Isroilov Shukurillo

FIZIKA

shaxsiy qo’llanma

KINEMATIKA

1. Tezlik	$$v = \frac{S}{t}$$
2. To'g'ri chiziqli tekis harakatning tenlamasi	$$X = X_0 + vt$$
3. To'g'ri chiziqli tekis harakatda yo'lning vaqtga bog'liqlik grafigidan	$$v = \frac{S}{t} = tan\,\alpha$$
4. Natijaviy tezlik	$$v = v_1 + v_2$$ $$v = \sqrt{v_1^2 + v_2^2 + 2v_1v_2\cos\alpha}$$
5. Nisbiy tezlik	$$v = v_1 - v_2$$ $$v = \sqrt{v_1^2 + v_2^2 - 2v_1v_2\cos\alpha}$$
6. Kater daryoda S masofaga t_1 vaqtda borib t_2 vaqtda kelgan bo'lsa	$$v_{oqim} = \frac{t_2 - t_1}{2t_1t_2}S$$ $$v_{kater} = \frac{t_2 + t_1}{2t_1t_2}S$$
7. Oniy tezlik	$$v = \frac{\Delta S}{\Delta t}$$
8. Notekis harakatda o'rtacha tezlik	$$v_{o`r} = \frac{S_{um}}{t_{um}}$$
9. Tekis o'zgaruvchan harakatda oniy tezlik	$$v = v_0 + at$$ $$v = \sqrt{v_0^2 + 2aS}$$ $$v = \frac{2S}{t} - v_0$$
10. Tekis o'zgaruvchan harakatda tezlanish	$$a = \frac{v - v_0}{t}$$ $$a = \frac{v^2 - v_0^2}{2S}$$ $$a = \frac{2(S - v_0t)}{t^2}$$
11. Tekis o'zgaruvchan harakatda yo'l	$$S = \frac{v^2 - v_0^2}{2a}$$ $$S = v_{o`r}t = \frac{v + v_0}{2}t$$

12. Tekis o'zgaruvchan harakat tenglamasi	$\mathbf{X = X_0 + v_0 t + \frac{at^2}{2}}$
13. Tekis o'zgaruvchan harakatda n-sekunddagi ko'chish	$\mathbf{\Delta S = v_0 + \frac{a}{2}(2n - 1)}$
14. Jismlarning erkin tushishi va yuqoriga tik otilgan jism harakati uchun ,,tekis o'zgaruvchan harakat" dagi barcha formulalar orinli, faqat	$\mathbf{a = g}$ $\mathbf{S = h}$
15. Jismlarning erkin tushishida tushish vaqti	$\mathbf{t_{tu} = \frac{v_0}{g} = \frac{2h}{v_0} = \sqrt{\frac{2h}{g}}}$
16. Erkin tushayotgan jism oxirgi Δt vaqt ichida Δh masofani o'tgan bo'lsa, butun yo'lni o'tish vaqti; — yo'lning birinchi h_1 qismini o'tish vaqti;	$\mathbf{t = \frac{\Delta h}{g\Delta t} + \frac{\Delta t}{2}}$ $\mathbf{t_1 = \frac{\Delta h}{g\Delta t} - \frac{\Delta t}{2}}$
17. Erkin tushayotgan jismning yo'li teng ikkiga bo'lingan holda, yo'lning 2-yarmini Δt vaqtda o'tsa yo'lning 1-yarmini o'tish vaqti; — jismning o'tgan butun yo'li;	$\mathbf{t = (1 + \sqrt{2}) \cdot \Delta t}$ $\mathbf{h = g \cdot (3 + 2\sqrt{2}) \cdot \Delta t^2}$
18. Δ tvaqt oralig'ida uzilgan 2tomchi orasidagi masofa Δh bo'lsa, harakatlanish vaqtlari; —birinchi tomchiga nisbatan; —ikkinchi tomchiga nisbatan;	$\mathbf{t_1 = \frac{\Delta h}{g\Delta t} - \frac{\Delta t}{2}}$ $\mathbf{t_2 = \frac{\Delta h}{g\Delta t} - \frac{\Delta t}{2}}$
19. Gorizontal otilgan jismning tezligi	$\mathbf{v_x = v_0}$ $\mathbf{v_y = gt = \sqrt{2gh}}$ $\mathbf{v = \sqrt{v_x^2 + v_y^2}}$
20. Gorizontal otilgan jismning vertikal ko'chishi yoki tushish	$\mathbf{y = h = \frac{gt^2}{2}}$

balandligi	$h = \frac{v_y^2}{2g} = \frac{g}{2v_0^2} \cdot L^2$
21.Gorizontal otilgan jismning gorizontal ko'chishi yoki uchish uzoqligi	$x = L = v_0 t$ $L = v_x \cdot \sqrt{\frac{2g}{h}}$
22. Gorizontal otilgan jismning harakat tenglamasi	$y = \frac{g}{2v_0^2} \cdot x^2$
23. Ixtiyoriy t vaqtdan keyin jism tezligining gorizont bilan tashkil etgan burchagi	$\tan\alpha = \frac{v_y}{v_x} = \frac{gt}{v_x} = \frac{\sqrt{2gh}}{v_0}$
24. Gorizontal otilgan jismda tangensial tezlanish	$a_t = \frac{g^2 t}{\sqrt{v_0^2 + g^2 t^2}}$
25. Gorizontal otilgan jismda normal tezlanish	$a_n = \frac{g v_0}{\sqrt{v_0^2 + g^2 t^2}}$
26. Tezlanishlar yig'indisi	$g = a_t + a_n$ $g = \sqrt{a_t^2 + a_n^2}$
27. Gorizontga burchak ostida otilgan jismning tezligi	$v_x = v_0 \cdot \cos\alpha$ $v_y = v_0 \cdot \sin\alpha - gt$ $v = \sqrt{v_x^2 + v_y^2}$
28. Gorizontga burchak ostida otilgan jismning maksimal ko'tarilish balandligi	$h_{max} = \frac{v_0^2 \sin^2\alpha}{2g} = \frac{gt_{tu}^2}{2}$ $h_{max} = \frac{v_y^2}{2g} = \frac{L \cdot \tan\alpha}{4}$
29. Gorizontga burchak ostida otilgan jismning ko'tarilish vaqti	$t_k = \frac{v_0 \sin\alpha}{g} = \sqrt{\frac{2h}{g}}$
30. Gorizontga burchak ostida otilgan jismning to'la uchish vaqti	$t_{uch} = 2t_k$ $t_k = t_{tu}$
31.Gorizontga burchak ostida otilgan jismning uchish	$L = v_x \cdot t = \frac{4h_{max}}{\tan\alpha}$

