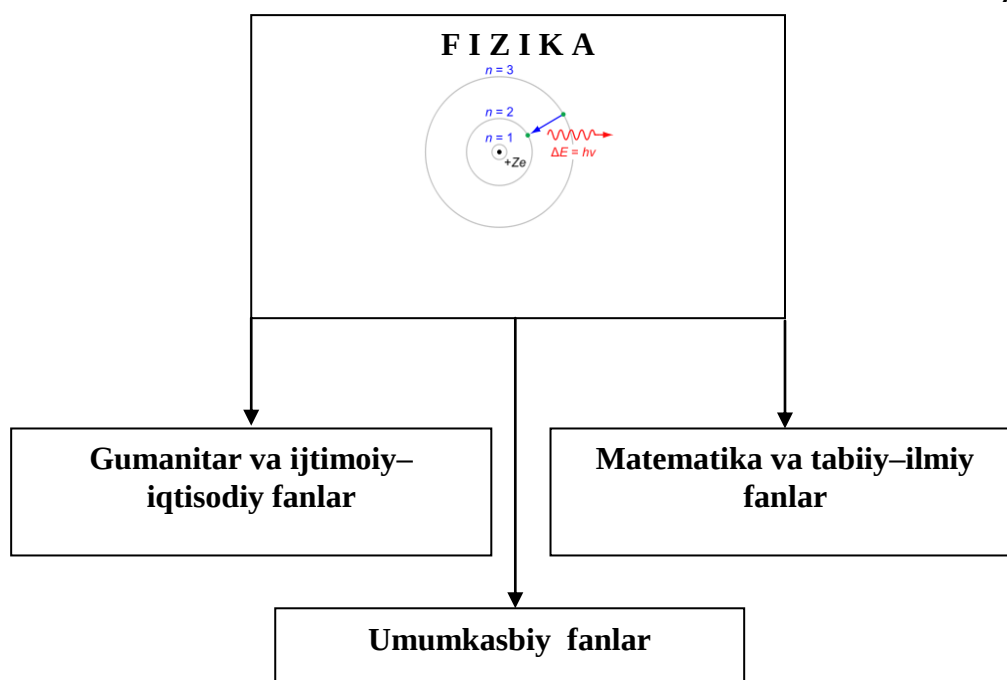
Statistik fizika	$10^{25} - 10^{-17} m$	Elektronlar sistemasidan yulduzlar sistemasigacha	Ixtiyoriy	Suyuqlik va gazlarda molekulalar harakati, radioaktiv yemirilish, plazma va boshqalar.
Termodinamika	$10^{25} - 10^{-3} m$ (shartli)	Istalgan makro sistemalar	Elektromagnit	Issiqlik uzatish. Ish.

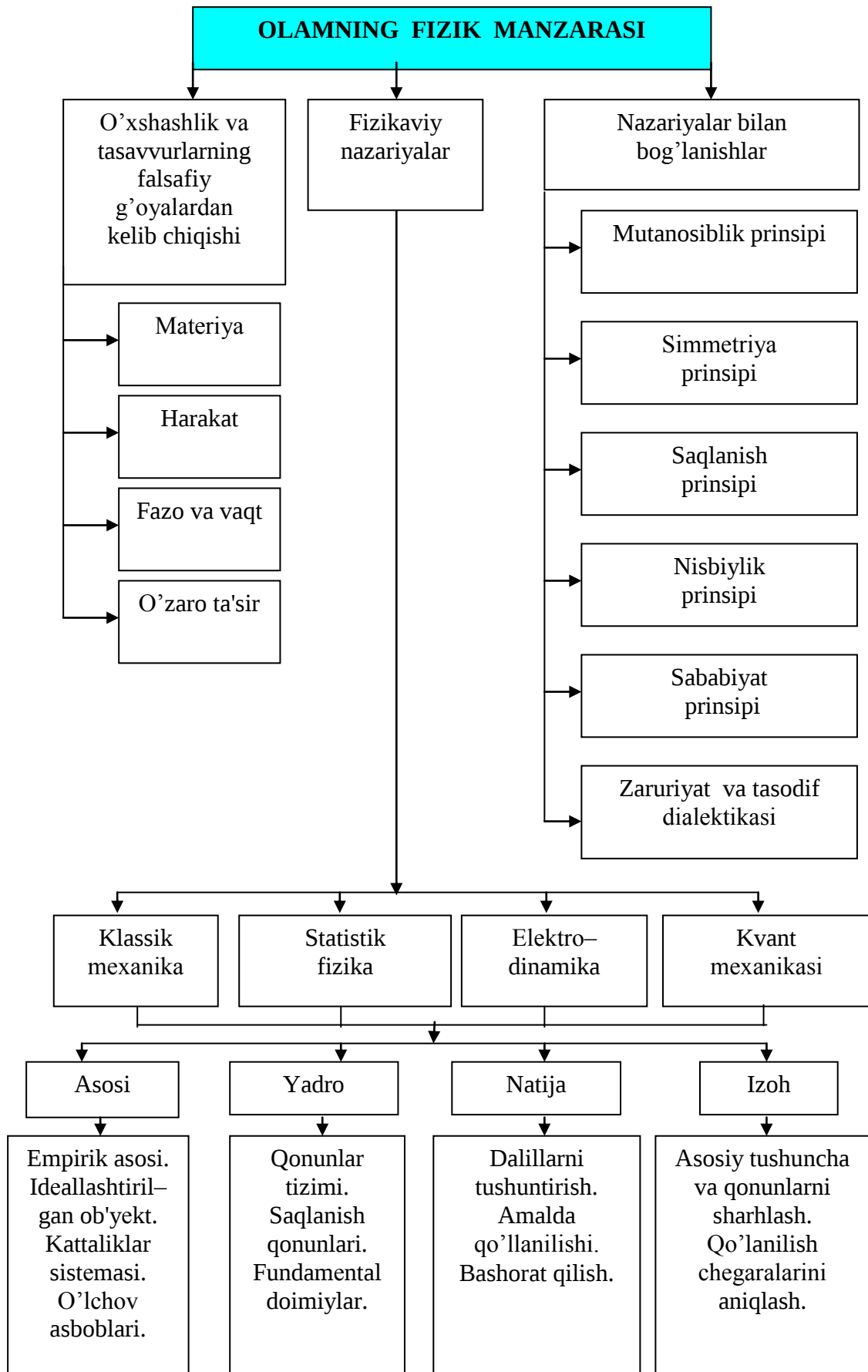
6–Ilova.

OLAMNING FIZIK MANZARASINI ANGLASH



7–Ilova





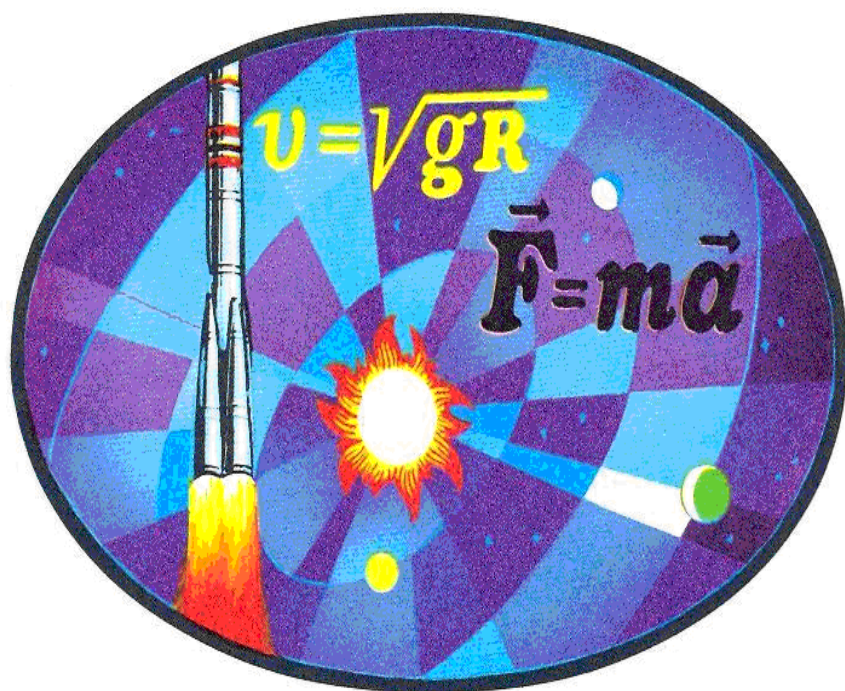
XALQARO SISTEMA (SI) DA FIZIK KATTALIKLARNING O'LCHOV BIRLIKLARI

Kattalikning nomi	Kattalikning o'lchov birligi		
	Nomi	belgisi	Ta'rifi
Asosiy birliklar			
Uzunlik	Metr	m	Kripton–86 atomining $2p_{10}$ va $5d_5$ sathlari orasidagi o'tishga mos bo'lgan vakuumdagi nurlanishning 1.650.763.730 ta to'lqin uzunligi 1 metr deb qabul qilingan.
Massa	Kilogramm	kg	Xalqaro kilogramm prototipining massasini 1 kilogramm deb qabul qilingan.
Vaqt	Sekund	s	Seziy–133 atomi asosiy holatining ikki o'ta nozik sathlari orasidagi o'tishga mos bo'lgan 9192631 770 nurlanish davri 1 sekund deb qabul qilingan.
Modda miqdori	Mol	mol	Uglerod–12 ning 0,012 kg massasidagi atomlar soniga teng element (masalan, atom, molekula, ion) lardan tashkil topgan sistemadagi modda miqdori 1 mol deb qabul qilingan.
Termodinamik temperatura	Kelvin	K	Suvning uchlanma nuqtasini xarakterlovchi termodinamik temperaturaning $\frac{1}{273,16}$ ulushi 1 kelvin deb qabul qilingan.
Elektr tokining kuchi	Amper	A	Amper–vakuumda bir–biridan 1 metr masofada joylashgan ikki parallel cheksiz uzun va kesimi juda kichik tug'ri o'tkazgichlardan tok o'tganda o'tkazgichning har 1m uzunligida $2 \cdot 10^{-7} N$ o'zaro ta'sir kuchi hosil qiladigan o'zgarmas tok kuchidir.
Yorug'lik kuchi	Kandela	kd	101325 Pa bosim ostidagi platinaning qotish temperaturasiga teng temperaturadagi to'lanurlangichning $\frac{1}{600000} m^2$ yuzasidan perpendikulyar yo'nalishda chiqarilayotgan yorug'lik kuchi 1 kandela deb qabul qilingan.
Qo'shimcha birliklar			
Yassi burchak	Radian	rad	Uzunligi radiusiga teng yoyga (aylana yoyiga) tiriluvchi markaziy burchak 1 radian deb qabul qilingan
Fazoviy burchak	Steradian	sr	Uchi sfera markazida bo'lgan va shu sfera sirtidan radius kvadratiga teng yuzali sirtini ajratadigan fazoviy burchakni 1 steradian deb qabul qilingan.



HOSILAVIY BIRLIKLAR

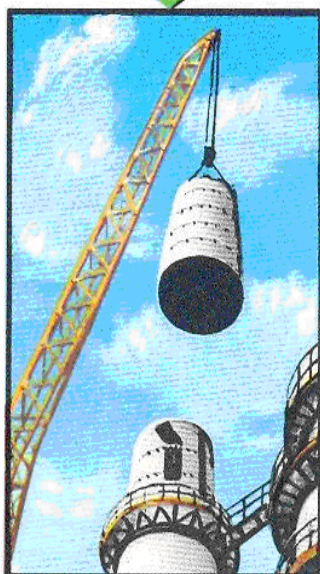
MEXANIKA



MEXANIZATSIYALASHTIRISH



TRANSPORT



QURILISH



QISHLOQ
XO'JALIK

1-MODUL
MEXANIKA ASOSLARI

1.1.–MAVZU	FIZIKA BO‘LIMLARI. MEXANIKA FAN SIFATIDA UNING PREDMETI VA TADQIQOT METODLARI. KINEMATIKA ASOSLARI
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1.1. MA’RUZANI OLIB BORISH TEXNOLOGIYASI	
O‘quv soati: –2 soat	Talabalar soni: – 50
O‘quv mashg‘ulot shakli	Ma’ruza
Ma’ruza rejasi:	1.Mexanik harakat. Fazo, vaqt, sanoq sistemalari haqida tushuncha. 2.To‘g‘ri chiziqli harakat va uning grafiklari. Egri chiziqli harakat. Aylanma harakat. 3.Erkin tushish. Yuqoriga tik otilgan jism harakati. Gorizontga qiya otilgan jism harakati.
O‘quv mashg‘ulotining maqsadi:	Fizika fanining predmeti, o‘rganish usullari. Sanoq sistemalarini tanlay bilish. Vektorlar ustida amallarni o‘zlashtirish. Harakatdagi jismning ko‘chishini topish asosida mexanikaning bosh masalasini yechish, jismning fazodagi koordinatasini aniqlash.
O‘qitish metodlari:	Ma’ruza, klaster, aqliy hujum, toifalash jadvali, konseptual jadval, T–jadval va Venna doirasi.
O‘qitish vositalari:	Ma’ruza matni, kompyuter slaydlari, doska, multimedia, proyektor.
O‘qitish shakllari:	Frontal, kollektiv ish.
O‘qitish sharoiti:	Kompyuter bilan ta’minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og‘zaki baholash, savol–javob.

1.1.MA’RUZANING TEXNOLOGIK XARITASI

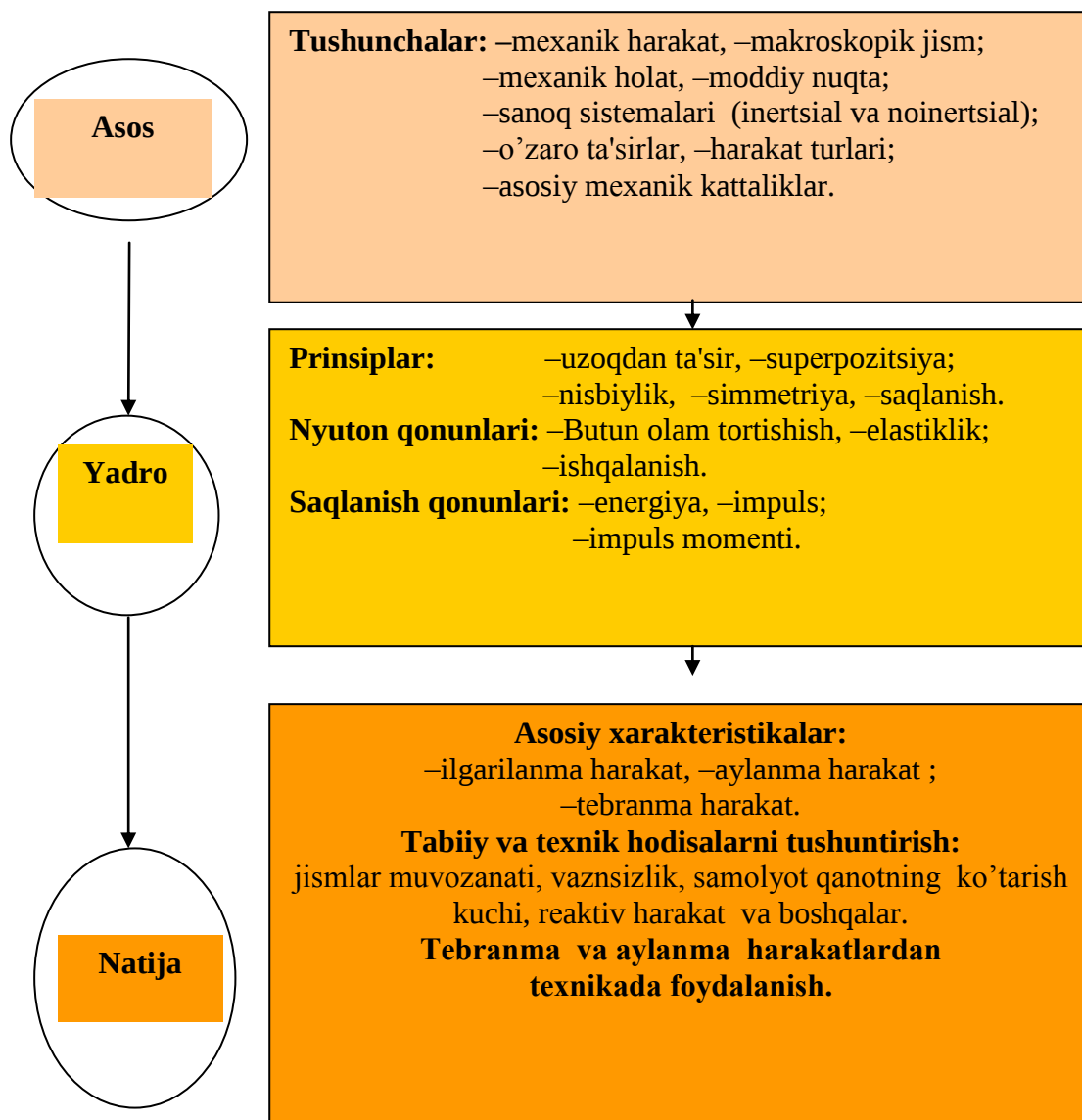
Ish bosqichlari	O‘qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining mazmuni
1–bosqich. Kursga va mavzuga kirish (20 daqiqa)	1.1.Fizika fani bo‘limlari haqida qisqacha tahlil (1.1.1–1.1.2–Ilovalar).	Tinglaydi
	1.2.Mexanik harakat. Fazo, vaqt, sanoq sistemalari haqida tushuncha (1.1.3–1.1.7–Ilovalar).	Tinglaydi, yozadi
	1.3.O‘quv mashg‘uloti mavzusi, maqsadi va o‘quv faoliyati natijalarini tushuntiradi.	Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo‘lim (50 daqiqa)	2.1.Shu mavzu bo‘yicha ma’ruza matnini tarqatadi va mavzu rejasi, tayanch iboralar bilan tanishib chiqishni so‘raydi.	O‘qiydi
	2.2.Mavzuni tanishtiradi. Vektorlar haqida tushuncha (1.1.8– 1.1.9–Ilovalar).	Eshitadi.
	2.3.To‘g‘ri chiziqli harakat va grafiklari. Egri chiziqli harakat. Ilgarilanma va aylanma harakat kinematikasi(1.1.10–1.1.14–Ilova).	Kerakli joylarni yozib oladi
	3.1.Mavzu bo‘yicha yakunlovchi xulosalar	Savollar beradi

3–bosqich. Yakunlovchi (10 daqiqa)	qiladi. Mavzu bo'yicha olingan bilimlarni qayerda ishlatish mumkinligi tushuntiradi. (1.1.14–ilova).	
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	
	3.3.Mavzu bo'yicha mustaqil o'rganish uchun savollar beradi: 1.Sanoq sistemasi va sanoq jismi? 2.Vektor va skalyar kattaliklar? 3.To'g'ri chiziqli o'zgaruvchan harakatda tezlik va yo'l? 4.Egri chiziqli harakatda tezlik va tezlanishlar?	Mustaqil tayyorlanish uchun savollarni yozib oladi.

ILOVALAR:

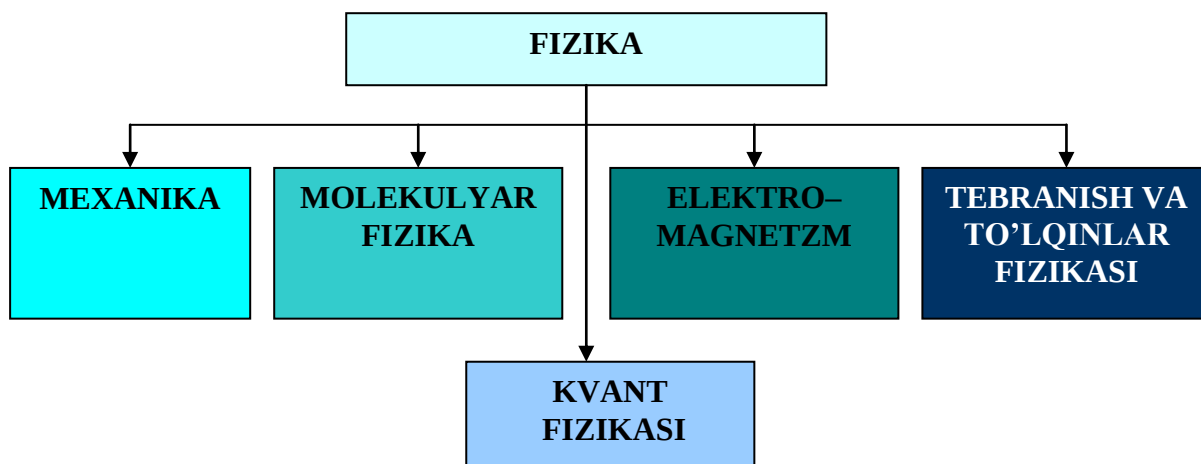
1.1.1–Ilova.

MEXANIKANING TUZILISHI VA MAZMUNI



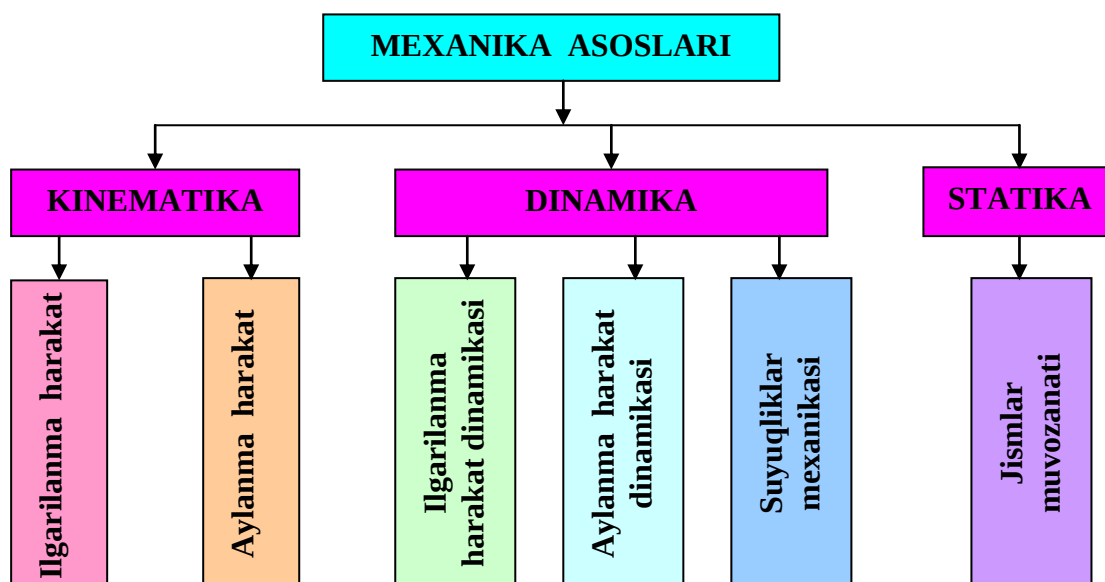
1.1.2–Ilova.

FIZIKA KURSINI XXI ASRDA QUYIDAGI BO'LIMLARGA BO'LIB O'RGANAMIZ:



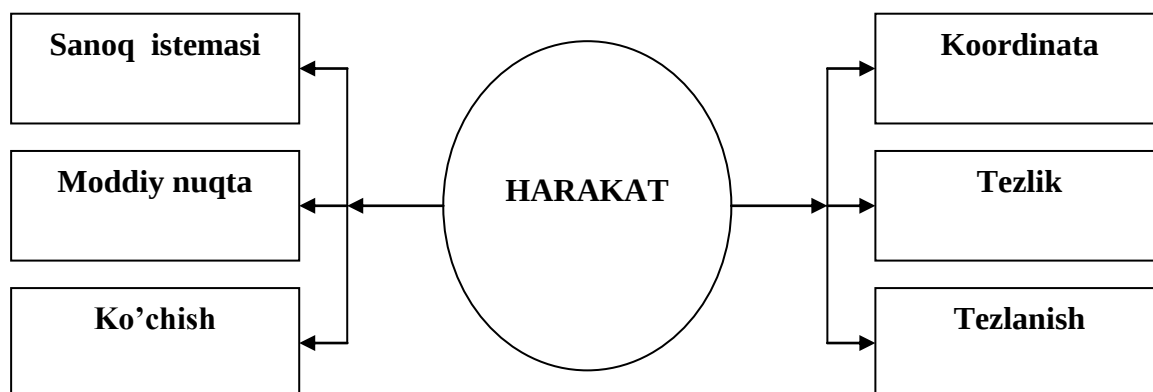
1.1.3–Ilova.

MEXANIKA BO'LIMINI QUYIDAGI QISMLARGA BO'LIB O'RGANAMIZ:



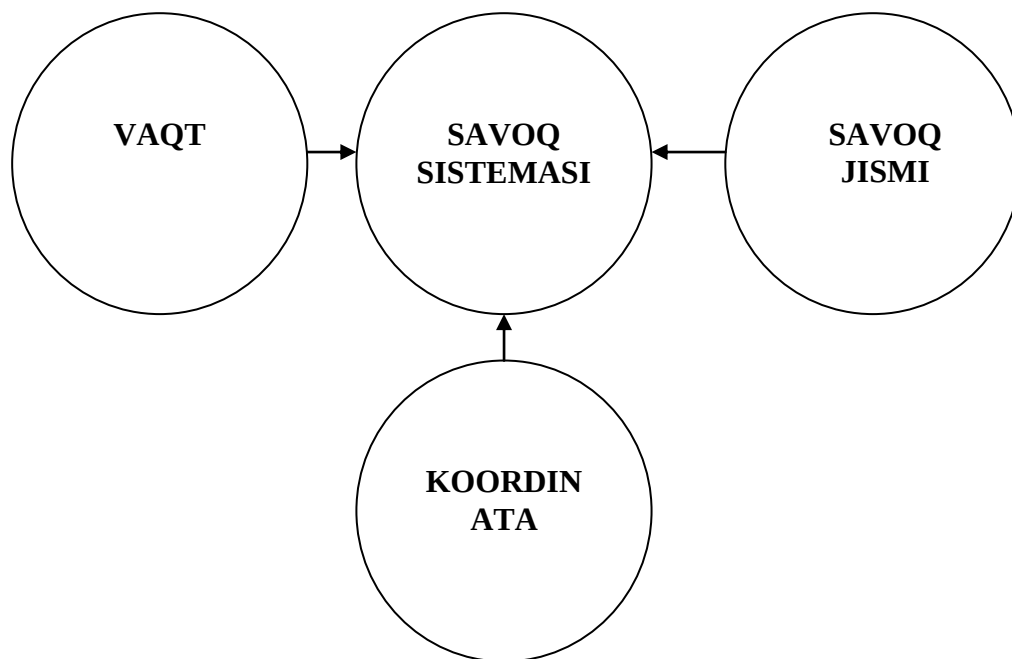
1.1.4–Ilova.

HARAKATNI TAVSIFLOVCHI ASOSIY TUSHUNCHALAR



1.1.5–Ilova.

SANOQ JISMI, KOORDINATA VA VAQT BIRGALIKDA SANOQ SISTEMASINI TASHKIL ETADI

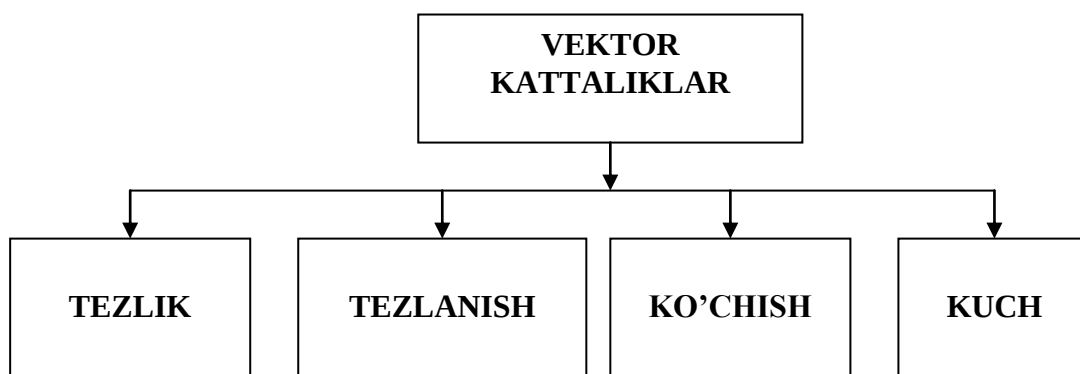


1.1.6–Ilova.