uzoqligi	$L = \frac{v_0^2 \cdot \sin 2\alpha}{g}$
32. Ixtiyoriy t vaqtdan keyin jism tezligining gorizont bilan tashkil etgan burchagi	$\tan\alpha = \frac{v_y}{v_x} = \frac{v_0 \cdot \sin\alpha - gt}{v_0 \cdot \cos\alpha}$
33. Traektoriyaning egrilik radiusi	$R = \frac{v_x^2}{a_n}$ $v_0 \cdot \cos\alpha = \sqrt{g \cdot R}$
34. Otilish burchagi	$\tan\alpha = \sqrt{\frac{2h}{R}}$
35. Aylana bo'ylab tekis harakatda — davr	$T = \frac{t}{N} = \frac{1}{\nu} = \frac{2\pi}{\omega}$
36. —chastota	$\nu = \frac{N}{t} = \frac{1}{T} = \frac{\omega}{2\pi}$
37. —burchak tezlik	$\omega = \frac{\Delta\varphi}{\Delta t} = \frac{\vartheta}{R} = 2\pi\nu$
38. —chiziqli tezlik	$\vartheta = \frac{\Delta S}{\Delta t} = \omega R = \frac{2\pi R}{T}$
39. —markazga intilma tezlanish	$a_{m.i} = \frac{\vartheta^2}{R} = \omega^2 R$
40. Aylana bo'ylab tekis harakat qilayotgan jism tezligining o'zgarishi — aylananing $\frac{1}{4}$ qismida — aylananing $\frac{1}{2}$ qismida — aylananing $\frac{3}{4}$ qismida — aylanani to'liq o'tganda	$\Delta v = \sqrt{2}v$ $\Delta v = 2v$ $\Delta v = \sqrt{2}v$ $\Delta v = 0$
41.Aylana bo'lab notekis harakatda —burchak	$\varphi = \omega_0 t + \frac{\varepsilon t^2}{2} = \frac{\omega^2 - \omega_0^2}{2\varepsilon}$
42. —burchak tezlik	$\omega = \omega_0 + \varepsilon t$
43. —burchak tezlanish	$\varepsilon = \frac{\Delta\omega}{\Delta t} = \frac{\omega - \omega_0}{t}$

44. —tangensial tezlanish	$\mathbf{a_t = \frac{\Delta\vartheta}{\Delta t} = \frac{\vartheta - \vartheta_0}{t} = \varepsilon R}$
45. —to'la tezlanish	$\mathbf{a = a_t + a_n}$ $\mathbf{a = \sqrt{a_t^2 + a_n^2}}$
46. Disk 2 nuqtasining radiuslar farqi ΔR, tezliklar farqi $\Delta v = v_1 - v_2$ bo'lsa	$\mathbf{R = \frac{\vartheta_1}{\vartheta_1 - \vartheta_2} \cdot \Delta R}$ $\mathbf{v = \frac{\Delta\vartheta}{2\pi\Delta R}}$
47. Aylanada harakatni tasma yordamida uzatishda va friksion uzatishda	$\mathbf{\vartheta_1 = \vartheta_2}$ $\mathbf{\omega_1 r_1 = \omega_2 r_2}$ $\mathbf{\frac{\nu_2}{\nu_1} = \frac{r_1}{r_2}}$
48. Aylanada harakatni tishli g'ildirak yordamida uzatish	$\mathbf{\frac{\nu_2}{\nu_1} = \frac{N_1}{N_2}}$

DINAMIKA

1. Zichlik	$\boldsymbol{\rho = \frac{m}{V} = \frac{3g}{4\pi RG}}$
2. Nyutonning 1-qonuni	$\boldsymbol{F = ma}$
3. Teng ta'sir etuvchi kuch	$\boldsymbol{F = F_1 + F_2 + \cdots + F_n}$ $\boldsymbol{F = \sqrt{F_1^2 + F_2^2 + 2\cos a \cdot F_1 \cdot F_2}}$
4. Nyutonning 3-qonuni	$\boldsymbol{F_1 = -F_2 \qquad F_1 = F_2}$
5. Markazga intilma kuch	$\boldsymbol{F_{m.i} = ma_{m.i} = \frac{m\vartheta^2}{R} = m\omega^2 R}$
6. Butun olam tortishish qununi	$\boldsymbol{F = G\frac{m_1 m_2}{R^2}}$
7. Yer sirtidan h balandlikdagi og'irlik kuchi	$\boldsymbol{F = G\frac{m_1 m_2}{(R+h)^2}}$
8. Yer sirtida erkin tushish tezlanishi	$\boldsymbol{g = G\frac{M}{R^2}}$
9. Yer sirtidan h balandlikdagi erkin tushish tezlanishi	$\boldsymbol{g = G\frac{M}{(R+h)^2}}$
10. Jism og'irligi: — $\vartheta = const$ da	$\boldsymbol{P = mg}$

— a tezlanish bilan yuqoriga — a tezlanish bilan pastga	$P = m(g + a)$ $P = m(g - a)$
11. Qavariq ko'prikda jism og'irligi yoki ko'prikka bosim kuchi	$P = m\ g - a_{m.i}\ = m(g - \frac{\vartheta^2}{R})$
12. Botiq ko'prikda jism og'irligi yoki ko'prikka bosim kuchi	$P = m\ g + a_{m.i}\ = m(g + \frac{\vartheta^2}{R})$
13. Jismning solishtirma og'irligi	$d = \frac{P}{V} = \rho g$
14. Yuklanish	$n = \frac{P}{mg} = \frac{m(g+a)}{mg}$
15. Birinchi kosmik tezlik	$\vartheta_I = \sqrt{gR} = 7.9\ \frac{km}{s}$
16. Ikkinchi kosmik tezlik	$\vartheta_{II} = \sqrt{gR} = 11.2\ \frac{km}{s}$
17. Uchinchi kosmik tezlik	$\vartheta_{III} = 16.7\ \frac{km}{s}$
18. h balandlikdagi sun'iy(yoki tabiiy) yo'ldosh tezligi	$\vartheta = \sqrt{G\frac{M}{(R+h)}}$
19. Kopler qonuni	$\left(\frac{T_1}{T_2}\right)^2 = \left(\frac{R_1}{R_2}\right)^3$
20. Guk qonuni	$F_{el} = -k\Delta l$
21. Nisbiy deformatsiya	$\varepsilon = \frac{\Delta l}{l_0} = \frac{l - l_0}{l_0}$
22. Absolyut deformatsiya	$\Delta l = l - l_0$
23. Mexanik kuchlanish yoki zo'riqish	$\sigma = E\varepsilon = \frac{F}{S}$
24. Prujina bikirligi	$k = \frac{F_{el}}{\Delta l} = \frac{ES}{l_0}$
25. Mustahkamlik chegarasi σ,zichligi ρ bo'lgan, bir uchidan osilgan trosning maksimal uzunligi — havoda — suyuqlikda	$l_{max} = \frac{\sigma}{\rho g}$ $l_{max} = \frac{\sigma}{(\rho_{jism} - \rho_{suyuq})g}$