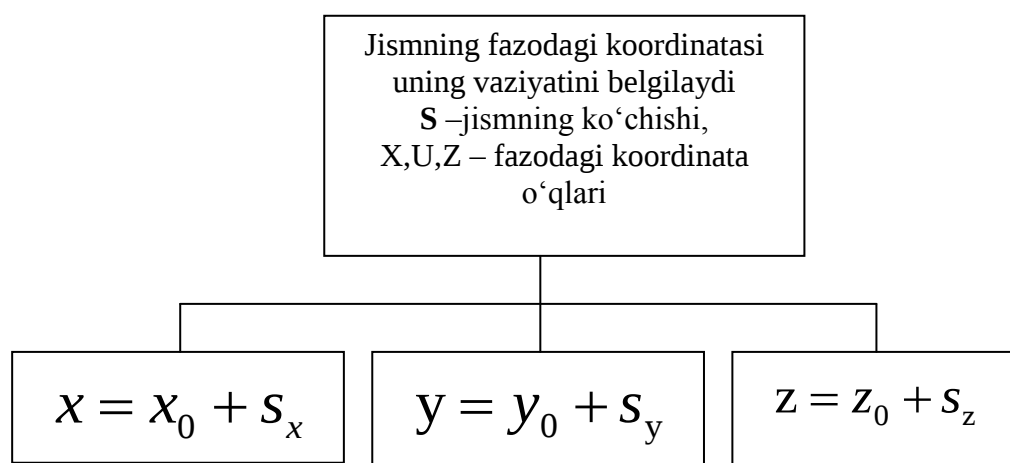


1.1.7–Ilova

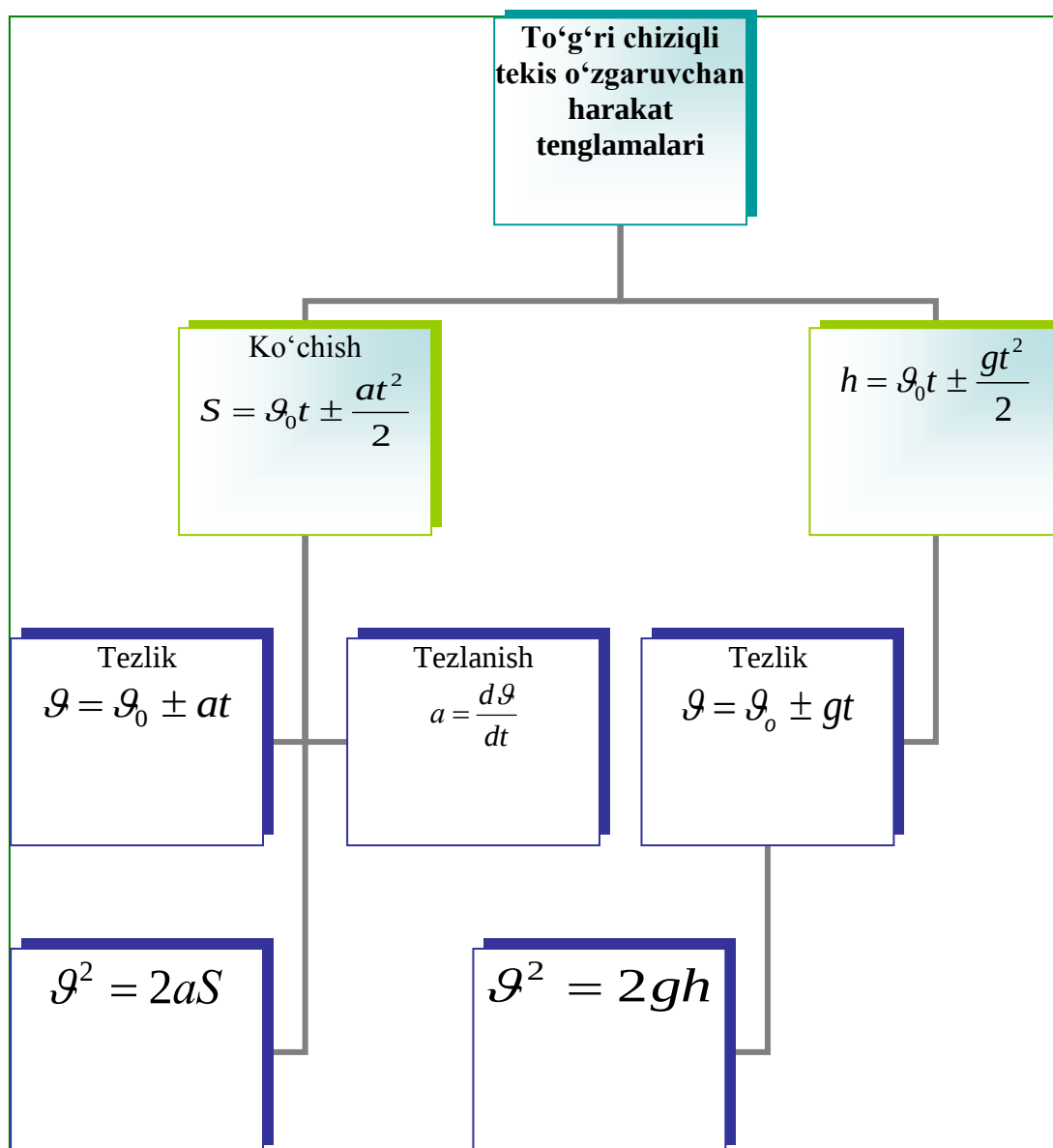
VEKTORLAR TUSHUNCHASI



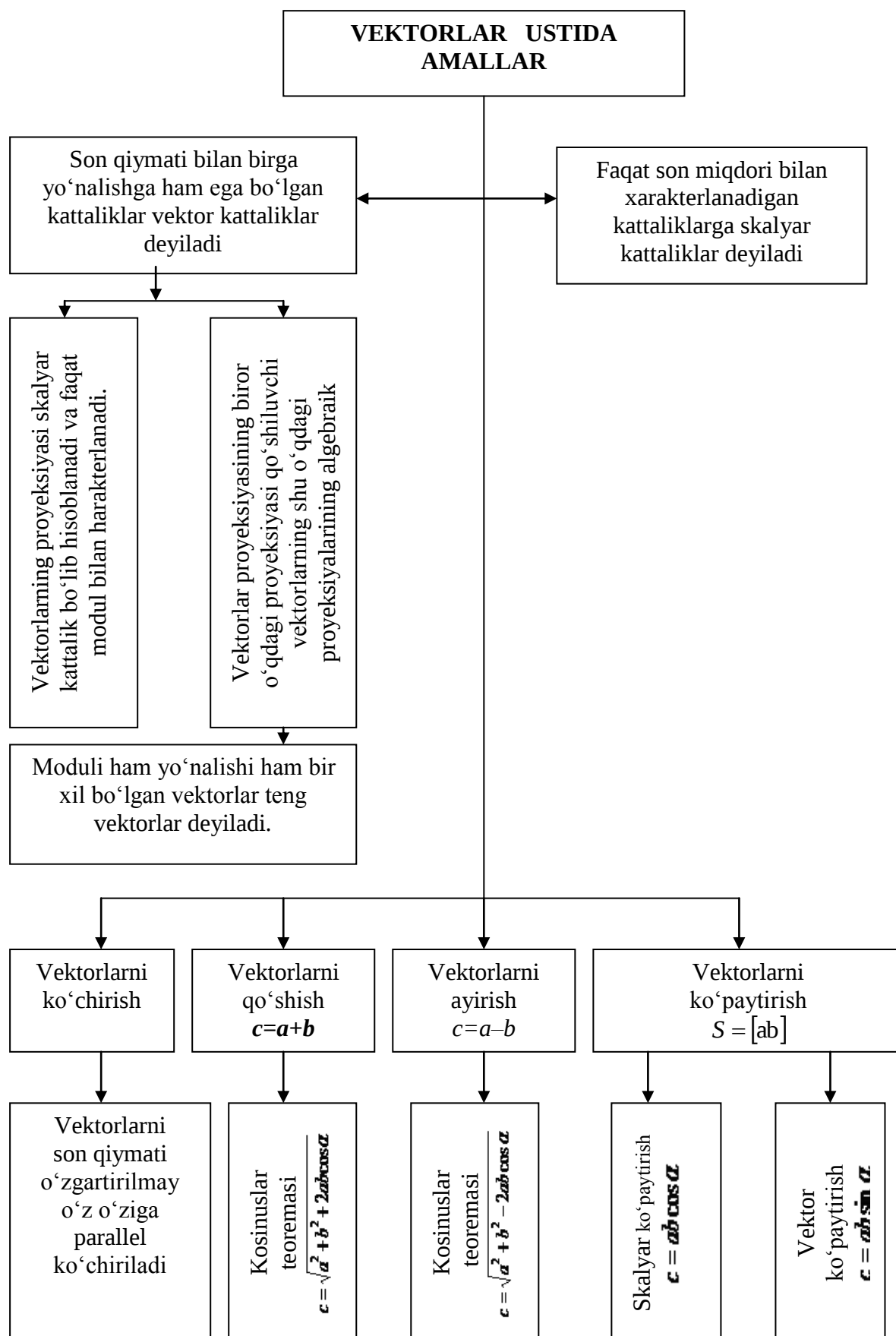
1.1.8–Ilova.



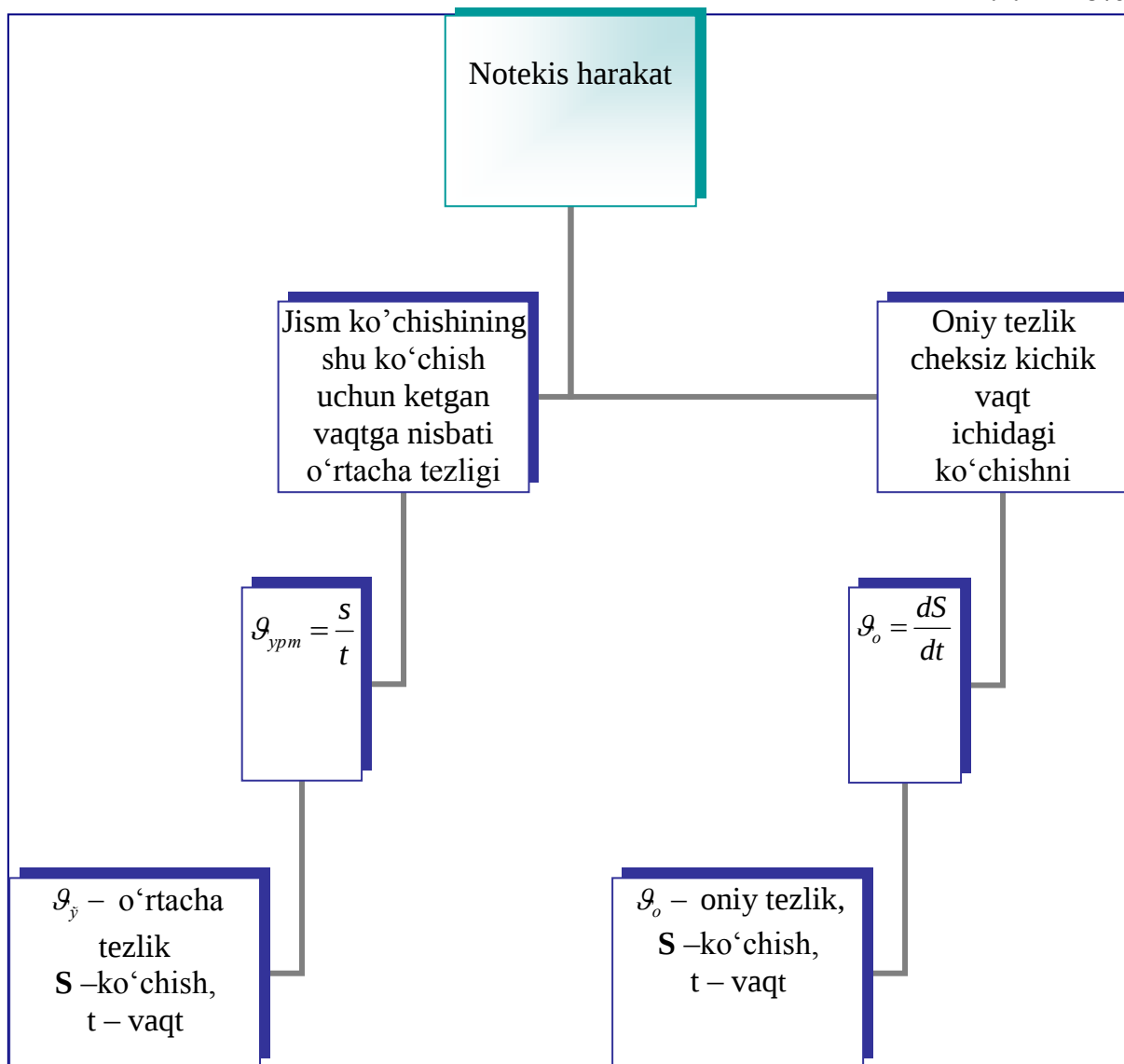
1.1.9–Ilova.



MEXANIK HARAKAT



1.1.11–Ilova.

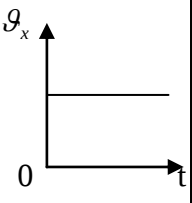
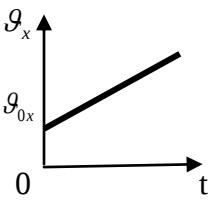
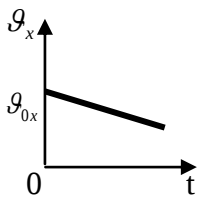
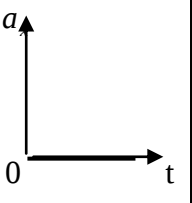
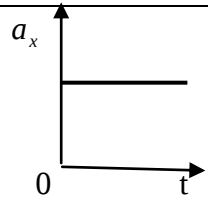
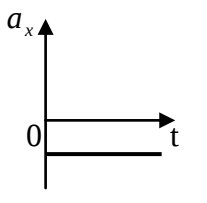
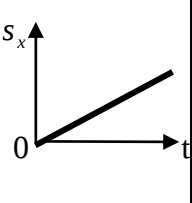
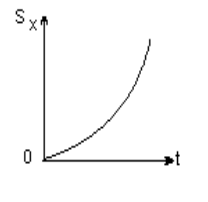
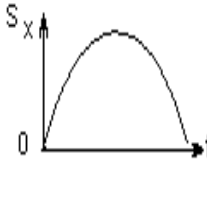
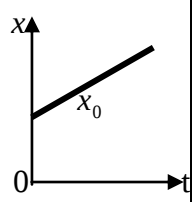
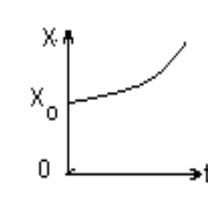
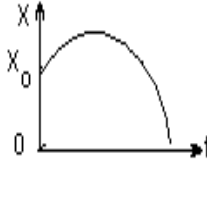


1.1.12–Ilova.

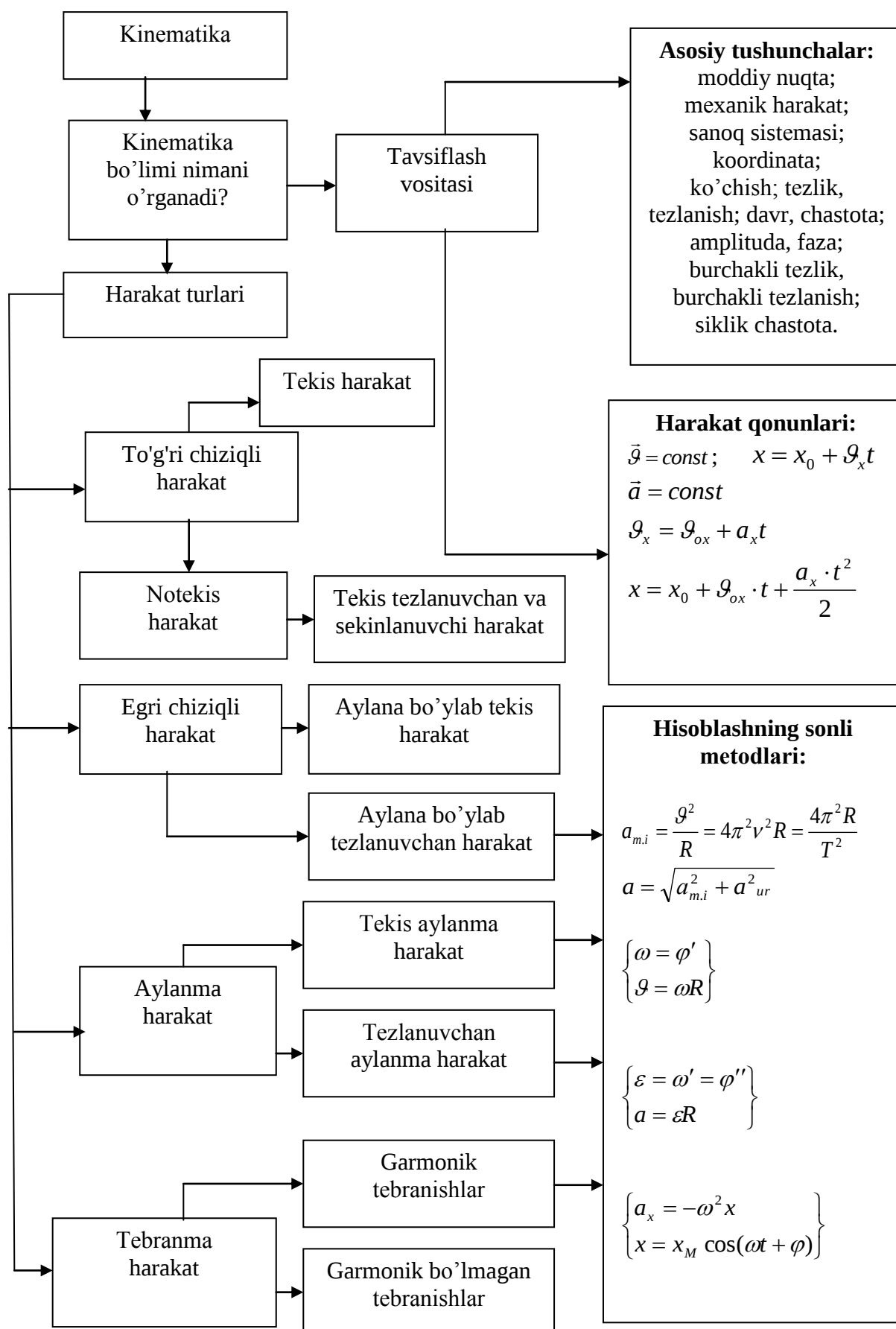
ILGARILANMA VA AYLANMA HARAKAT KINEMATIKASI KATTALIKLARINI SOLISHTIRISH

Ilgarilanma harakat	Belgilanishi	Aylanma harakat	Belgilanishi	harakatlar orasidagi munosabat	
Vaqt	t	Vaqt	t		
Yo'l	S	Burilish burchagi	φ	$S = \varphi \cdot R$	$\varphi = \frac{S}{R}$
Chiziqli Tezlik	$\vartheta = \frac{dS}{dt}$	Burchakli tezlik	$\omega = \frac{d\varphi}{dt}$	$\vartheta = \omega \cdot R$	$\omega = \frac{\vartheta}{R}$
Chiziqli tezlanish (tangetsial)	$a_t = \frac{d\vartheta}{dt}$	Burchakli tezlanish	$\varepsilon = \frac{d\omega}{dt}$	$a_t = \varepsilon \cdot R$	$\varepsilon = \frac{a_t}{R}$

HARAKAT GRAFIKLARI

Tekis harakat			Notekis harakat		
	Formula	Grafik	Formula	Grafik	
				$\vec{a} \uparrow \uparrow \vec{g}_0$	$\vec{a} \uparrow \downarrow \vec{g}_0$
Tezlik	$\vec{g} = \frac{\vec{S}}{t}$		$\vec{g} = \vec{g}_0 + \vec{a}t$		
Tezlanish	$\vec{a} = \vec{0}$		$\vec{a} = \frac{\vec{g} - \vec{g}_0}{t}$		
Ko'chish	$\vec{s} = \vec{g}t$		$\vec{s} = \vec{g}_0t + \frac{\vec{a}t^2}{2}$		
Koordinata	$x = x_0 + g_x t$		$x = x_0 + g_0t + \frac{a_x t^2}{2}$		

KINEMATIKANING TUZILISHI VA MAZMUNI



1.2.–MAVZU	DINAMIKA ASOSLARI. NYUTON QONUNLARI
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1.1. MA'RUZANI OLIB BORISH TEXNOLOGIYASI	
O'quv soati: –4 soat	Talabalar soni: – 50
O'quv mashg'ulot shakli	Ma'ruza
Ma'ruza rejasi:	1.Kuch va o'zaro ta'sir. Nyuton qonunlari. 2.Jismning erkin bo'lmagan harakati. Kuch va jism impulsi. Impulsning saqlanish qonuni. O'zgaruvchi massali jism harakati. 3.Ish va energiya. Kuchning ishi. Deformasiyalangan energiyasi. Kinetik energiya. Noelastik va elastik urilishlar. 4.Yerning tortish maydonida jismning harakati. Energiya integrali va saqlanish qonunlari. Erkin harakat. Kosmik tezliklar. 5.Ishqalanish kuchlari va ularning turlari. Inersial sanoq sistemalari. Inersial sistemada jism harakati.
O'quv mashg'ulotining maqsadi:	Kuch, massa, inertlik, inersial sanoq sistemalar to'g'risidagi umumiy tushunchalar bilan tanishish. Nyuton qonunlari, kuch, tezlanish va massa orasidagi bog'lanishlarning tahlili. Kuchlarni turlarga ajratish. Harakat miqdori haqida tushunchalar. Kuchning fizik ma'nosi bilan tanishish.
O'qitish metodlari:	Ma'ruza, klaster, aqliy hujum, toifalash jadvali, konseptual jadval, T-jadval va Venna doirasi.
O'qitish vositalari:	Ma'ruza matni, kompyuter slaydlari, doska, multimediya, proyektor.
O'qitish shakllari:	Frontal, kollektiv ish.
O'qitish sharoiti:	Kompyuter bilan ta'minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og'zaki baholash, savol-javob.