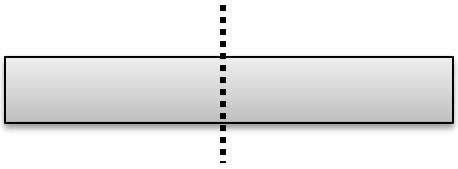
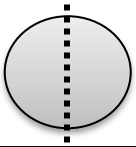
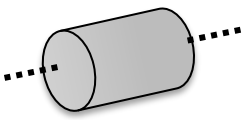
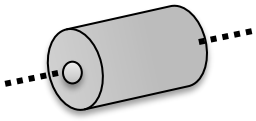
26. Mustahkamlik chegarasi σ,zichligi ρ bo'lgan,devorning maksimal balandligi	$$h_{max} = \frac{\sigma}{\rho g}$$
27. Ketma-ket ulangan prujina uchun	$$\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \cdots + \frac{1}{k_n}$$
28. Parallel ulangan prujina uchun	$$k = k_1 + k_2 + \cdots + k_n$$
29. Ko'chmas blok — tezlanish — taranglik kuchi	$$a = g\frac{m_1 - m_2}{m_1 + m_2}$$ $$T = \frac{2gm_1m_2}{m_1 + m_2}$$
30. Ko'char blokning FIKi η bo'lsa	$$F = \frac{mg}{2\eta}$$
31.Ishqalanish kuchi	$$F = \mu N = \mu mg$$
32. F kuch ta'sirida jism a tezlanish bilan harakatlansa	$$F = F_{ish} + ma$$
33. Tortish koeffitsienti	$$k = \frac{F}{mg}$$
34. Tormozlanishda jism tezlanishi	$$a = \mu g$$
35. Qiya tekislikda ishqalanish kuchi	$$F_{ish} = \mu N = \mu mg\cos a$$
36. Qiya tekislikda pastga harakatlantiruvchi kuch	$$F_P = mg\sin a$$
37. Qiya tekislikda jism tezlanishi	$$a = g(\sin a - \mu\cos a)$$
38. Qiya tekislikda jismni a tezlanish bilan yuqoriga tortuvchi kuch	$$F_T = F_P + F_{ish} + ma$$
39. Qiya tekislikda jismni tekis tortuvchi(yoki ushlab turuvchi) kuch	$$F_T = F_P + F_{ish}$$
40. Qiya tekislikda jismni a tezlanish bilan pastga tushsa	$$F_P = F_{ish} + ma$$
41.Qiya tekislikda jism	

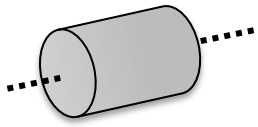
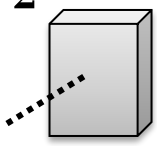
— tinch turadi — tekis sekinlanuvchan harakat qiladi — tekis tezlanuvchan harakat qiladi	$\mu = tan\,a$ $\mu > tan\,a$ $\mu < tan\,a$
42. Qiya tekislikning FIKi	$\eta = \frac{tan\,a}{tan\,a + \mu}$
43. Stol chetida osilib turgan l uzunlikdagi ip(yoki prujina) uchun	$\mu = \frac{l_{os}}{l_{us}}$; $l = l_{os} + l_{ua}$
44. Qarshilik kuchi jism tezligiga bog'liq — jism tezligi kichik bo'lganda — jism tezligi katta bo'lganda	$F_{qar} = -kv$ $F_{qar} = -kv^2$
45. Qayrilayotgan velisopedchi, motosiklchi yoki konkichi uchun	$\frac{mv^2}{R} \cdot tan\,a = mg;$ $\mu = tan\,a$
46. Jism impulsi	$P = mv$
47. Kuch impulsi	$I = F\Delta t = m(v - v_0)$
48. Impulsning saqlanish qonuni	$m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2;$
49. Jismlar sistemasining impulsi	$P_{nat} = P_1 + P_2 + \cdots + P_n$
50. Nisbiy impuls	$P_{nis} = mv_{nis}$
51.Jismlar markaziy noelastik to'qnashgandan keying tezligi — harakat yo'nalishi bir xil bo'lganda — harakat yo'nalishi qarama-qarshi bo'lganda	$u = \frac{m_1v_1 + m_2v_2}{m_1 + m_2}$ $u = \frac{m_1v_1 - m_2v_2}{m_1 + m_2}$
52. Jismlar markaziy elastik to'qnashgandan keying tezligi - u_1 va u_2 — harakat yo'nalishi bir xil bo'lganda — harakat yo'nalishi qarama-	$u_1 = \frac{2m_2v_2 - (m_2 - m_1)v_1}{m_1 + m_2}$ $u_1 = \frac{2m_2v_2 + (m_2 - m_1)v_1}{m_1 + m_2}$ $u_1 = \frac{-2m_2v_2 - (m_2 - m_1)v_1}{m_1 + m_2}$

qarshi bo'lganda	$u_1 = \frac{2m_2v_2 - (m_2 - m_1)v_1}{m_1 + m_2}$
53. Mexanik ish	$A = F \cdot S \cdot \cos a = \Delta E$
54. Yerda yotgan l uzunlikdagi sterjenni gorizontga nisbatan a burchakka og'dirishda bajarilgan ish	$A = mg\frac{l}{2}\sin a$
55. Quvvat	$N = \frac{A}{t} = F \cdot v \cdot \cos a$
56. Foydali ish koeffitsiyenti (FIK)	$\eta = \frac{A_f}{A_u} \cdot 100\% = \frac{N_f}{N_u} \cdot 100\%$
57. Kinetik energiya	$E_k = \frac{mv^2}{2}$
58. Potensial energiya	$E_p = mgh$
59. Prujinaning potensial energiyasi	$E_p = \frac{k\Delta x^2}{2}$
60. Qiya tekislikdan dumalab tushayotgan slindrning kinetik energiyasi — sirpanishsiz tushayotgan bo'lsa — sirpanib tushayotgan bo'lsa	$E_k = \frac{3mv_0^2}{4}$ $E_k = \frac{5mv_0^2}{4} + \frac{J_0\omega^2}{2}$
61.Massa markazi orqali o'tgan o'q atrofida erkin aylanayotgan qattiq jism energiyasi	$E_k = \frac{mv_0^2}{2} + \frac{J_0\omega^2}{2}$

STATIKA

1. Jismning muvozanat sharti	$F_1 + F_2 + \cdots + F_n = 0$
2. Kuch momenti	$M = F \cdot l$
3. Qo'zg'alamas o'q atrofida aylana oladigan jismning muvozanat sharti yoki momentlar qoidasi	$M_1 + M_2 + \cdots + M_n = 0$

4. Jismlar sistemasining massa markazi	$x_0 = \dfrac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$
5. Vaznsiz richagning muvozanat sharti	$F_1 l_1 = F_2 l_2$
6. Massaga ega bo'lgan richagning muvozanat sharti	$Mg = \dfrac{2(F_1 l_1 - F_2 l_2)}{l_2 - l_1}$
7. Aylanma harakat dinamikasining asosiy tenglamasi	$M = I \cdot \varepsilon$
8. Massasi m va uzunligi l bo'lgan sterjenning uning uzunligiga tik va o'rtasidan o'tgan aylanish o'qiga nisbatan inersiya momenti	$I = \dfrac{1}{12} m l^2$ 
9. Massasi m va uzunligi l bo'lgan sterjenning uning uzunligiga tik va bir uchidan o'tgan aylanish o'qiga nisbatan inersiya momenti	$I = \dfrac{1}{3} m l^2$ 
10. Massasi m va radiusi R bo'lgan sharning o'z markazidan o'tgan aylanish o'qiga nisbatan inersiya momenti	$I = \dfrac{2}{5} m R^2$ 
11. Massasi m va radiusi R bo'lgan yahlit slindirning o'z o'qiga nisbatan inersiya momenti	$I = \dfrac{1}{2} m R^2$ 
12. Massasi m, tashqi radiusi R va ichki radiusi r bo'lgan qalin devorli kovak slindirning o'z o'qiga nisbatan inersiya momenti	$I = \dfrac{1}{2} m (R^2 + r^2)$ 
13. Massasi m va radiusi R bo'lgan	$I = mR^2$