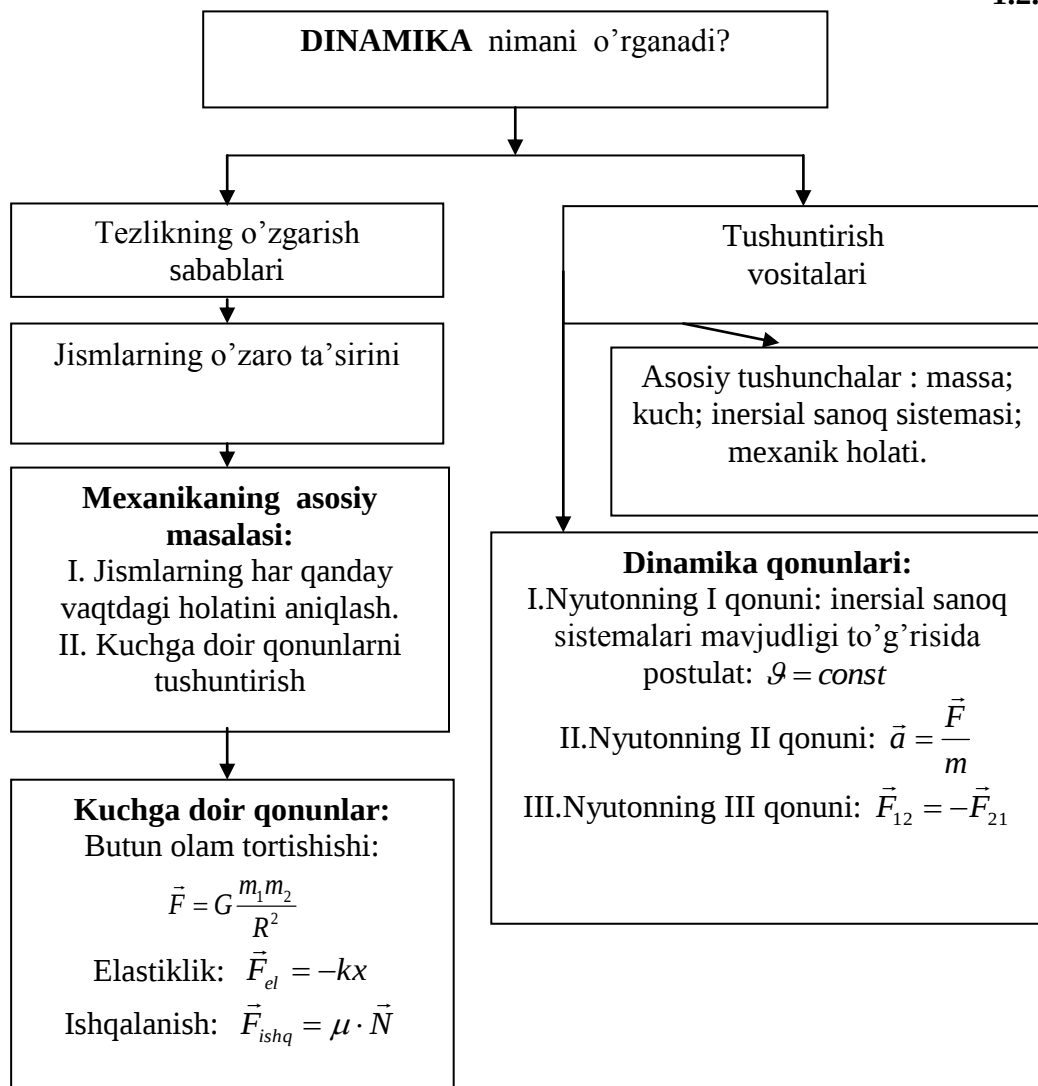
1.2.MA'RUZANING TEXNOLOGIK XARITASI

Ish bosqichlari	O'qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining mazmuni
1–bosqich. Mavzuga kirish (20 daqiqa)	1.1.Dinamika haqida umumiy tushunchalar beriladi. (1.2.1–ilova).	Tinglaydi
	1.2.Mavzu rejalari bilan qisqacha tanishtiradi. (1.2.2–ilova).	Tinglaydi, yozadi
	1.3.O'quv mashg'uloti mavzusi, maqsadi va o'quv faoliyati natijalarini aytadi.	Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo'lim (50 daqiqa)	2.1.Nyuton qonunlari haqida ma'lumot beradi (1.2.3–ilova).	O'qiydi
	2.2.Impul'sning saqlanish qonuni. (O'zgaruvchan massali jism harakati) (1.2.4–ilova).	
	2.3.Ish, kinetik va potensial energiya haqida tushuncha. Energiyaning saqlanish qonuni (1.2.5–1.2.6–ilovalar).	Eshitadi.
	2.4.Yerning tortish maydonida jismning harakati (1.2.7–ilova).	Kerakli joylarni yozib oladi
	2.4.Mexanik kuchlar va ularning	Kerakli joylarni

	qo'llanilishi (1.2.8–ilova).	yozib oladi
3–bosqich. Yakunlovchi (10 daqiqa)	3.1.Mavzu bo'yicha yakunlovchi xulosalar qiladi. Mavzu bo'yicha olingan bilimlarni qayerda ishlatish mumkinligi ma'lum qiladi (1.2.9–1.2.13–ilovalar).	Savollar beradi
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	Kerakli joylarni yozib oladi
	3.3.Mavzu bo'yicha mustaqil o'rganish uchun savollar beradi: 1.Dinamika nimani o'rganadi? 2.Mexanik kuchlar? 3.Ilgarilama harakat dinamikasining bosh tenglamasi? 4.Reaktiv kuchlar?	Mustaqil tayyorlanish uchun savollarni yozib oladi.

ILOVALAR:

1.2.1–Ilova.

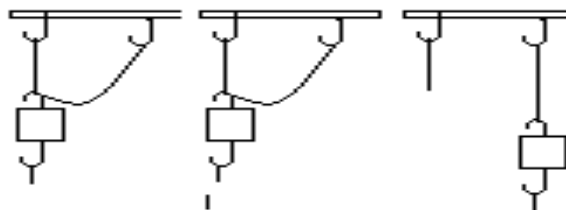


**OG'IRLIK, ELASTIK VA ISHQALANISH KUCHLARINING TABIATI VA
ULAR ORASIDAGI FARQLARNI TAQQOSLASH**

№	Taqqoslanuvchi kuchlar Taqqoslanuvchi xossalari	Og'irlik Kuchi	Elastiklik kuchi	Ishqalanish kuchi
1	Vujudga kelishi	Jismlarning yerga tortilish tufayli	Jismlarning deformasiyalanish tufayli	Jismlarning bir-biriga ishqalanish tufayli
2	Tabiati	Gravitatsion tabiatga ega	Elektromagnit tabiatga ega	Elektromagnit tabiatga ega
3	Formulasi	$P = mg$	$F = -kx$	$F = \mu \cdot N$
4	Qiymati	Yer sirtida eng maksimal qiymatiga ega	Tashqi kuchga qarama-qarshi yo'nalgan bo'lib, tashqi kuch oshishi bilan oshadi va kamayishi bilan kamayadi.	Tashqi kuchga qarama-qarshi yo'nalgan bo'lib, maksimal qiymati tinchlikdagi ishqalanish kuchiga son jihatdan teng bo'ladi.
5	Kattaligi	Jismlarning massalari ko'paymasiga to'g'ri, ular orasidagi masofa kvadratiga teskari proporsional	Moddaning tuzilishiga va geometrik o'lchamlariga bog'liq	Ishqalanuvchi jismlarning materialiga va ishqalanuvchi sirtlarning silliqqligiga, nisbiy tezlikka bog'liq.
6	Sirtga nisbatan yo'nalishi	Doimo Yer markaziga qarab yo'nalgan bo'lib, Yer sirtiga perpendikulyar bo'ladi.	Doimo deformasiyalanuvchi sirtga perpendikulyar bo'ladi.	Doimo ishqalanuvchi sirtlarga urinma boylab yo'nalgan bo'ladi.
7	Haroratga bog'liqligi	Bog'liq emas	Bog'liq emas	Harorat ortishi bilan oshadi.
8	Sirtning yuzasiga bog'liqligi	Bog'liq emas	Bog'liq emas	Bog'liq

MASSA

1.MASSA–FIZIKAVIY KATTALIK BO'LIB, JISMNING INERTLIK O'LCHOVI HISOBLANADI



$$1) \frac{\Delta \mathcal{G}_1}{t} > \frac{\Delta \mathcal{G}_2}{t}; \quad m_1 < m_2$$

Agar : $F_1 = F_2$ bolsa u holda

$$\frac{a_1}{a_2} = \frac{m_2}{m_1}$$

$$2) \frac{\Delta \mathcal{G}}{t_1} < \frac{\Delta \mathcal{G}}{t_2}; \quad m_1 > m_2$$

$$\frac{a_{et}}{a_j} = \frac{m_j}{m_{et}}; \quad m_j = \frac{a_{et}}{a_j} m_{et}$$

IV.Asosiy qonuniyatlar:

1.O'zaro ta'sir turiga bog'liq emas.

2.Bir jism massasi uni tashkil qilgan massalar yig'indisiga teng bo'ladi.

3. $\mathcal{G} \rightarrow c$ bo'lganda

$$m = \frac{m_0}{\sqrt{1 - \frac{\mathcal{G}^2}{c^2}}}$$

II.Massa birligi:

Xalqaro SI sistemasida $[kg]$ qabul qilingan

III.Massani o'lchash turlari:

1.To'g'ridan-to'g'ri o'lchash.

Gravitasion massa.



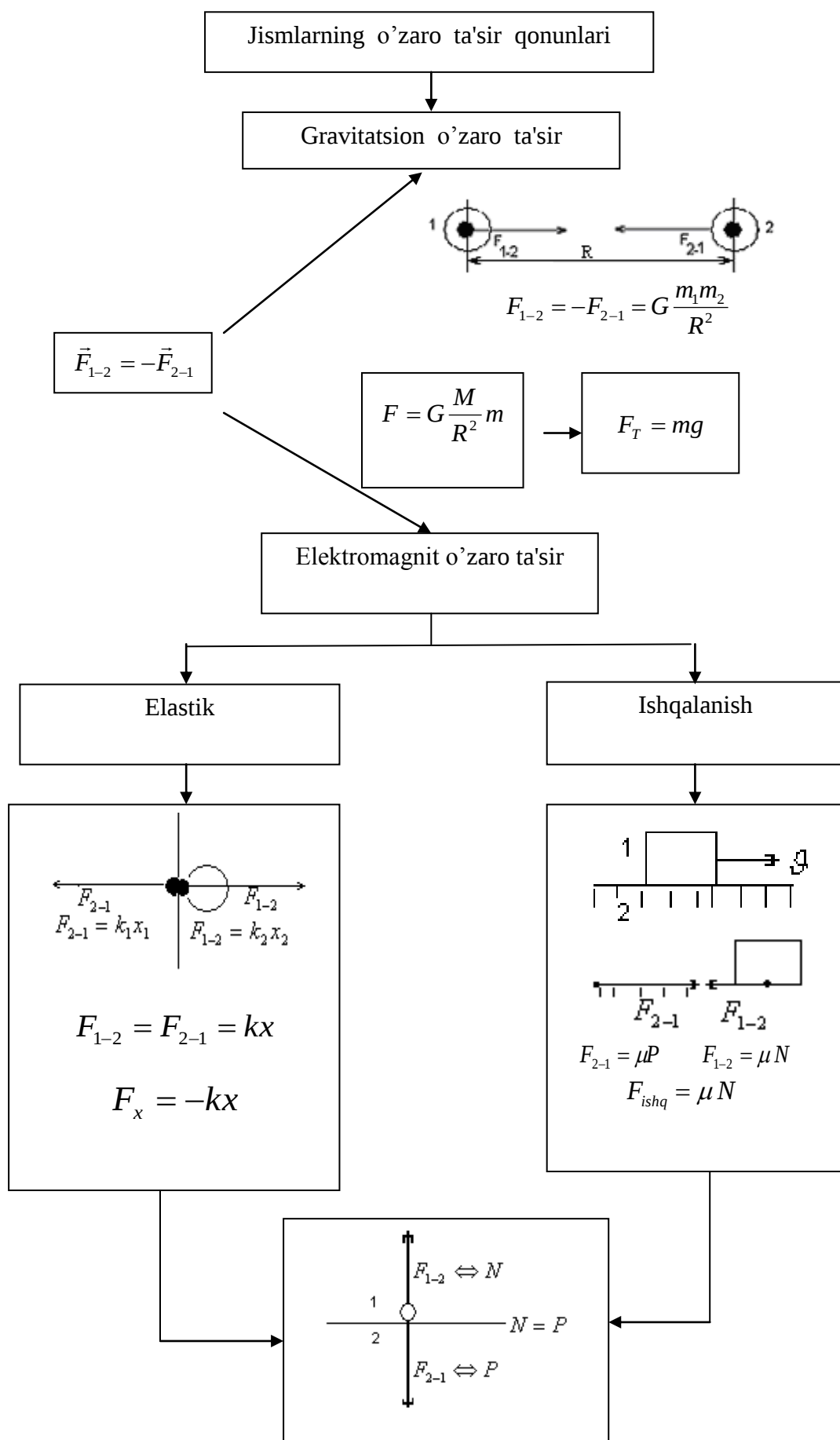
2.Qiyosiy o'lchash.

$$m_j = \frac{a_{et}}{a_j} m_{et}; \quad m = \rho V;$$

$$m = m_0 N; \quad m = \frac{F}{9,8 \frac{N}{kg}}$$

Inert massa.

JISMLARNING O'ZARO TA'SIR QONUNLARI

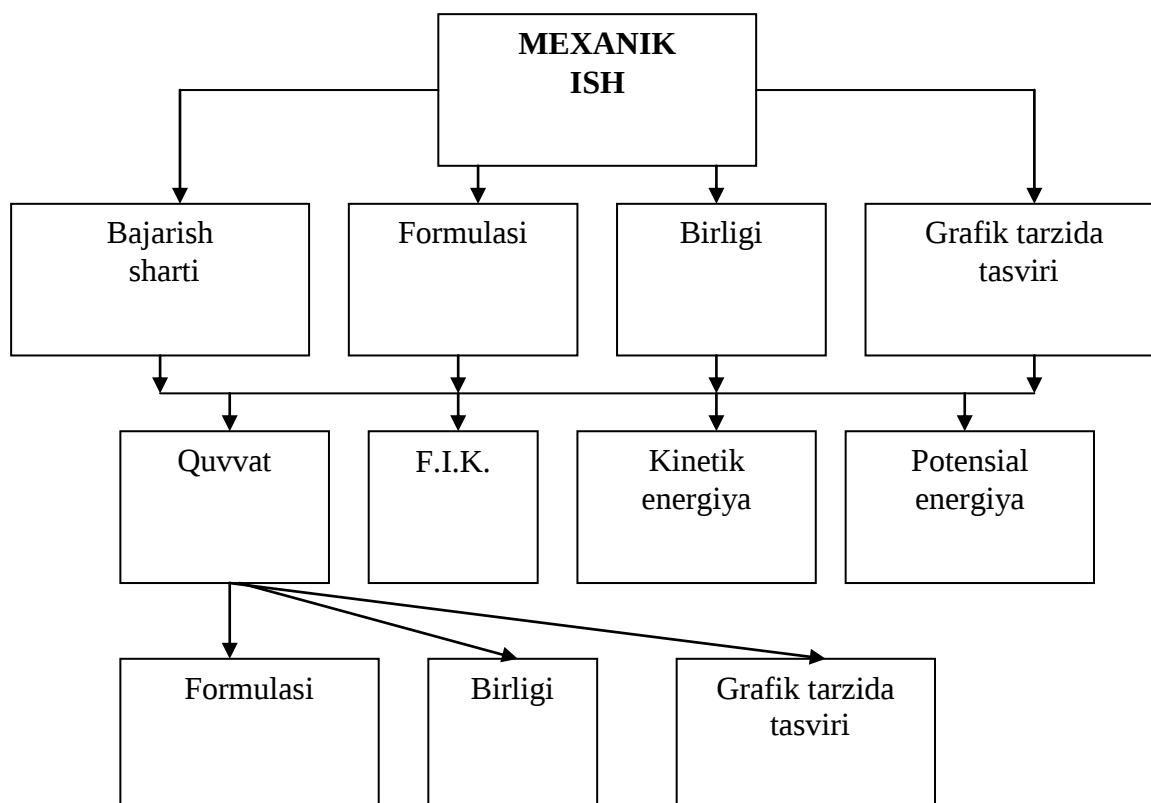


1.2.5–Ilova.

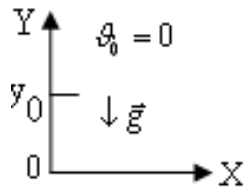
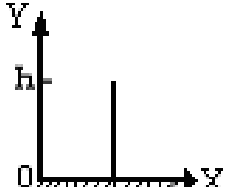
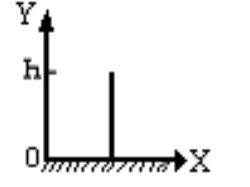
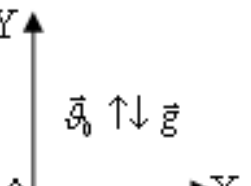
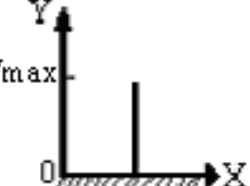
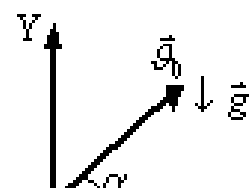
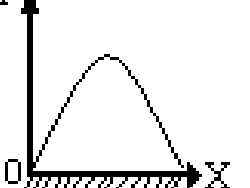
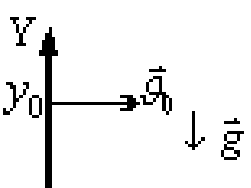
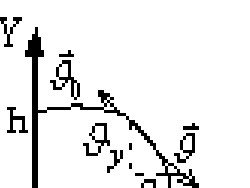
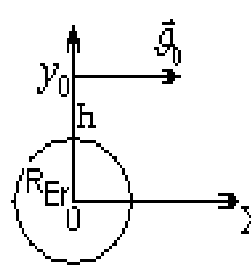
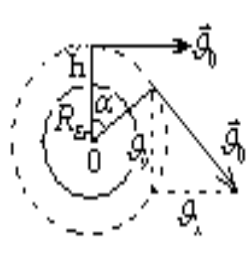
NYUTON QONUNLARI

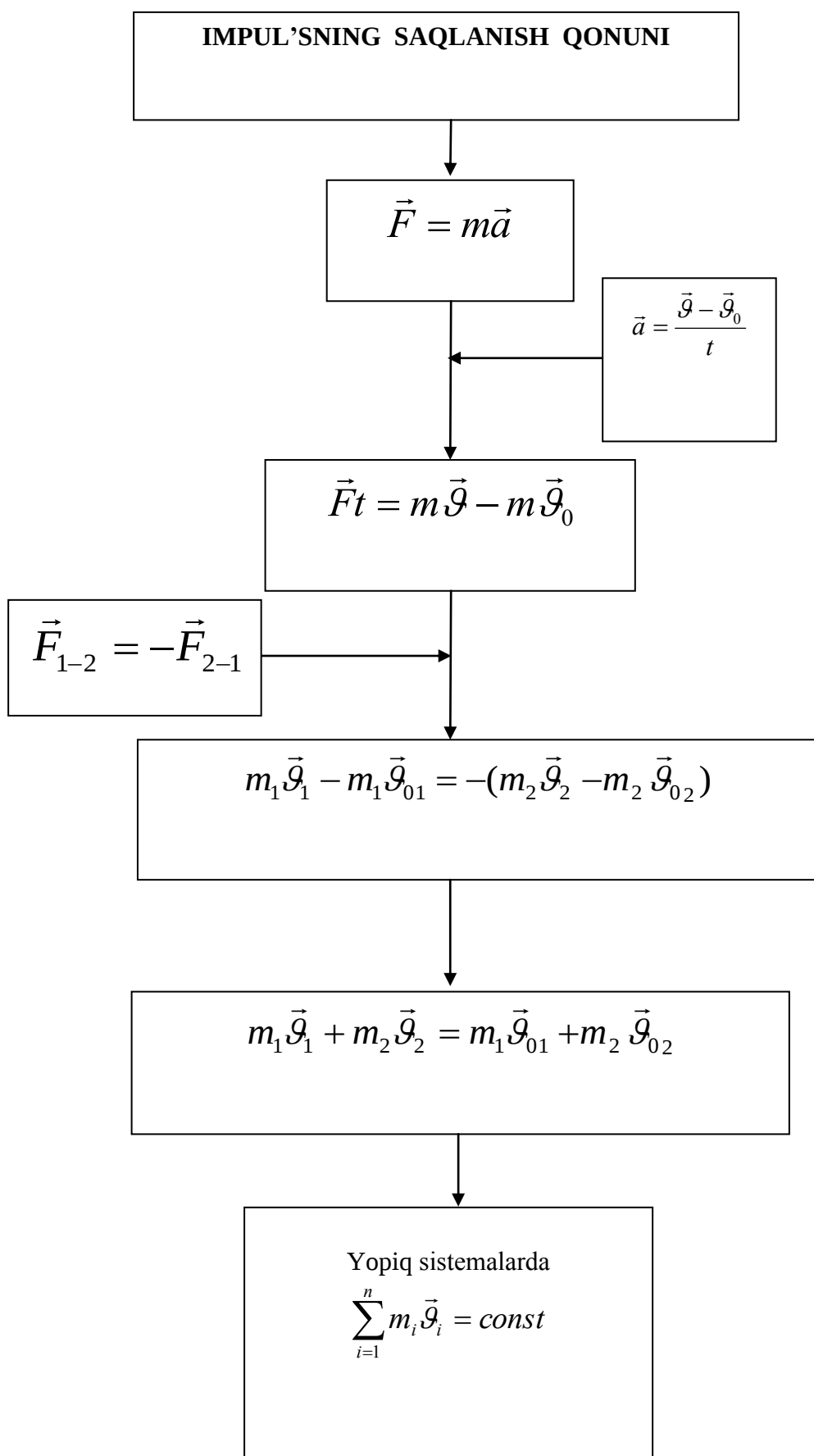
	Nyutonning birinchi qonuni	Nyutonning ikkinchi qonuni	Nyutonning uchinchi qonuni
Fizikaviy sistema	Makroskopik jism		Ikki jism sistemasi
Model	Moddiy nuqta		Ikki moddiy nuqta sistemasi
hodalarni tavsiflash	Tinch yoki to'g'ri chiziqli tekis harakat holati	Tezlanuvchan harakat	Jismlarning o'zaro ta'siri
Qonunlarning mohiyati	Inertsial sanoq sistemaning mavjudligi to'g'risidagi postulati (agar $\sum \vec{F} = 0$, u holda $\vec{g} = const$) bo'ladi	O'zaro ta'sir tezlik yoki tezlanishning o'zgarishini aniqlaydi. $\vec{a} = \frac{\sum \vec{F}}{m}$	Kuchlarning ta'siri va aks ta'siri moduli boyicha teng, yo'nalishi boyicha qarama-qarshi har xil jismlarga qoyilgan $\vec{F}_{12} = -\vec{F}_{21}$
Namoyish etishga misollar	Kosmik kemadan uzoqdagi jismlarning tortishish harakati	Sayyoralar, jismlarning Yer sirtiga tushishi, avtomobillarning tormozlanish va quvib o'tishdagi harakati	Jismlarning o'zaro ta'siri: Quyosh va Yer, Yer va Oy, avtomobillarning Yer sirtiga, bilyard sharlarining ta'siri
Qo'llanilish chegarasi	Inertsial sanoq sistemalari, makro va mega olam, yorug'lik tezligiga nisbatan juda kichik tezlik bilan harakat qiladigan jismlar.		

1.2.6–Ilova.



OG'IRLIK KUCHI TA'SIRI OSTIDA JISMLARNING HARAKATI

Boshlang'ich shartlar		Harakatning tavsifi	
Boshlang'ich koordinata	Boshlang'ich tezlik	Formula	Trayektoriya
$y_0 = h$		$g_y = \pm gt$ $y = h \pm \frac{gt^2}{2}$	
$y_0 = h$		$g = -g_0 - gt$ $y = h - g_0 t - \frac{gt^2}{2}$	
$y_0 = 0$		$g = g_0 - gt$ $g = g_0 t - \frac{gt^2}{2}$	
$y_0 = 0$		$g_x = g_0 \cos \alpha$ $g_y = g_0 \sin \alpha - gt$ $x = g_0 t \cos \alpha$ $y = g_0 t \sin \alpha - \frac{gt^2}{2}$	
$y_0 = h$		$g_x = g_0$ $g_y = -gt$ $x = g_0 t$ $y = h - \frac{gt^2}{2}$	
$y_0 = R_{\text{yer}} + h$ $x_0 = 0$ $g_0 = 8 \frac{\text{km}}{\text{s}}$		$g_x = g_0 \cos \alpha$ $g_y = g_0 \sin \alpha$ $x = (R_0 + h) \sin \frac{2\pi}{T} t$ $y = (R_0 + h) \cos \frac{2\pi}{T} t$	



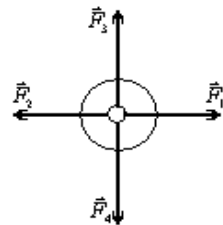
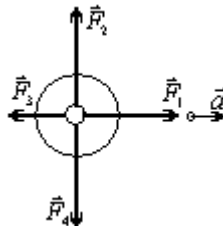
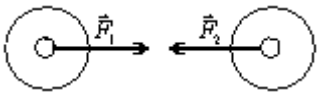
MEXANIK KUCHLAR

Elastik kuchlar	Tortishish kuchlari	Kuchlarning nomi
Elektromagnit	Gravitatsion	O'zaro ta'sirlarning tabiati
$F_x = -kx$	$F_T = G \frac{mM}{R^2}$	Kuchlarni hisoblash uchun formulalar
Kuch masofaning (deformatsiyaga bog'liqligi) funksiyasi hisoblanadi	O'zaro ta'sir etuvchi jismlar orasidagi masofaning funksiyasi hisoblanadi.	Kuchlarning masofaga yoki nisbiy tezlikka bog'liqligi
Bog'liq emas	O'zaro ta'sir etuvchi jismlar massalari ko'paytmasiga to'g'ri proporsional	Kuchlar o'zaro ta'sir etuvchi jismlarning massasiga bog'liqmi?
Deformatsiyalanayotgan zarrachalarning ko'chishi ta'sir etuvchi kuchlar yo'nalishiga qarab qayshirib bo'linadi	O'zaro ta'sir etuvchi jismlarni tutashiruvchi to'g'ri chiziqli boylab yo'nalgan	Kuchlar qanday yo'nalgan?
Saqlanadi, chunki x-o'zgarmaydi	Masofa R-o'zgarmaganligi uchun kuchlarining qiymati o'zgarmaydi.	Bir inertial sistemadan boshqasig o'tgan kuchlarning invariantligi saqlanadimi?
Deformatsiya kattaligi x-nihoyat darajada kichik	Moddiy nuqta yoki sferik simmetrik sharlar	Formulalarning qo'llanilish shartlari

Ishqalanish kuchi:	Elektromagnit	$F_{ishq} = \mu \cdot N$ $F_{qar} = \alpha \vartheta_{nisc}$ $F_{qar} = \beta \vartheta_{nis}^2$	Kuch nisbiy harakat ϑ_{nis} tezligining funksiyasi hisoblanadi	Bog'liq emas	Kuch ϑ_{nis} tezlik vektorining yo'nalishiga qarama-qarshi yo'nalgan	Saqlanadi, chunki nisbiy tezlik ϑ_{nis} moduli o'zgarmaydi	$F_{ishq} = \mu N$ formulaning ifodasi taxminiy bajariladi. Chunki quruq ishqalanish kuchi tezlikka bog'liq. Suyuqliklarda ishqalanish jarayonida ma'lum tezlikkacha $F_{qar} = \alpha \vartheta_{nis}$ formula o'rinli va keyin $F_{qar} = \beta \vartheta_{nis}^2$ bo'ladi.
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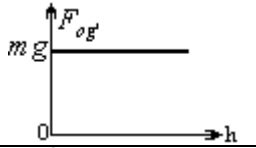
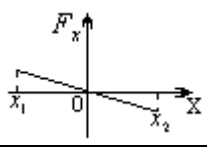
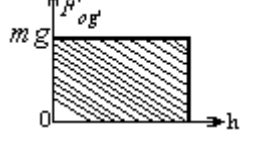
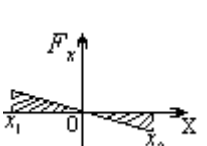
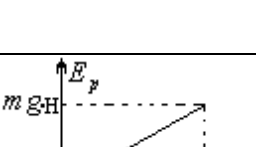
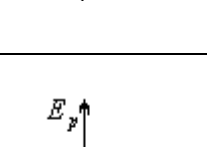
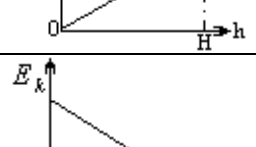
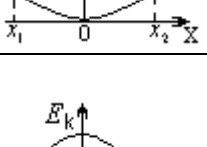
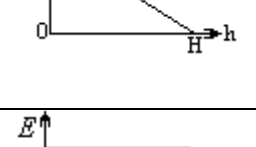
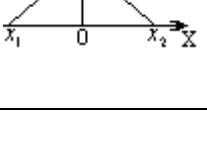
1.2.10–Ilova.

NYUTON QONUNLARINI UMUMLASHTIRISH

Dinamikaning asosiy qonunlari	Javobi qonundan topiladigan savol	Formula	Rasm
Nyutonning birinchi qonuni	Qachon jism tezlanishsiz harakat qiladi?	$\vec{a} = 0$ bo'lsa $F = 0$	
Nyutonning ikkinchi qonuni	Tezlanish nimaga bog'liq?	$\vec{a} = \frac{\vec{F}}{m}$	
Nyutonning uchinchi qonuni	Jism bir-biri bilan qanday ta'sirlashadi?	$\vec{F}_1 = -\vec{F}_2$	

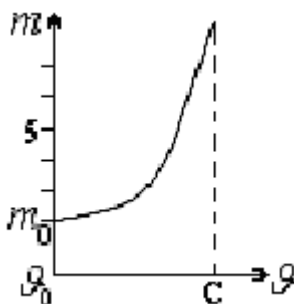
1.2.11–Ilova.