yupqa (halqa) slindirning o'z o'qiga nisbatan inersiya momenti	
14. Massasi m, bo'yi a va eni b bo'lgan brusokning inersiya momenti	$I = \frac{1}{2}m(a^2 + b^2)$ 
15. Aylanma harakat qilayotgan jismning kinetik energiyasi	$E = \frac{I\omega^2}{2}$
16. Bosim	$P = \frac{F}{S} = \frac{F_y}{S}$
17. Gidravlik press	$\frac{F_1}{S_1} = \frac{F_2}{S_2}$ $\frac{h_1}{h_2} = \frac{F_2}{F_1}$
18. Suyuqlikning idish tubiga va yon devoriga bosimi	$P_a = \rho_s gh$ $P_{yon} = \frac{\rho_s gh}{2}$
19. Tutash idishlarda suyuqliklar muvozanati	$\rho_1 h_1 = \rho_2 h_2$
20. Dengiz sathidan h balandlikdagi atmosfera bosimi	$P = 10^5 - \frac{h}{12} \cdot 133.3 \ Pa$ $P = 760 - \frac{h}{12} \ mm.sim.ust$
21. Usti ochiq idishdagi suyuqlikning idish tubiga va yon devoriga bosim	$P_a = \rho_s gh + P_0$ $P_{yon} = \frac{\rho_s gh}{2} + P_0$
22. Ko'l tubidan ko'tarilgan pufakchaning hajmi n marta ortgan bo'lsa, ko'lning chuqurligi — $T_1 = T_2$ — $T_1 \neq T_2$	$h = 10\ n - 1$ $h = 10\ \frac{T_1}{T_2} n - 1$
23. Arximed kuchi	$F_A = p_s V_j h$
24. Ko'taruvchi kuch	$F_k = F_A - mg$

25. Jismning suyuqlikka botgan qismi	$\frac{V_b}{V_j} = \frac{\rho_j}{\rho_s}$
26. Suyuqlikda tezlanish — tepaga — pastga	$a = \frac{\rho_s - \rho_j}{\rho_j} \cdot g$ $a = \frac{\rho_j - \rho_s}{\rho_j} \cdot g$
27. Jism havoda h balandlikdan tushib, suvga botish chuqurligi	$g \cdot h = a \cdot l$
28. Suyuqlik oqimining uzluksizlik tenglamasi	$Sv = const$
29. Bernulli tenglamasi	$\frac{\rho v^2}{2} + \rho g h + P = const$
30. Suyuqlik qatlamlarining ichki qarshilik kuchlari	$F_{ishq.} = -\eta \frac{\Delta v}{\Delta l} \cdot S$
31.Puazeyl formulasi	$\Delta V = -\frac{\pi r^4}{8\eta} \cdot \frac{\Delta P}{\Delta l} \cdot \Delta t$
32. Suyuqlik ichida harakatlanayotgan shar uchun Stoks formulasi	$F = 6\pi\eta r v$
33. Suyuqlik oqimining quvvati	$N = \frac{S\rho v^3}{2}$
34. Idishdagi suyuqlik sathidan h balandlik pastda ochilgan teshikdan oqib chiqayotgan suyuqlikning tezligi	$v = \sqrt{2gh}$

MEXANIK TEBRANISH VA TO'LQINLAR

1. Garmonik tebranma harakat tenglamasi	$X = X_0 \sin(\omega t + \varphi_0)$ $X = X_0 \cos(\omega t + \varphi_0)$
2. Garmonik tebranma harakatda tezlik	$v = x' = -v_0 \cos(\omega t + \varphi_0)$ $v_0 = x_0 \omega$
3. Garmonik tebranma harakatda	$a = x'' = a_0 \sin(\omega t + \varphi_0)$

tezlanish	$a_0 = x_o\omega^2$
4. Garmonik tebranma harakatda bikrlik	$k = \omega^2 m$
5. Matamatik mayatnik uchun Gyugens formulasi	$T = 2\pi\sqrt{\frac{l}{g}}; \quad \nu = \frac{1}{2\pi}\sqrt{\frac{g}{l}}$ $\omega = \sqrt{\frac{g}{l}}$
6. Matematik mayatnik vertikaldan a burchak og'gan holda gorizontal tekislikda R radiusli aylana bo'ylab harakat qilayotganda	$T = 2\pi\sqrt{\frac{l\cos a}{g}}$
7. Mayatnik ipining uzunligi Δl ga ortganda davri ΔT ga ortgan bo'lsa, boshlang'ich davr	$T_0 = \frac{2\pi^2\Delta l}{\Delta T g} - \frac{\Delta T}{2}$
8. Mayatnik ipining uzunligi Δl ga kamayganda davri ΔT ga kamaysa, boshlang'ich davr	$T_0 = \frac{2\pi^2\Delta l}{\Delta T g} + \frac{\Delta T}{2}$
9. Prujinali mayatnik uchun Gyugens formulasi	$T = 2\pi\sqrt{\frac{m}{k}}; \quad \nu = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$ $\omega = \sqrt{\frac{k}{m}}$
10. Prujinali mayatnik yukuning massasi Δm ga ortganda davri n marta ortsa, yukning dastlabki massasi	$m_0 = \frac{\Delta m}{n^2 - 1}$
11. Prujinali mayatnik yukuning massasi Δm ga kamaytirilganda davri n marta kamaysa, yukning dastlabki massasi	$m_0 = \frac{n^2 \cdot \Delta m}{n^2 - 1}$

12. Garmonik tebranma harakat energiyasi	$E_T = E_{k.max} = E_{p.max} = \frac{kx_0^2}{2}$
13. Majburiy tebranishlarda siljish	$x = \frac{F_0 \sin \omega t}{m(\omega_0^2 - \omega^2)}$
14. Mexanik to'lqinlar uchun	$\vartheta = \lambda \cdot \nu; \quad l = N \cdot \lambda$
15. Bir-biridan Δx masofada tebranayotganyassi to'lqinlardagi fazalar farqi	$\Delta\varphi = \frac{2\pi}{\lambda} \cdot \Delta x$
16. Tarqalayotgan yo'lqinning o'rtacha energiyasi	$\overline{E} = \frac{1}{2} m\omega^2 A^2$
17. To'lqin energiya zichligi	$\overline{\omega} = \frac{1}{2} \rho\omega^2 A^2$
18. Tovushning intensivligi yoki kuchi(balandligi)	$I = \frac{E}{St} = \frac{1}{2} \rho v \omega^2 A^2$

MOLEKULYAR FIZIKA

1. Atomning nisbiy massa birligi	$M_r = \dfrac{m_0}{\frac{1}{12}m_{0C}}$
2. Modda miqdori	$\nu = \dfrac{N}{N_A} = \dfrac{m}{M}$
3. Molyar massa	$M = m_0 \cdot N_A = \dfrac{m}{N}N_A$
4. Molekulaning o'lchami	$d = \sqrt[3]{\dfrac{V}{N}} = \sqrt[3]{\dfrac{M}{\rho \cdot N_A}}$
5. Gaz molekulalari orasidagi masofa	$b = \sqrt[3]{\dfrac{kT}{P}}$
6. Molekulalar konsentratsiyasi	$n = \dfrac{N}{V}$
7. Zichlik	$\rho = \dfrac{m}{V} = n \cdot m_0$
8. Bitta molekulaning kinetik energiyasi	$E_k = \dfrac{m_0 v^2}{2}$
9. Temperatura - molekulyar kinetik energiya o'lchovidir	$E_k = \dfrac{3}{2}kT$
10. Molekulyar kinetik nazariyasining asosiy tenglamasi	$P = knT$ $P = \dfrac{2}{3}nE_k$
11. Dalton qonuni	$P = P_1 + P_2 + \cdots + P_n$
12. Universal gaz doimiysi	$R = k \cdot N_A$
13. Gaz molekulalarining o'rtacha kvadratik tezligi	$v = \sqrt{\dfrac{3RT}{M}} = \sqrt{v_x^2 + v_y^2 + v_z^2}$ $v = \sqrt{\dfrac{3P}{\rho}} = \dfrac{\omega R_B \ R_B - R_A}{S}$
14. Temperatura; - Kelvin-Selsiy - Frangeyt - Selsiy	$T = 273.15 + t \ K$ $F = \dfrac{9}{5}t + 32 \ {}^0F$