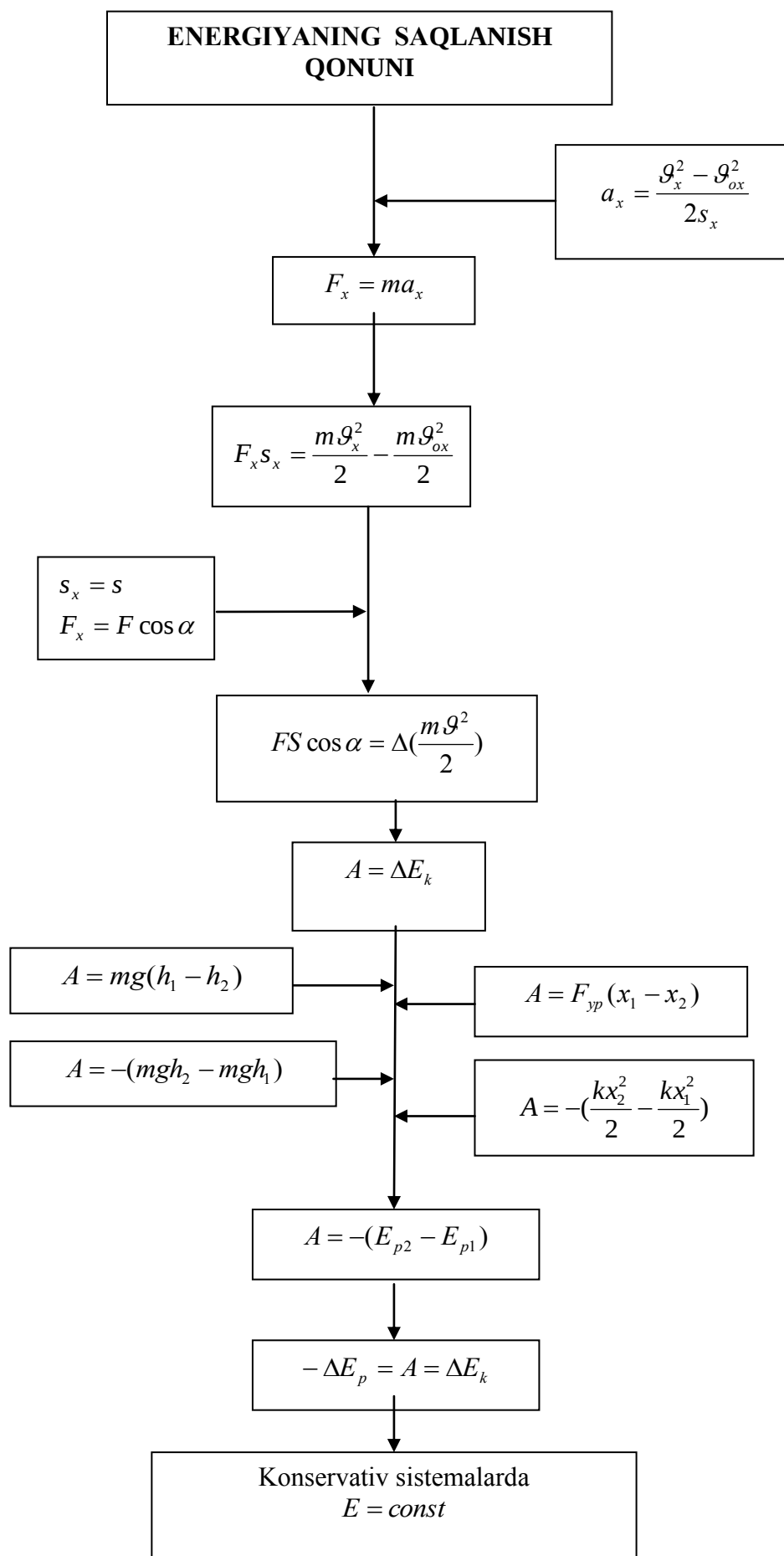
KUCH, ISH, ENERGIYA

Formula	Grafik	Formula	Grafik
Og'irlik kuchi $F_{og'} = mg$		Elastiklik kuchi $F_x = -kx$	
Og'irlik kuchining ishi $A = Fs \cos \alpha$ $F = mg; \quad s = h$ $\alpha = 0; \quad A = mgh$		Elastiklik kuchining ishi $A = \frac{kx_1^2}{2} - \frac{kx_2^2}{2}$	
Potensial energiya $E_p = mgh$		Potensial energiya $E_p = \frac{kx^2}{2}$	
Kinetik energiya $E_k = \frac{mg^2}{2} = mg(H-h)$		Kinetik energiya $E_k = \frac{mg^2}{2} = \frac{k}{2}(x_1^2 - x_2^2)$	
To'la energiya $E = mgh + \frac{mg^2}{2} = mgH$		To'la energiya $E = \frac{kx^2}{2} + \frac{mg^2}{2} = \frac{kx_1^2}{2}$	

1.2.12–Ilova.

ENERGIYA INTEGRALI

Formula	Jadval	Grafik	Misollar																										
$\frac{m_0}{m} = e^{-\frac{g}{u}}$	<table><tr><th>$\frac{g}{u}$</th><th>$\frac{m_0}{m}$</th></tr><tr><td>1</td><td>2,72</td></tr><tr><td>2</td><td>7,69</td></tr><tr><td>3</td><td>20,1</td></tr><tr><td>4</td><td>54,01</td></tr><tr><td>5</td><td>148</td></tr><tr><td>6</td><td>403</td></tr><tr><td>7</td><td>1100</td></tr><tr><td>8</td><td>2980</td></tr><tr><td>9</td><td>8400</td></tr><tr><td>10</td><td>22000</td></tr><tr><td>11</td><td>59900</td></tr><tr><td>12</td><td>163000</td></tr></table>	$\frac{g}{u}$	$\frac{m_0}{m}$	1	2,72	2	7,69	3	20,1	4	54,01	5	148	6	403	7	1100	8	2980	9	8400	10	22000	11	59900	12	163000		$g_1 = 8 \frac{km}{sek}$ $u = 1 \frac{km}{sek} \rightarrow \frac{m_0}{m} = 2980$ $u = 2 \frac{km}{sek} \rightarrow \frac{m_0}{m} = 54,01$ $u = 4 \frac{km}{sek} \rightarrow \frac{m_0}{m} = 7,69$
$\frac{g}{u}$	$\frac{m_0}{m}$																												
1	2,72																												
2	7,69																												
3	20,1																												
4	54,01																												
5	148																												
6	403																												
7	1100																												
8	2980																												
9	8400																												
10	22000																												
11	59900																												
12	163000																												



1.3.–MAVZU	QATTIQ JISMLARNING ILGARILANMA VA AYLANMA HARAKATI
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1.3. MA'RUZANI OLIB BORISH TEXNOLOGIYASI	
O'quv soati: –2 soat	Talabalar soni: – 50
O'quv mashg'ulot shakli	Ma'ruza
Ma'ruza rejasi:	1.Qattiq jismlarning ilgarilanma va aylanma harakati. Qo'zg'almas o'qqa ega bo'lgan jismlarning muvozonat shartlari. Jismning qo'zg'almas o'q atrofida aylanma harakat qonuni. Impuls momenti. 2.Og'irlik va inersiya markazlari. Qattiq jismning inersiya markazining harakati. Shteyner teoremasi va uning tadbiqu. 3.Qattiq jismning harakati uchun dinamikaning asosiy qonunlari. Aylanma va ilgarilanma harakat qilayotgan jismning kinetik energiyasi. 4.Butun olam tortilish qonuni. Inert va gravitatsion massa. Tortishishning potensial energiyasi. Koinot mexanikasi asoslari. 5.Elastik deformatsiya. Guk qonuni. Yung modeli.
O'quv mashg'ulotining maqsadi:	Aylanma harakatdagi mexanik masalalarni yechish muammolari va usullari. Aylanma harakatda bajarilgan ishni tahlil qilish va jism harakatining o'zgarish qonunlarini o'rganish.
O'qitish metodlari:	Ma'ruza, klastr, aqliy hujum, toifalash jadvali, konseptual jadval, T–jadval va Venna doirasi.
O'qitish vositalari:	Ma'ruza matni, kompyuter slaydlari, doska, multimediya, proyektor.
O'qitish shakllari:	Frontal, kollektiv ish.
O'qitish sharoiti:	Kompyuter bilan ta'minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og'zaki baholash, savol–javob.

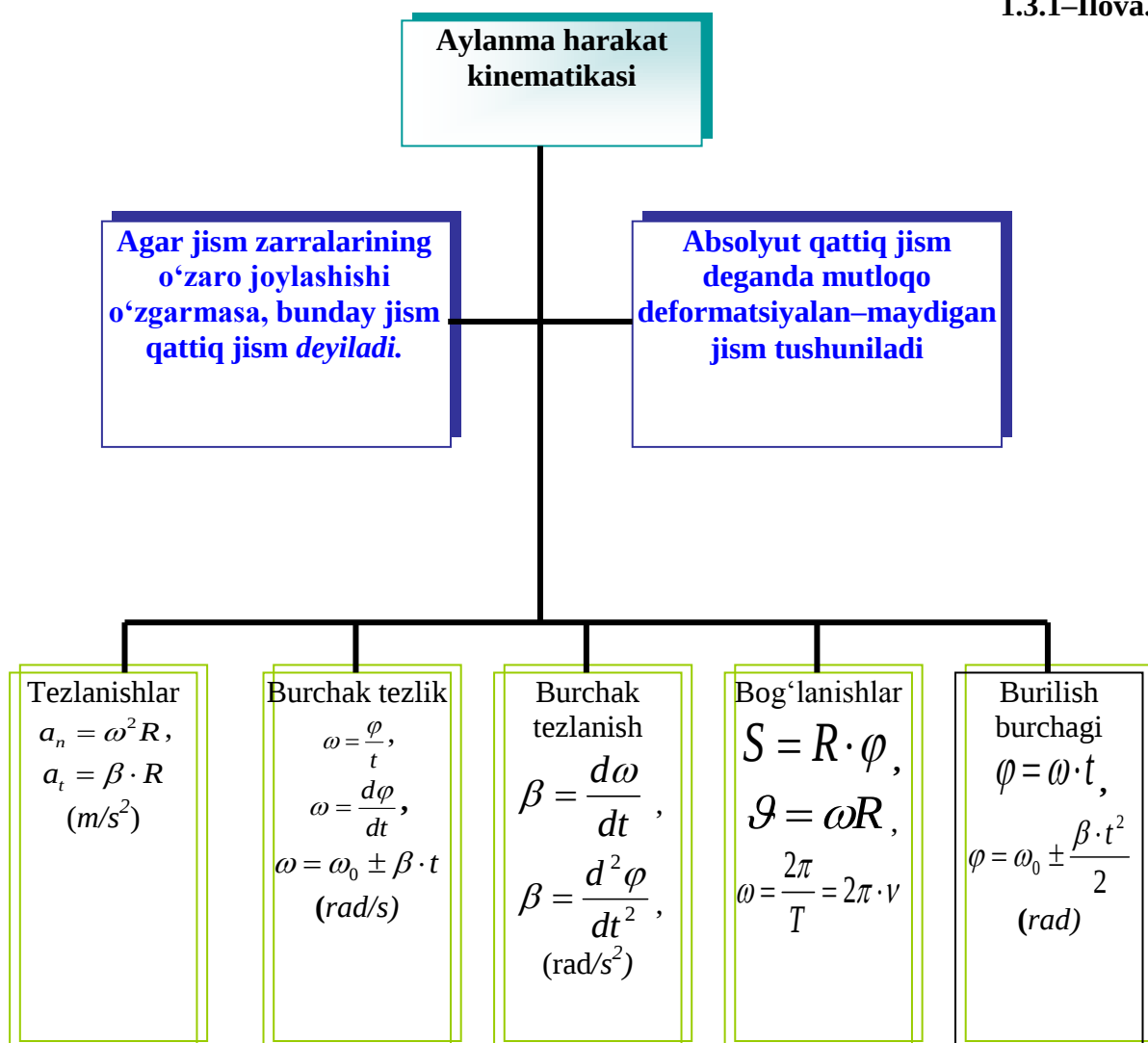
1.3.MA'RUZANING TEXNOLOGIK XARITASI

Ish bosqichlari	O'qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining mazmuni
1–bosqich. Mavzuga kirish (20 daqiqa)	1.1.O'quv mashg'uloti mavzusi, maqsadi va o'quv faoliyati natijalarini tushintiradi.	Tinglaydi
	1.2.Mavzu rejasi bilan qisqacha tanishtiradi.	Tinglaydi, yozadi
	1.3.Qattiq jismlarning ilgarilanma va aylanma harakatini, qo'zg'almas o'qqa ega bo'lgan jismlarning muvozonat shartlarini, Jismning qo'zg'almas o'q atrofida aylanma harakat qonunlarini, impul's momentini tushintiradi. (1.3.1–1.3.2 Ilova)	Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo'lim	2.1.Shu mavzu bo'yicha ma'ruza matnini tarqatadi, mavzu rejasi va tayanch iboralar bilan tanishib chiqishni so'raydi.	O'qiydi
	2.2.Og'irlik va inersiya markazi, Qattiq jismning inersiya markazining harakati,	Eshitadi.

(50 daqiqa)	Shteyner teoremasi va uning tadbqiqini tushuntiradi (1.3.3–1.3.4 Ilova)	
	2.3.Qattiq jismning harakati uchun dinamikaning asosiy qonunlari. Aylanma va ilgarilanma harakat qilayotgan jismning kinetik energiyasini tushuntiradi (1.3.3–1.3.4–1.3.5–Ilovalar).	Kerakli joylarni yozib oladi
3–bosqich. Yakunlovchi (10 daqiqa)	3.1.Mavzu bo'yicha yakunlovchi xulosalar qiladi, olingan bilimlarni qayerda ishlatish mumkinligi ma'lum qiladi.	Savollar beradi
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	Eshitadi.
	3.3.Mavzu bo'yicha mustaqil o'rganish uchun savollar beradi: 1. Energiya turlari? 2.Mexanik ish? 3.Mexanik quvvat?	Mustaqil tayyorlanish uchun savollarni yozib oladi.

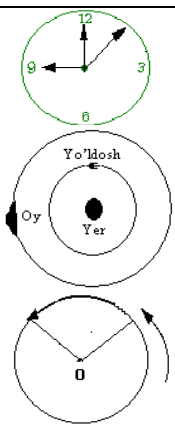
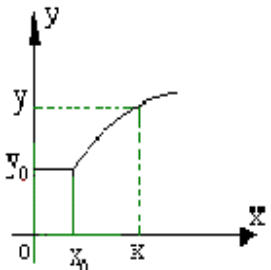
ILOVALAR:

1.3.1–Ilova.

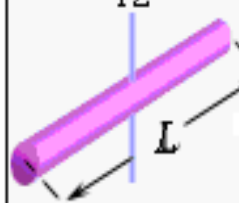
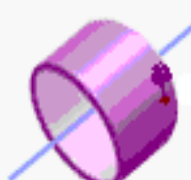


1.3.2–Ilova.

AYLANA BO'YLAB TEKIS HARAKAT

Ta'rif	Aylana bo'ylab tekis harakat grafigi	Aylana bo'ylab tekis harakat
		Moddiy nuqtaning aylana boylab tekis harakati deb teng vaqtlarda teng yoylarni bosib o'tgan harakatga aytiladi.

1.3.3–Ilova.

$I_C = \frac{1}{12}ML^2$  Qattiq sterjen	$I_C = \frac{2}{5}MR^2$  Shar	$I_C = \frac{2}{3}MR^2$  Yupqa qatlamli sferik qobiq
$I_C = MR^2$  Yupqa qatlamli silindr	$I_C = \frac{1}{2}MR^2$  Disk	$I_C = \frac{1}{4}MR^2$  Disk

1.3.4–Ilova.