15.Izotermik jarayon	$P_1V_1 = P_2V_2; \quad T = const$
16.Izobarik jarayon	$\frac{V_1}{T_1} = \frac{V_2}{T_2}; \quad P = const$
17.Izoxorik jarayon	$\frac{P_1}{T_1} = \frac{P_2}{T_2}; \quad V = const$
18.Adiabatik jarayon (Puasson tenglamasi)	$PV^{\gamma} = const; \quad TV^{\gamma-1} = const;$ $TP^{\frac{\gamma}{\gamma-1}} = const; \quad \gamma = \frac{i+2}{i}$
19.Ideal gaz bosimining termik koeffitsiyenti	$\beta = \frac{\Delta P}{P_0 \Delta T}$
20. Ideal gaz hajmining termik koeffitsiyenti	$\beta = \frac{\Delta V}{V_0 \Delta T}$
21.Klapeyron tenglamasi	$\frac{PV}{T} = kN = const$
22. Mendeleyeev- Klapeyron tenglamasi	$\frac{PV}{T} = \nu RT$
23. Loshmit soni	$N_L = \frac{N_A}{V_0}$
24. Moddaning ichki energiyasi	$U = E_k + E_p$
25. Bir atomli ideal gazning ichki energiyasi	$U = \frac{3}{2}\nu RT$
26. Bitta molekulaning kinetik energiyasi	$E_k = \frac{i}{2}kT$
27. Jismni isitish uchun sarflangan issiqlik miqdori	$Q = c \cdot m \cdot \Delta T$
28. Issiqlik balansi tenglamasi	$Q_1 + Q_2 + Q_3 = Q_1' + Q_2' + Q_3'$
29. Suyuqlik aralashmasining temperaturasi	$t = \frac{m_1 t_1 + m_2 t_2}{m_1 + m_2}$
30. Yoqilg'ining to'la yonish issiqligi	$Q = q \cdot m$
31.Yoqilg'ida ishlaovchi dvigatelning FIKi	$\eta = \frac{N_{foyda} \cdot t}{q m_{yoq}} \cdot 100\%$
32. Avtomobil o'zgarmas tezlik bilan ketayotgan bo'lsa	$\frac{NS}{v} = \eta q m_{yoq}$

TERMODINAMIKA

1. Termodinamikaning 1-qonuni	$Q = \Delta U + A$ $\Delta U = Q + A^T$
2. Izotermik jarayon uchun termodinamikaning 1-qonuni	$T = const \Longrightarrow \Delta U = 0$ $Q = A = P\Delta V$
3. Izoxorik jarayon uchun termodinamikaning 1-qonuni	$V = const \Longrightarrow A = 0$ $Q = \Delta U = \frac{3}{2}\nu R\Delta T$
4. Izobarik jarayon uchun termodinamikaning 1-qonuni	$P = const; \quad Q = \Delta U + A$ $A = \nu R\Delta T = P\Delta V = \frac{2}{5}Q$ $\Delta U = \frac{3}{2}\nu R\Delta T = \frac{3}{5}Q$
5. Adiabatik jarayon uchun	$Q = 0; \quad \Delta U + A = 0$ $\frac{3}{2}\nu R\Delta T = -P\Delta V$
6. Solishtirma issiqlik sig'imi	$c = \frac{Q}{m\Delta T}$
7. Molyar isssiqlik sig'imi	$C_M = M \cdot c$
8. O'zgarmas hajmdagi molyar isssiqlik sig'imi	$C_V = \frac{i}{2}R$
9. O'zgarmas bosimdagi molyar isssiqlik sig'imi	$C_P = C_V + R; \quad A = R$ $C_P = \frac{i+2}{2}R$
10. Real issiqlik mashinasining FIKi	$\eta = \frac{Q_1 - Q_2}{Q_1} \cdot 100\%$ $A = Q_1 - Q_2$
11. Ideal issiqlik mashinasining FIKi (Karno sikli uchun)	$\eta = \frac{T_1 - T_2}{T_1} \cdot 100\%$
12. Erish issiqligi	$Q = r \cdot m$
13. Bug'lanish issiqligi	$Q = \lambda \cdot m$
14. Absolyut namlik	$\rho = \frac{m}{V}$
15. Nisbiy namlik	$\varphi = \frac{\rho_a}{\rho_T} \cdot 100\% = \frac{P_a}{P_T} \cdot 100\%$
16. Xo'llash burchagi	

- xo'llaydigan suyuqlik - xo'llamaydigan suyuqlik	$\varphi < \frac{\pi}{2}$ $\varphi > \frac{\pi}{2}$
17.Sirt taranglik kuchi	$F = \sigma \cdot l$
18.Sirt taranglikda sirt energiyasi va bajarilgan ish	$W = \sigma \cdot S$ $A = \sigma \cdot \Delta S$
19.Laplas formulasi - xo'llaydigan suyuqlik - xo'llamaydigan suyuqlik	$P = \frac{2\sigma}{R}$ $P > 0$ $P < 0$
20. Kapilyarlarda suyuqlikning ko'tarilish balandligi	$h = \frac{2\sigma}{\rho g R}$
21.Jyuren formulasi	$h = \frac{2\sigma}{\rho g R} \cdot \cos a$
22. Tomchilar soni	$N = \frac{mg}{\sigma l} = \frac{mg}{\sigma 2\pi R}$
23. Jismlarni issiqlikdan kengayishi	$l = l_0\ 1 + \alpha t$ $V = V_0\ 1 + \varphi t$

ELEKTROSTATIKA

1. Zaryadlarning karralik qonuni	$q = n \cdot e;\quad n \in Z$
2. Zaryadlarning saqlanish qonuni	$q_1 + q_2 + \cdots + q_n = const$
3. Kulon qonuni	$F = \frac{k}{\varepsilon} \cdot \frac{q_1 q_2}{r^2};\quad k = \frac{1}{4\pi\varepsilon_0}$
4. Elektr maydon kuchlanganligi	$E = \frac{F}{q}$
5. Maydonlarning superpozitsiya (ustms-ust tushib qolish) prinsipi	$E = E_1 + E_2 + \cdots + E_n$ $E = \sqrt{E_1^2 + E_2^2 + 2\cos a \cdot E_1 E_2}$
6. Kuchlanganlik oqimi	$N = ES$
7. Ostrogradskiy – Gauss teoramasi	$N = \frac{q_1 + q_2 + \cdots + q_n}{\varepsilon_0}$
8. Zaryad sirt zichligi	$\sigma = \frac{q}{S}$
9. Tekis zaryadlangan cheksiz tekislikning maydon kuchlanganligi	$E = \frac{\sigma}{2\varepsilon_0 \varepsilon}$
10. Qarama-qarshi ishorali tekis zaryadlangan cheksiz parallel tekisliklarning maydon kuchlanganligi	$E_{ich} = \frac{\sigma}{\varepsilon_0 \varepsilon};\quad E_{tash} = 0$
11. Nuqtaviy zaryadning r masofadagi maydon kuchlanganligi	$E = \frac{k}{\varepsilon} \cdot \frac{q}{r^2}$
12. Tekis zaryadlangan shar yoki sferaning maydon kuchlanganligi - r > R - r = R - r < R	$E = \frac{k}{\varepsilon} \cdot \frac{q}{r^2}$ $E = \frac{\sigma}{\varepsilon_0 \varepsilon}$ $E = 0$
13. Gorizontal yo'nalishdagi elektr maydonida elektronning tezlanishi	$a = \frac{eE}{m_e} = \frac{eU}{m_e \cdot d}$