Jism	Aylanish o'qining holati	Inersiya momenti J_a
Yupqa devorli silindr	Aylanish o'qi sterjenga tik va uning oxirgi uchidan o'tgan	mR^2
Disk yoki ichi to'la silindr	Aylanish o'qi silindrning markazidan o'tgan	$\frac{1}{2}mR^2$
Shar	Aylanish o'qi silindrning markazidan o'tgan	$\frac{2}{5}mR^2$
Yupqa devorli sfera	O'q sharning markazidan o'tgan	$\frac{2}{3}mR^2$
l uzunlikdagi sterjen	O'q sferaning markazidan o'tgan	$\frac{1}{12}ml^2$
l uzunlikdagi sterjen	Aylanish o'qi sterjenga tik va uning markazidan o'tgan	$\frac{1}{3}ml^2$

**ILGARILANMA VA AYLANMA HARAKAT XARAKTERISTIKALARI
ORASIDAGI BOG'LANISH**

Ilgarilanma harakat	Belgila-nishi	Aylanma harakat	Belgilanishi
Massa	m	Inertsia momenti	$I = m \cdot r^2$
Kuch	$\vec{F}$	Kuch momenti	$\vec{M} = [\vec{F} \cdot \vec{r}]$
Impuls	$\vec{P} = m\vec{g}$	Impuls momenti	$\vec{L} = I \cdot \vec{\omega}$
Impuls o'zgarish qonuni:	$d\vec{p} = \vec{F} dt$	Impuls momentining o'zgarish qonuni:	$d\vec{L} = \vec{M} dt$
$\vec{F} = \frac{d\vec{p}}{dt} = \frac{d(m\vec{g})}{dt}$ Dinamikaning asosiy qonuni $\vec{M} = \frac{d\vec{L}}{dt} = \frac{d(I\vec{\omega})}{dt}$			
Impulsning saqlanish qonuni:	$\sum_{i=1}^n \vec{p}_i = \sum_{i=1}^n m_i \vec{g}_i = const$	Impuls momentining saqlanish qonuni:	$\sum_{i=1}^n \vec{L}_i = \sum_{i=1}^n I_i \vec{\omega}_i = const$
Ish	$dA = F_s \cdot dS$	Ish	$dA = M d\varphi$
Kinetik energiya	$\frac{m\vec{g}^2}{2}$	Kinetik energiya	$\frac{I\vec{\omega}^2}{2}$

1.4.–MAVZU	SUYUQLIK VA GAZLAR MEXANIKASI
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1.4. MA'RUZANI OLIB BORISH TEXNOLOGIYASI	
O'quv soati: –2 soat	Talabalar soni: – 50
O'quv mashg'ulot shakli	Ma'ruza
Ma'ruza rejasi:	1.Moddaning agregat holatlari. Suyuqlikning statsionar oqishi. Ideal suyuqlik zarrasi uchun dinamikaning asosiy qonunlari. 2.Bernulli tenglamasi. Torrichelli formulasi. 3.Suyuqlik va gaz oqimining jismga ta'siri. Magnus effekti. Ko'tarish kuchi.
O'quv mashg'ulotining maqsadi:	Ideal suyuqlik, oqim chiziqlari, oqim nayi. Suyuqliklarda kinematik tushinchalar. Suyuqliklar dinamikasi. Dinamik, gidravlik va statik bosimlar. Suyuqliklarda qovushqoqlik. Reynolds soni
O'qitish metodlari:	Ma'ruza, klastr, aqliy hujum, toifalash jadvali, konseptual jadval, T–jadval va Venna doirasi.
O'qitish vositalari:	Ma'ruza matni, kompyuter slaydlari, doska, multimediya, proyektor.
O'qitish shakllari:	Frontal, kollektiv ish.
O'qitish sharoiti:	Kompyuter bilan ta'minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og'zaki baholash, savol–javob.

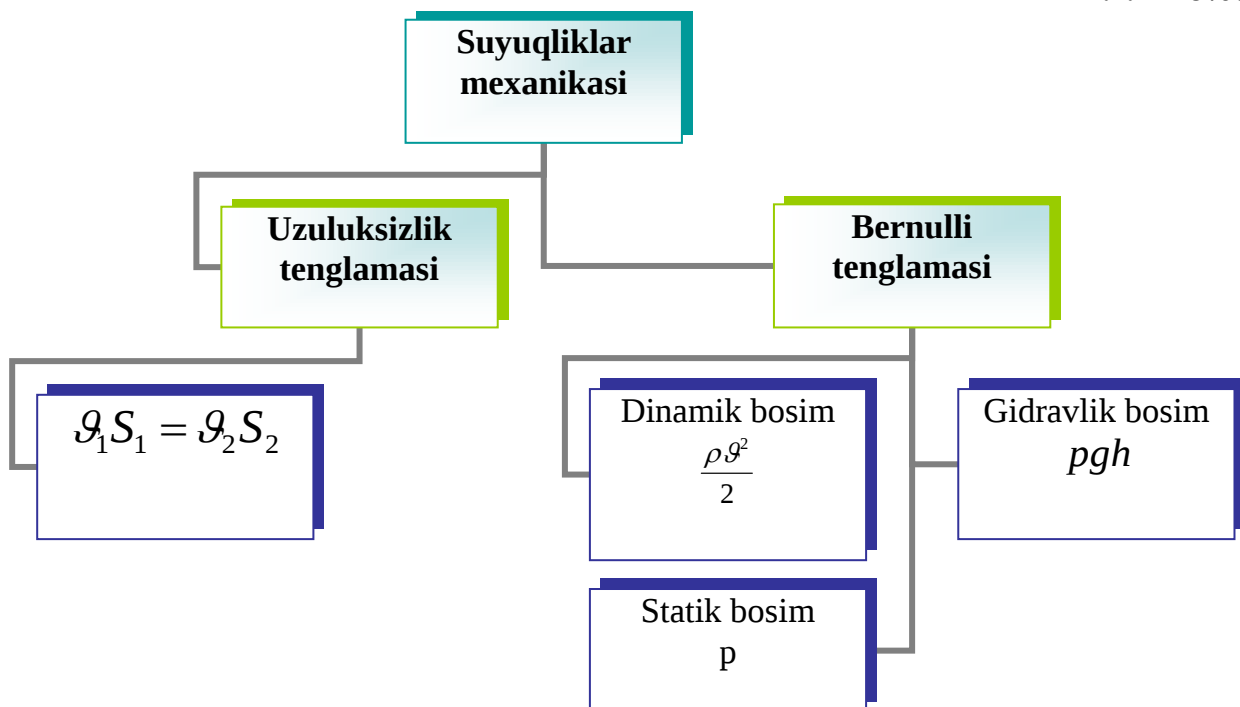
1.4.MA'RUZANING TEXNOLOGIK XARITASI

Ish bosqichlari	O'qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining
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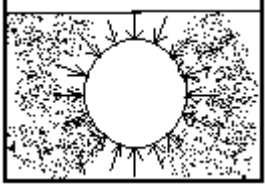
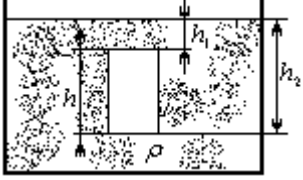
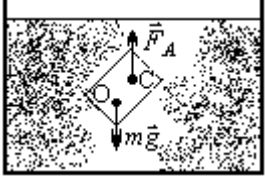
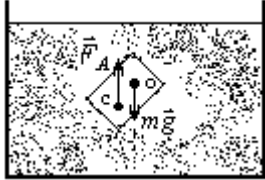
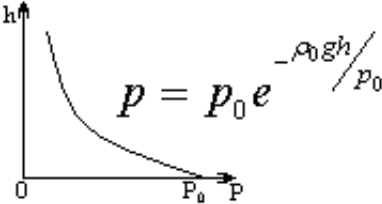
		mazmuni
1–bosqich. Mavzuga kirish (20 daqiqa)	1.1.Moddaning agregat holati haqida umumiy tushunchalar beradi.	Tinglaydi
	1.2.Talabalarni mavzu rejasi bilan qisqacha tanishtiradi.	Tinglaydi, yozadi
	1.3.O‘quv mashg‘uloti mavzusi, maqsadi va o‘quv faoliyati natijalarini aytadi.	Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo‘lim (50 daqiqa)	2.1.Shu mavzu bo‘yicha ma’ruza matnini tarqatadi va mavzu rejasi, tayanch iboralar bilan tanishib chiqishni so‘raydi.	O‘qiydi
	2.2.Gidro va aerodinamika haqida tushuncha beradi (1.4.2–1.4.2–ilova)	Eshitadi.
	2.3.Bernulli tenglamasi. Torrichelli formulasini keltirib chiqaradi.	Kerakli joylarni yozib oladi
	2.4.Suyuqlik va gaz oqimining jismga ta’siri. Magnus effekti. Ko‘tarish kuchi haqida tushuncha (1.4.3–1.4.5–ilovalar)	
3–bosqich. Yakunlovchi (10 daqiqa)	3.1.Mavzu bo‘yicha yakunlovchi xulosalar qiladi. Olingan bilimlarni qayerda ishlatish mumkinligi ma’lum qiladi (4.6–4.7–ilovalar)	Savollar beradi
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	
	3.3.Mavzu bo‘yicha mustaqil o‘rganish uchun savollar beradi: 1.Uzuluksizlik tenglamasining ma’nosi? 2.Bernulli tenglamasini izohlang.	Mustaqil tayyorlanish uchun savollarni yozib oladi.

ILOVALAR:

1.4.1–Ilova.

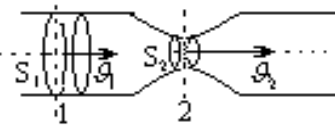
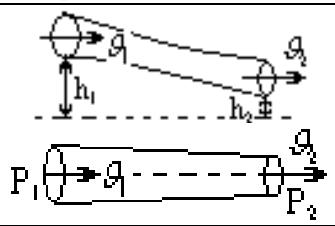
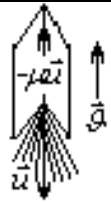
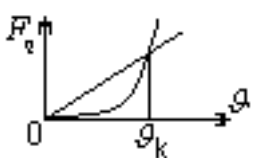


GIDRO VA AEROSTATIKA

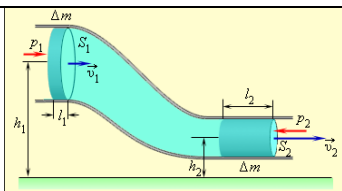
Gaz va suyuqliklarning umumiy xossalari	1. Juda kichik kuchlar ta'siri ostida o'z shaklini istagancha o'zgartirish qobiliyati. 2. Suyuqlik va gazlar o'zlarini har tomonlama siqilgan va cho'zilgan elastik deformatsiyalangan jism kabi tutadi. 3. Har qanday yuzali suyuqlik va gazlarda faqat normal kuchlanish mavjud bo'lib, $p = \frac{dF}{ds}$ gidrostatik bosim deb ataladi. 4. Berilgan nuqtada suyuqlik va gazning gidrostatik bosim kattaligi barcha yo'nalishlarda bir xil.	
Paskal qonuni (1663 yil)	Tashqi kuchlar hosil qilgan suyuqlik sirtining bosimi suyuqlikning hamma yo'nalishlarda bir xil uzatiladi.	
Arximed qonuni (Eramizdan oldingi III asr)	Suyuqlikka (yoki gazga) botirilgan barcha jismlarga suyuqlik (yoki gaz) tomonidan itarib chiqaruvchi kuch ta'sir qiladi. Bu kuchning kattaligi siqib chiqarilgan suyuqlik (yoki gaz) ning og'irligiga teng bo'lib, yuqoriga tik yo'nalgan va siqib chiqarilgan suyuqlik hajmining og'irlik markazidan o'tadi.	
	 $F_A = F_{og'}$	 $p_2 = p_1 + \rho_0 gh$ $F = (p_2 - p_1)S = \rho_0 ghS = \rho_0 Vg$
Muvozanat shartlari $F_A = mg$	Turg'un muvozanat 	Turg'un bo'lmagan muvozanat 
Izotermik jarayon uchun barometrik formula	 $p = p_0 e^{-\rho_0 gh / p_0}$	

GIDRO VA AERODINAMIKA

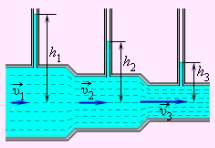
Gidro va aerodinamikaning asosiy tushunchalari	Oqim chiziqlari har bir nuqtaga urinma chiziqlar bo'lib, tezlik oqimi yo'nalishini ko'rsatadi. Statsionar oqim qaysiki alohida zarrachalar trayektoriyasi oqim chiziqlari bilan mos keladi. Suyuqlik (gaz)ning tezligi ko'ndalang kesimi bir xil bo'lgan yuzalarda bir xil bo'ladi.
Model	Suyuqliklar (va hatto gazlar) statsionar oqimlarida suyuqliklar siqilmaydi deb hisoblash mumkin, ya'ni bosimning o'zgarishini hisobga olmaymiz.

Oqimning uzluksizlik tenglamasi		$\Delta m = const$ $s_1 g_1 = s_2 g_2$
Bernulli tenglamasi (1738)		$\rho gh + \rho \frac{g^2}{2} + p = const$ $p_2 - p_1 = \frac{\rho}{2}(g_1^2 - g_2^2)$
Reaktiv harakat		$\vec{F}_p = -\mu \vec{u}$
Suyuqliklarda va gazlarda jismlarning harakati		
Ishqalanish qarshiligi: $F \approx k g$ Bosim qarshiligi: $F \approx r^2 g^2$		$g \ll g_k \quad da$ $F \approx g$ $g \gg g_k \quad da$ $F \approx g^2$
Samolyot qanotining ko'tarilish kuchi		R_u —ko'tarilish kuchi. R_x —peshona qarshilik kuchi.

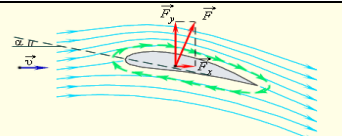
1.4.4—Ilova.

Rasmi	Formulasi	Kattaliklar
	$\rho \frac{g_1^2}{2} + \rho gh_1 + p_1 =$ $\rho \frac{g_2^2}{2} + \rho gh_2 + p_2 = const$	$\rho \frac{g^2}{2}$ —dinamik bosim; ρgh —gidrostatik bosim; p —statik bosim.

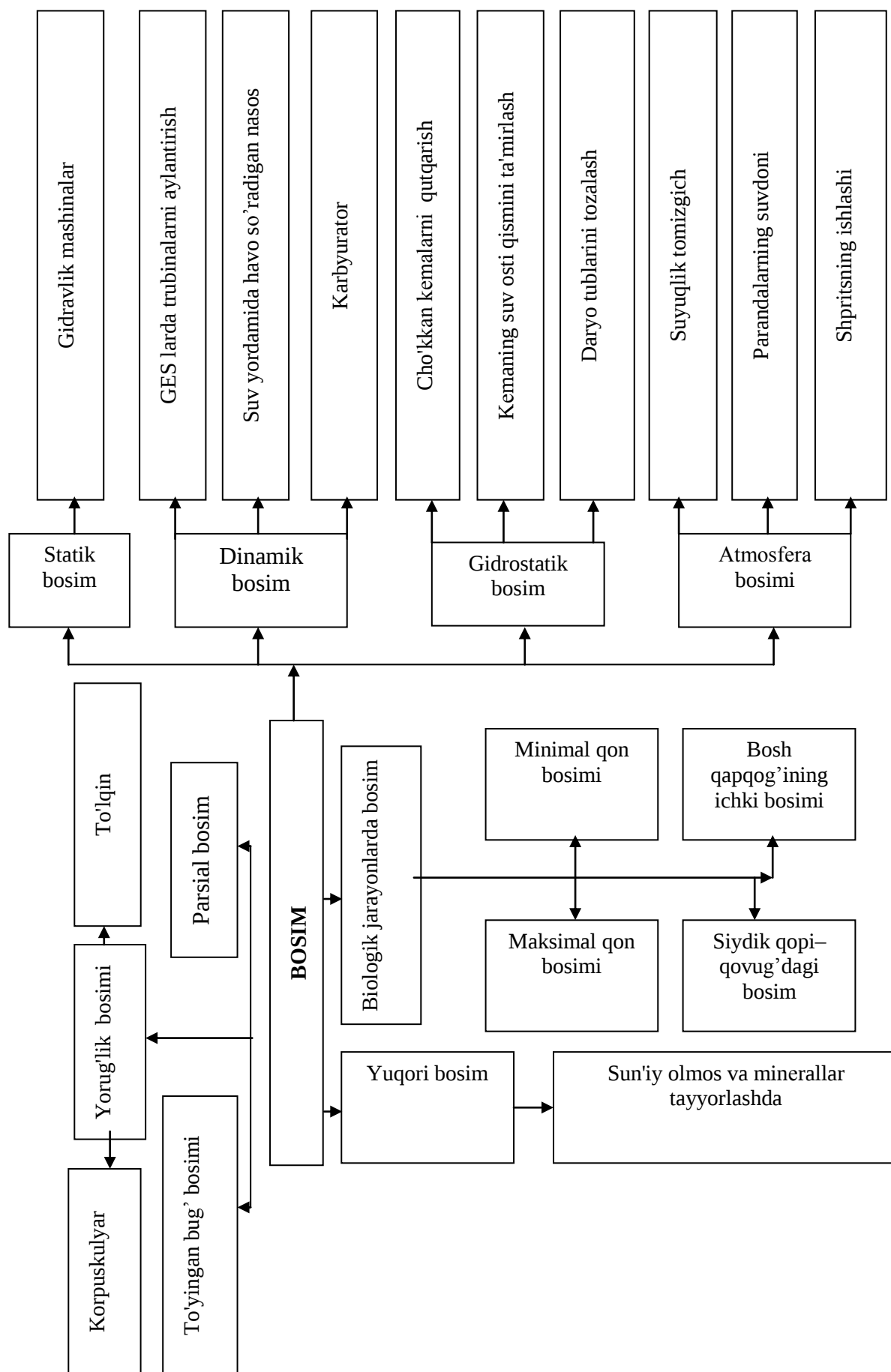
1.4.5—Ilova.

	$\frac{g^2}{2} = gh, \quad g = \sqrt{2gh}$	g —tezlik h —balandlik
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1.4.6—Ilova.

	$F_b = C_x S \frac{\rho g^2}{2}$ $C_x = 0,04$	F_b —bosim kuchi S —yuza C_x —peshona qarshiligi
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BOSIM VA UNING AMALIYOTDAGI O'RNI



1.5.–MAVZU	TEBRANMA HARAKAT VA TO‘LQINLAR
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1.5. MA’RUZANI OLIB BORISH TEXNOLOGIYASI	
O‘quv soati: –2 soat	Talabalar soni: – 50
O‘quv mashg‘ulot shakli	Ma’ruza
Ma’ruza rejasi:	1.Garmonik tebranma harakat. Matematik mayatnik. Uning kinematikasi va dinamikasi. Fizik mayatnik. Xususiy tebranishlarda energiyaning o‘zgarishi. 2.So‘nuvchi tebranma harakat. Majburiy tebranishlar. Rezonans. Tebranishlarni qo‘shish. 3.To‘lqinlar. To‘lqin energiyasi. To‘lqin interferensiyasi. Tovush va uning tabiati. Akustika elementlari.
O‘quv mashg‘ulotining maqsadi:	Garmonik tebranma harakat va to‘lqin energiyasi. Tovush va uning tabiati. Akustika elementlari haqida tushuncha berish.
O‘qitish metodlari:	Ma’ruza, klastr, aqliy hujum, toifalash jadvali, konseptual jadval, T–jadval va Venna doirasi.
O‘qitish vositalari:	Ma’ruza matni, kompyuter slaydlari, doska, multimediya, proyektor.
O‘qitish shakllari:	Frontal, kollektiv ish.
O‘qitish sharoiti:	Kompyuter bilan ta’minlangan auditoriya.
Monitoring va baholash:	Kuzatish, og‘zaki baholash, savol–javob.

1.5.MA’RUZANING TEXNOLOGIK XARITASI

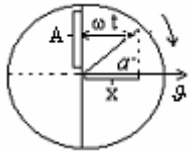
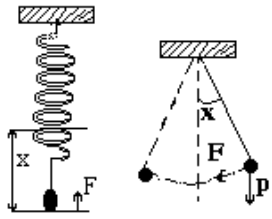
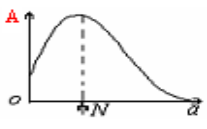
Ish bosqichlari	O‘qituvchi faoliyatining mazmuni	Tinglovchi faoliyatining mazmuni
1–bosqich. Mavzuga kirish (20 daqiqa)	1.1.Tebanish va to‘lqinlar haqida umumiy tushunchalar beradi (1.5.1–ilova). 1.2.O‘quv mashg‘uloti mavzusi, maqsadi va o‘quv faoliyatini natijalarini aytadi.	Tinglaydi Mavzu nomini yozib oladi.
2–bosqich. Asosiy bo‘lim (50 daqiqa)	2.1.Shu mavzu bo‘yicha ma’ruza matnini tarqatadi va mavzu rejasi, tayanch iboralar bilan tanishib chiqishni so‘raydi.	O‘qiydi
	2.2.Garmonik tebranma harakat. Matematik mayatnik va uning kinematikasi hamda dinamikasi haqida tushuncha beradi (1.5.2–ilova).	Eshitadi.
	2.3.To‘lqin energiyasi va to‘lqin interferensiyasi haqida tushuncha beradi. Tovush va uning tabiati, akustika elementlari bilan tanishtiradi (1.5.3–1.5.4–Ilovalar).	Kerakli joylarni yozib oladi
3–bosqich. Yakunlovchi (10 daqiqa)	3.1.Mavzu bo‘yicha yakunlovchi xulosalar qiladi, olingan bilimlarni qayerda ishlatish mumkinligini ma’lum qiladi (1.5.5–1.5.9–Ilovalar).	Savollar beradi
	3.2.Mavzu maqsadiga erishishdagi tinglovchilar faoliyati tahlil qilinadi va baholanadi.	
	3.3.Mavzu bo‘yicha mustaqil o‘rganish	Mustaqil tayyorlanish

	uchun savollar beradi: 1. Matematik va fizik mayatniklar tebranishlari kinematikasi va dinamikasi. 2. To'liqlar. To'liqlar harakat energiyasi nima?	uchun savollarni yozib oladi.
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ILOVALAR:

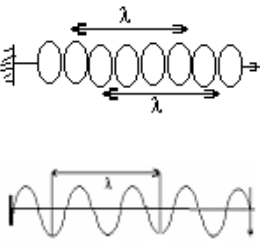
1.5.1–Ilova

MEXANIK TEBRANISHLAR

	$x = A \sin \omega t$ $v = \omega A \cos \omega t$ $a = -\omega^2 A \sin \omega t$ $a = -\omega^2 x$	x – siljish. ω – tezlik. A – amplituda. t – vaqt. ωt – tebranish fazasi
	1. $F = -kx$ 2. $T = 2\pi \sqrt{\frac{m}{k}}$ 3. $T = 2\pi \sqrt{\frac{l}{g}}$	1. Garmonik tebranma harakatning asosiy belgilari. 2. Garmonik tebranma harakat nuqtasining istalgan to'la tebranish davri uchun formulasi. 3. k – proporsionallik koeffitsiyenti.
	$A_{\max} \nu = N$ bo'lsa	ν – chastota. N – rezonatorning tebranish davri. A – tebranish amplitudasi.

1.5.2–Ilova

KUNDALANG VA BUYLAMA TO'LQINLAR. TO'LQIN UZUNLIGI

	$\lambda = gT$ $\lambda = \frac{g}{\nu}$	λ – to'liqlar uzunligi g – to'liqlarning tarqalish tezligi T – tebranish davri ν – tebranish chastotasi
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1.5.3–Ilova.

TEBRANISHLAR KLASSIFIKATSIYASI

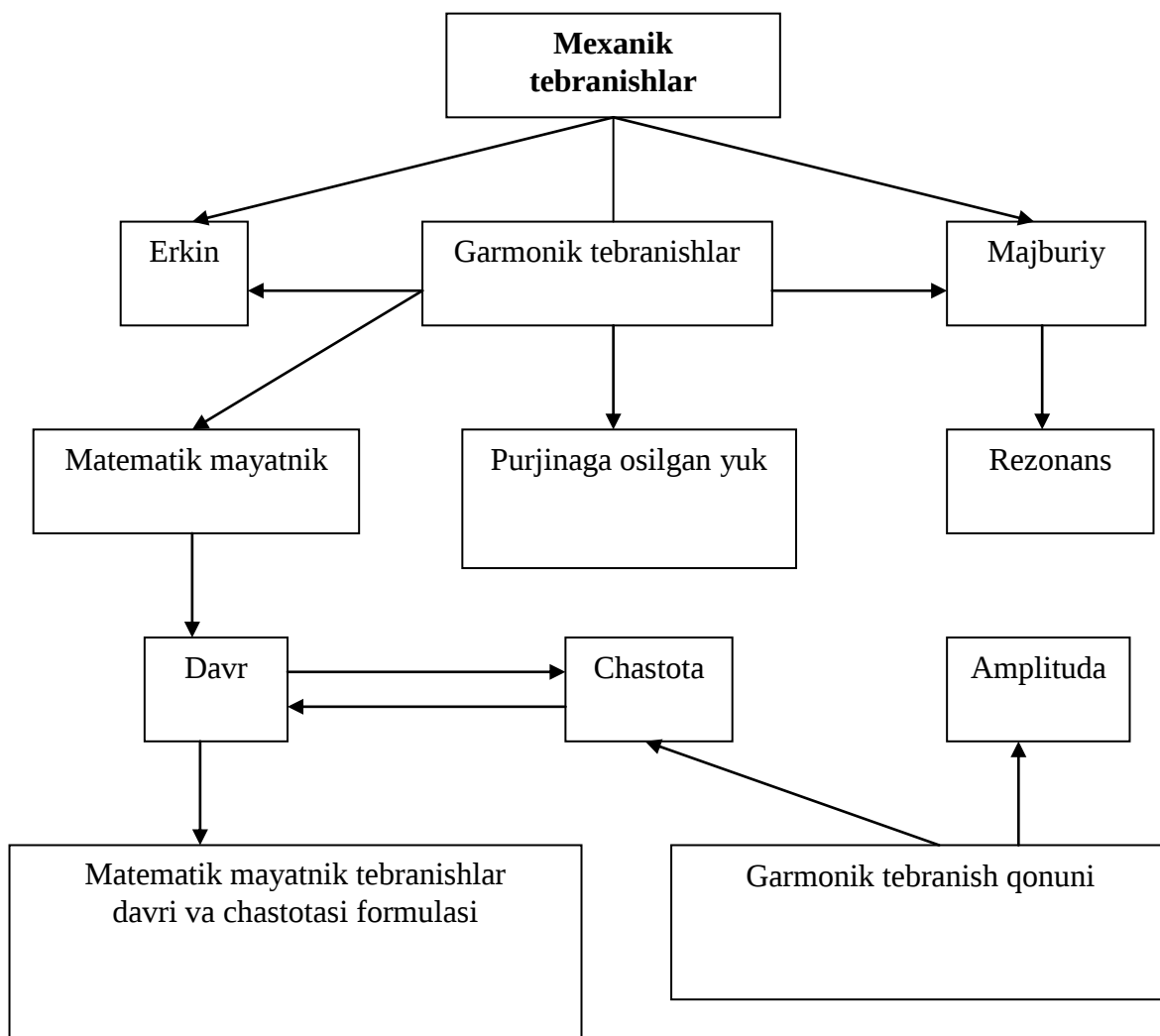
Tebranishlarning turlari	Qanday sharoitlarda tebranishlar hosil bo'ladi	Tebranishlar davri qanday aniqlanadi?	Tebranishlar amplitudasi nima bilan aniqlanadi?
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Erkin tebranishlar	Tebranuvchi sistemaning boshlang'ich energiyasi mavjudligi tufayli	Tebranish sistemasining xususiy parametrlari $T = 2\pi\sqrt{\frac{m}{k}}$ $T = 2\pi\sqrt{\frac{l}{g}}$ $T = 2\pi\sqrt{LC}$	Boshlang'ich shartlari bilan
Majburiy tebranishlar	Tashqi davriy o'zgaruvchi ta'sirlar tufayli	Tashqi davriy o'zgaruvchi ta'sirlarning chastotalari.	Tebranishlar sistemalarida tashqi ta'sir amplitudasi chastotaga $v_{tashqi} = v_{xususiy}$ mos dissipativ energiya yo'qotish hisobiga
Avtotebranishlar	Avtotebranishlar sistemasi ortiqcha tashqi energiya manbai sababli	Tebranishlar sistemasida xususiy parametr sababli	Avtotebranishlar sistemasi parametrlari (chiziqli bo'lmagan) hisobiga
Parametrik tebranishlar	Davriy o'zgaruvchi parametrlar tebranishi hisobiga	Tebranish sistemalarining xususiy parametrlar hisobiga	Tebranish sistemasi parametrlarining chastotasi bilan xususiy tebranish chastotasining bog'lanishi hisobiga

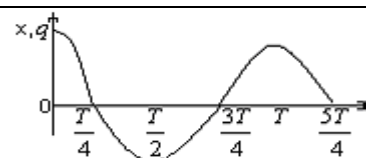
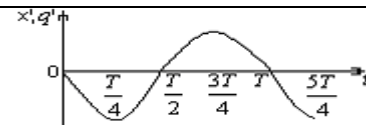
1.5.4–Ilova

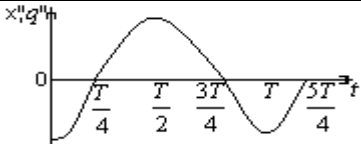
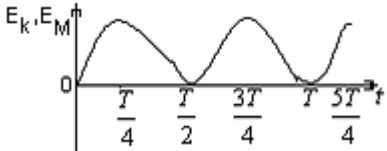
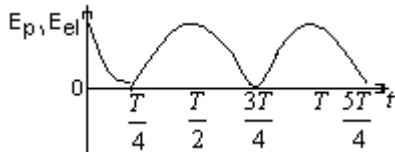
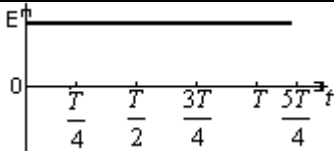
№	Tortish maydonidagi tebranishlar	Elastik tebranishlar
1	$s = S_0 \sin \omega t$	$s = S_0 \sin \omega t$
2	$\mathcal{G} = \omega S_0 \cos \omega t$	$\mathcal{G} = \omega S_0 \cos \omega t$
3	$a = -\omega^2 S_0 \sin \omega t$	$a = -\omega^2 S_0 \sin \omega t$
4	$T = 2\pi\sqrt{\frac{l}{g}}$	$T = 2\pi\sqrt{\frac{m}{k}}$
5	$f = -ks$	$f = -ks$
6	$a + \frac{g}{l}s = 0$	$a + \frac{k}{m}s = 0$

MEXANIK TEBRANISHLAR



GARMONIK TEBRANISHLAR

	Formularlar	Grafiklar
1	$x = x_m \cos \omega t$ $q = q_m \cos \omega t$	
2	$x' = \dot{x} = -x_m \omega \sin \omega t$ $q' = \dot{q} = -q_m \omega \sin \omega t$	

3	$x'' = a = -x_m \omega^2 \cos \omega t$ $q'' = -q_m \omega^2 \cos \omega t$	
4	$E_k = \frac{m\omega^2 x_m^2}{2} \sin^2 \omega t$ $E_{magn} = \frac{L\omega^2 q_m^2}{2} \sin^2 \omega t$	
5	$E_p = \frac{m\omega^2 x_m^2}{2} \cos^2 \omega t$ $E_{эл} = \frac{m\omega^2 q_m^2}{2} \cos^2 \omega t$	
6	$E = E_k + E_p = \frac{m\omega^2 x_m^2}{2}$ $E = E_{эл} + E_{magn} = \frac{m\omega^2 q_m^2}{2}$	

1.5.7–Illova

TO'LQINLI JARAYONLAR PARAMETRLARINING O'ZARO BOG'LANISHI

	ω	T	k	λ
ω	=	$\frac{2\pi}{T}$	gk	$\frac{2\pi g}{\lambda}$
T	$\frac{2\pi}{\omega}$	=	$\frac{2\pi}{gk}$	$\frac{\lambda}{g}$
K	$\frac{\omega}{g}$	$\frac{2\pi}{gT}$	=	$\frac{2\pi}{\lambda}$
λ	$\frac{2\pi g}{\omega}$	gT	$\frac{2\pi}{k}$	=

MEXANIK TO'LQINLAR