14. Vertikal yo'nalishdagi elektr maydonida q zaryadning dinamik tenglamasi	$ma = \pm qE \pm mg$
15. Muhitning nisbiy dielektrik singdiruvchanligi	$\varepsilon = \frac{F_{vakuum}}{F_{muhit}} = \frac{E_{vakuum}}{E_{muhit}}$
16. Elektr dipoli	$p = q \cdot l$
17. Ikki nuqtaviy zaryad potensial energiyasi	$W_p = \frac{k}{\varepsilon} \cdot \frac{q_1 q_2}{r}$
18. Nuqtaviy zaryad potensiali	$\varphi = \frac{W_p}{q} = \frac{k}{\varepsilon} \cdot \frac{q_1}{r}$
19. Elektr maydonida nuqtaviy zaryadni ko'chirishda bajarilgan ish	$A = qEl$ $A = E_{p.1} - E_{p.2}$ $A = \Delta\varphi \cdot q$
20. Kuchlanish	$U = \Delta\varphi = E \cdot q$
21. q_1 zaryadli R_1 radiusli shar q_2 zaryadli R_2 radiusli shar bilan tutashtirilgandan keyingi zaryadlar	$q_1' = R_1 \cdot \frac{q_1 + q_2}{R_1 + R_2}$ $q_2' = R_2 \cdot \frac{q_1 + q_2}{R_1 + R_2}$
22. q_1 zaryadli R_1 radiusli shar q_2 zaryadli R_2 radiusli shar bilan tutashtirilgandan keyingi umumiy potensial	$\varphi_{um} = \frac{R_1\varphi_1 + R_2\varphi_2}{R_1 R_2}$
23. φ_0 potensialga ega n ta shar birlashtirilganidan hosil bo'lgan bitta kata sharning potensiali	$\varphi = \sqrt[3]{n^2} \cdot \varphi_0$
24. Yakkalangan o'tkazgichning elektr sig'imi	$C = \frac{q}{\varphi}$
25. Yakkalangan sharning elektr sig'imi	$C = \frac{\varepsilon R}{k}$
26. Kondensatorning elektr sig'imi	$C = \frac{q}{\varphi_1 - \varphi_2} = \frac{q}{U}$
27. Yassi kondensatorning elektr sig'imi	$C = \frac{\varepsilon\varepsilon_0 \cdot S}{d}$

28. Slindirik kondensatorning elektr sig'imi	$$C = \frac{2\pi\varepsilon\varepsilon_0 L}{\ln\frac{R_2}{R_1}}$$
29. Sferik kondensatorning elektr sig'imi	$$C = \frac{4\pi\varepsilon\varepsilon_0 \cdot R_1 \cdot R_2}{R_1 - R_2}$$
30. Yassi kondensator qoplamalari orasidagi fazoning yarmi ε_1 qolgan yarmi ε_2 dielektrik bilan to'ldirilgan bo'lsa, uning sig'imi - vertikal yarmi - gorizontal yarmi	$$C = \frac{2\varepsilon_1\varepsilon_2\varepsilon_0 S}{(\varepsilon_1 + \varepsilon_2)\cdot d}$$ $$C = \frac{(\varepsilon_1 + \varepsilon_2)\cdot \varepsilon_0 S}{2d}$$
31.Kondensatorlarni parallel ulash	$$q = q_1 + q_2 + \cdots + q_n$$ $$U = U_1 = U_2 = \cdots = U_n$$ $$C = C_1 + C_2 + \cdots + C_2$$
32. Kondensatorlarni ketma-ket ulash	$$q = q_1 = q_2 = \cdots = q_n$$ $$U = U_1 = U_2 = \cdots = U_n$$ $$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots + \frac{1}{C_2}$$
33. Zaryadlangan o'tkazgich energiyasi	$$W = \frac{q\cdot\varphi}{2}$$
34. Zaryadlangan kondensator energiyasi - Yassi kondensator uchun	$$W = \frac{q\cdot U}{2}$$ $$W = \frac{\varepsilon\varepsilon_0 E^2}{2}\cdot Sd$$
35. Elektrostatik maydon energiya zichligi	$$\omega_e = \frac{W}{V} = \frac{\varepsilon\varepsilon_0 E^2}{2}$$

O'ZGARMAS TOK

1. Tok kuchi	$$I = \frac{q}{t} = q_0 nSv$$
2. Tok zichligi	$$j = \frac{I}{S} = q_0 nS$$
3. Qarshilik	$$R = \rho_{s.q}\cdot\frac{l}{S}$$

4. Zarjirning bir qismi uchun Om qonuni	$$I = \frac{U}{R}$$
5. O'tkazgichlarni ketma-ket ulash	$$I = I_1 = I_2 = \cdots = I_n$$ $$U = U_1 + U_2 + \cdots + U_n$$ $$R = R_1 + R_2 + \cdots + R_n$$
6. O'tkazgichlarni parallel ulash	$$I = I_1 + I_2 + \cdots + I_n$$ $$U = U_1 = U_2 = \cdots = U_n$$ $$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}$$
7. O'lchash chegarasidan n marta katta tok kuchini o'lchash uchun ampermetrga parallel ulangan shuntning qarshiligi ampermetr ichki qarshiligidan (n-1) marta kichik bo'lishi kerak	$$I = n \cdot I_a$$ $$R_{sh} = \frac{R_a}{n-1}$$
8. O'lchash chegarasidan n marta katta kuchlanishni o'lchash uchun voltmetrga ketma-ket ulangan shuntning qarshiligi voltmetr ichki qarshiligidan (n-1) marta katta bo'lishi kerak	$$U = n \cdot U_V$$ $$R_{sh} = (n-1) \cdot R_V$$
9. Zanjirning bir qismi uchun Joul-Lens qonuni	$$Q = A = U \cdot I \cdot t$$ $$Q = I^2 \cdot R \cdot t = \frac{U^2}{R} \cdot t$$
10. Tok quvvati	$$N = \frac{A}{t} = U \cdot I$$
11. Elektr yurituvchi kuch	$$\varepsilon = \frac{A_T}{q} = U_R + U_r$$
12. Berk zanjir uchun Om qonuni	$$I = \frac{\varepsilon}{R + r}$$
13. Qisqa tutashuv toki	$$I = \frac{\varepsilon}{r}$$
14. Akkumlyatorni zaryadlashda	$$U_{zaryad} = \varepsilon + I_{zaryad} \cdot r$$
15. Akkumlyatorni razryadlashda	$$U_{razryad} = \varepsilon - I_{razryad} \cdot r$$
16. Ikkita manba ketme-ket	$$\varepsilon_{um} = \varepsilon_1 \pm \varepsilon_2 \pm \cdots \pm \varepsilon_n$$

ulanganda	$r_{um} = r_1 + r_2 + \cdots + r_n$
17.Ikkita manba parallel ulanganda	$\varepsilon_{um} = r_{um} \cdot \frac{\varepsilon_1}{r_1} \pm \frac{\varepsilon_2}{r_2} \pm \cdots \pm \frac{\varepsilon_n}{r_n}$ $\frac{1}{r_{um}} = \frac{1}{r_1} + \frac{1}{r_2} + \cdots + \frac{1}{r_n}$
18.Manbaning FIK i	$\eta = \frac{R}{R+r} = \frac{U}{\varepsilon} = \frac{N_f}{N_T}$
19.Elktr dvigatelning FIK i	$\eta = \frac{N_{um}}{I \cdot U} = \frac{F \cdot v}{I \cdot U}$
20. Kirxgofning 1-qoidasi	$q = q_1 + q_2 + \cdots q_n$ $I = I_1 + I_2 + \cdots I_n$
21.Kirxgofning 2-qoidasi	$I_1R_1 + I_2U_2 + \cdots + I_nR_n =$ $= \varepsilon_1 + \varepsilon_2 + \cdots + \varepsilon_n$
22. To'liq zanjir uchun Joul-Lens qonuni	$Q = A = \varepsilon \cdot I \cdot t$ $Q = I^2 \ R + r \ \cdot t = \frac{\varepsilon^2}{R+r} \cdot t$
23. Tok manbaidagi samarasiz quvvat	$N_s = I^2 \cdot r$
24. Tashqi zanjir quvvati (foydali quvvat)	$N_f = I^2 \cdot R = U \cdot I$
25. Tok manbaining to'liq quvvati	$N_T = N_s + N_f = I^2(R + r)$
26. Manbaga ulangan istemolchidagi maksimal quvvat R = r bo'lganda amalga oshadi	$N_{max} = \frac{\varepsilon^2}{4r}$
27. Kuchlanishning ayni bir qiymatida elektr quvvatlari N_1, N_2, … , N_n bo'lgan o'zaro ketme-ket ulangan qarshiliklardan tashkil topgan zanjirning umumiy quvvati	$\frac{1}{N} = \frac{1}{N_1} + \frac{1}{N_2} + \cdots + \frac{1}{N_n}$
28. Kuchlanishning ayni bir qiymatida elektr quvvatlari N_1, N_2, … , N_n bo'lgan o'zaro parallel ulangan qarshiliklardan tashkil topgan zanjirning	$N = N_1 + N_2 + \cdots + N_n$

umumiy quvvati	

TURLI MUHITLARDA ELEKTR TOKI

1. Metall o'tkazgich qarshiligining temperaturaga bog'liqligi	$R = R_0\ 1 + \alpha t$ $\rho = \rho_0(1 + \alpha t)$ $\alpha = \frac{1}{273°C}$
2. Elektrolitlarda o'tkazgich qarshiligining temperaturaga bog'liqligi	$R = R_0\ 1 - \alpha t$ $\rho = \rho_0(1 - \alpha t)$ $\alpha = \frac{1}{273°C}$
3. Elktrolitdan o'tayotgan umumiy tok	$I = I^+ + I^-$
4. Elektrolitlarda tok zichligi	$j = q_- n_- v_- - q_+ n_+ v_+$
5. Faradeyning 1-qonuni	$m = k \cdot q$
6. Faradeyning 2-qonuni	$k = \frac{1}{F} \cdot \frac{M}{n}$
7. Faradeyning birlashgan qonuni	$\frac{m}{It} = \frac{M}{n} \cdot \frac{1}{eN_A}$
8. Dissotsiatsiyalanish darajasi	$\beta = \frac{n}{n_0}$
9. Elektronning to'qnashish oldidagi energiyasi	$\frac{mv^2}{2} = eEl$
10. Elektron neytral atomni ionlashtirish sharti	$\frac{mv^2}{2} \geq A_i$
11. Elektronni metalldan ajratib chiqarish uchun kerak bo'ladigan chiqish ishi	$A = e \cdot \Delta\varphi$
12. Elektron anodga yetib borishida elektr maydon bajargan ish va elektroning tezlanishi	$A = qU$ $a = \frac{eU}{md}$

13. Xususiy yarim o'tkazkichlarda to'la tok	$I = I_{elektron} + I_{teshik}$ $I_{elektron} = I_{teshik}$

MAGNIT MAYDON

1. Bir jinsli magnit maydonida tokli yassi konturga ta'sir etuvchi kuch momenti	$M = I \cdot S \cdot B \cdot \sin a$
2. Magnit momenti	$P_m = I \cdot S$
3. Parallel toklarning o'zaro ta'siri	$F = \frac{\mu\mu_0}{4\pi} \cdot \frac{2I_1 I_2}{r} \cdot l$
4. Magnit maydon induksiya vektori	$B = \frac{M_{max}}{P_m}$
5. Muhitning nisbiy magnit singdiruvchanligi	$\mu = \frac{B}{B_0}$
6. Magnit maydon kuchlanganligi	$H = \frac{B}{\mu\mu_0} = I \cdot \frac{N}{l}$
7. Amper kuchi	$F_A = I \cdot B \cdot l \cdot \sin a$
8. Bio-Savar-Laplas qonuni	$\Delta B = \frac{\mu\mu_0}{4\pi} \cdot \frac{I\Delta l}{r^2} \cdot \sin a$
9. Cheksiz to'g'ri tok hosil qilgan magnit maydon induksiyasi	$B = \frac{\mu\mu_0}{4\pi} \frac{2I}{r}$
10. Aylanma tokning magnit maydon induksiyasi	$B = \mu\mu_0 \frac{I}{2r}$
11. Tokli solenoid o'zagidagi magnit maydon induksiyasi	$B = \mu\mu_0 In = \mu\mu_0 I \frac{N}{l}$
12. Tokli toroidning magnit maydon induksiyasi	$B = \mu\mu_0 In = \mu\mu_0 I \frac{N}{2\pi r}$
13. Magnit maydon uchun superpozitsiya prinsipi	$B = B_1 + B_2 + \cdots + B_n$ $B = \sqrt{B_1^2 + B_2^2 + 2\cos a \cdot B_1 B_2}$
14. Lorens kuchi	$F_L = qvB \cdot \sin a$
15. Magnit maydonidagi harakatlanayotgan zaryadli	$R = \frac{mv}{qB}$

zarrachaning harakat traektoriyasining radiusi	
16. Zaryadli zarraning aylanish davri	$T = \frac{2\pi m}{qB}$
17. Zaryadning harakat tezligi	$v = \sqrt{\frac{2qU}{m}}$
18. Magnit oqimi	$\Phi = B \cdot S \cdot \cos a$
19. Tokli o'tkazgichni magnit maydonida ko'chirishda bajarilgan ish	$A = IBl\Delta x$ $A = I\Delta\Phi = I\ \Phi_2 - \Phi_1$
20. Elektromagnit induksiya qonuni	$\varepsilon_i = -\frac{\Delta\Phi}{\Delta t} = \frac{A}{q}$
21. O'ramlar soni N ta bo'lgan g'altakda vujudga keluvchi induksion EYUK	$\varepsilon_i = -N \cdot \frac{\Delta\Phi}{\Delta t}$
22. Fuko toki	$I_\Phi = \frac{\varepsilon_i}{R}$
23. Bir jinsli magit maydonida o'zgarmas v tezlik bilan harakatlanayotgan l uzunlikdagi o'tkazgichda hosil bo'ladigan induksion EYUK	$\varepsilon_i = v \cdot B \cdot l \cdot \sin a$
24. S yuzali, N ta o'ramga ega bo'lgan ramka magnit maydonida o'zgarmas ω sikllik chastota bilan aylanayotda yuzaga keluvchi induksion EYUK	$\varepsilon_i = \omega NBS \sin\ \omega \cdot t$
25. Induktivlik	$L = \frac{\Phi}{I}$
26. Uzunligi l bo'lgan ko'ngdalang kesim yuzi S bo'lgan solenoidning induktivligi	$L = \frac{\Phi}{l} = \mu\mu_0 n^2 V$
27. G'altaklar ketma-ket ulansa	$L = L_1 + L_2$

28. G'altaklar parallel ulansa	$\frac{1}{L}=\frac{1}{L_1}+\frac{1}{L_2}$
29. Kunturda hosil bo'lgan o'zinduksiya EYUK	$\varepsilon=-L\cdot\frac{\Delta I}{\Delta t}$
30. G'altak magnit maydon energiyasi	$W=\frac{\Phi\cdot \mathrm{I}}{2}=\frac{B^2V}{2\mu\mu_0}$ $W=\frac{LI^2}{2}=\frac{\Phi^2}{2L}$
31.Magnit maydon energiya zichligi	$\omega=\frac{W}{V}=\frac{B^2}{2\mu\mu_0}$

ELEKTROMAGNIT TABRANISH VA TO'LQINLAR

1. Elektromagnit tebranishlarda elektromagnit maydonning to'la energiyasi	$W_{to'la}=W_{elektr}^{max}=W_{magnit}^{max}$ $W_{to'la}=W_{elek}+W_{mag}=const$
2. Tebranish konturida elektr maydon energiyasining maksimal qiymati	$W_{elektr}^{max}=\frac{q_0^2}{2C}$
3. Tebranish konturida magnit maydon energiyasining maksimal qiymati	$W_{magnit}^{max}=\frac{LI_0^2}{2}$
4. Tebranish konturida elektro magnit tebranishlar tenglamasi	$Q=-\frac{1}{LC}q$
5. Tebranish konturi uchun Tomson formulasi	$T=2\pi\sqrt{LC};\quad \nu=\frac{1}{2\pi\sqrt{LC}}$ $\omega=\frac{1}{\sqrt{LC}}$
6. Kondensatordagi zaryadning maksimal qiymati	$q_0=\frac{I_0}{\omega}$
7. Kondensatordagi kuchlanishning maksimal	$U_0=\omega\cdot LI_0$

qiymati	
8. G'altakdagi tok kuchining maksimak qiymati	$I_0 = \omega \cdot q = \frac{U_0}{\omega \cdot L}$
9. O'zgaruvchan elektr tokida zaryad va tok kuchi	$q = q_0 \sin\ \omega t + \varphi_0$ $i = I_0 \cos\ \omega t + \varphi_0$
10. O'zgaruvchan tok zanjirida resistor - R	$i = I_0 \cos \omega t$ $u = U_0 \cos \omega t$ $N = I_0 U_0 \cos^2 \omega t$ $R = \frac{u}{i} = \frac{U_0}{I_0}$
11. Tok kuchi va kuchlanishning effektiv qiymati	$I_{ef} = \frac{I_0}{\sqrt{2}} = \frac{U_{ef}}{R}$ $U_{ef} = \frac{U_0}{\sqrt{2}} = I_{ef} R$
12. Aktiv qarshilikda tok kuchi va kuchlanish bir xil fazada tebranadi	$\Delta\varphi = 0$
13. Aktiv qarshilikda o'zgaruvchan tok quvvatining o'rtacha qiymati	$N_{o'r} = \frac{I_0 U_0}{2} = I_{ef} \cdot U_{ef}$
14. O'zgaruvchan tok zanjirida kondensator - C	$u = U_0 \cos \omega t$ $i = -I_0 \sin \omega t = I_0 \cos\ \omega t + \frac{\pi}{2}$ $N = -\frac{I_0 U_0}{2} \sin 2\omega t$
15. Kondensatorda sig'im qarshilik	$X_C = \frac{U_0}{\omega C}$
16. Kondensatorda kuchlanish tok kuchidan π\2 faza orqada yuradi	$\Delta\varphi = \frac{\pi}{2}$
17. Kondensatorda quvvat ajralmaydi	$N = 0$
18. Tok kuchi va kuchlanishning aplitudalari	$I_0 = \frac{U_0}{X_C}$ $U_0 = I_0 \cdot X_C$
19. O'zgaruvchan tok zanjirida	$u = U_0 \cos \omega t$

g'altak - L	$i = I_0 \sin \omega t = I_0 \cos\ \omega t - \frac{\pi}{2}$ $N = \frac{I_0 U_0}{2} \sin 2\omega t$
20. G'altakning induktiv qarshiligi	$X_L = \omega L$
21.G'altakda kuchlanish tok kuchidan π\2 faza oldinda yuradi	$\Delta\varphi = \frac{\pi}{2}$
22. G'altakda quvvat ajralmaydi	$N = 0$
32. G'altakdagi induksion EYUKning maksimal qiymati	$\varepsilon_{i0} = \omega L I_0$
23. Tok kuchi va kuchlanishning aplitudalari	$I_0 = \frac{U_0}{X_L}$ $U_0 = I_0 \cdot X_L$
24. Ketma-ket ulangan rezistor, kondensator va g'altakdan iborat o'zgaruvchan tok zanjirida;	$u = U_0 \cos \omega t$ $I_0 \cos\ \omega t + \varphi$
25. Kuchlanish va tok kuchi tebranishlari orasidagi fazalar farqi - oldinda - orqada	$\varphi = arccos \frac{R}{Z}$ $\varphi = arctg \frac{X_L - X_C}{R}$ $\varphi > 0$ $\varphi < 0$
26. Zanjirdagi umumiy kuchlanish	$U_{um} = \sqrt{U_R^2 + (U_L - U_C)^2}$
27. Zanjirdagi umumiy tok	$I_{um} = I_R$
28. O'zgaruvchan tok zanjirida to'la qarshilik	$Z = \sqrt{R^2 + (X_L - X_C)^2}$
29. Tok kuchi va kuchlanishning aplitudalari	$I_0 = \frac{U_0}{Z}$ $U_0 = I_0 \cdot Z$
30. Tok kuchi va kuchlanishning effektiv qiymati	$I_{ef} = \frac{U_{ef}}{Z}$ $U_{ef} = I_{ef} \cdot Z$
31.O'zgaruvchan tokning quvvati	$N = I_{ef} \cdot U_{ef} \cdot \cos\varphi$ $N = I_R \cdot U_R$

32. Quvvat koeffitsiyenti	$\cos\varphi = \frac{R}{Z} = \frac{R}{\sqrt{R^2 + (X_L - X_C)^2}}$
33. Issiqlik isrofi orqali yo'qolgan quvvat	$\Delta N = \frac{N^2}{U^2 \cos^2\varphi} \cdot R$
34. Transformatorlarda	$\frac{U_1}{U_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$
35. Transformatsiya koeffitsiyenti - pasaytiruvchi - kuchaytiruvchi	$K = \frac{U_1}{U_2}$ $K > 1$ $K < 1$
36. Transformator g'altaklaridagi quvvat	$P_1 = I_1 U_1$ $P_2 = I_2 U_2$
37. Transformatorning FIKi	$\eta = \frac{P_2}{P_1}$
38. Uzatish liniyasida kuchlanish n marta ortsa energiya sarfining kamayishi	$n^2\ marta$
39. Juft magnit qutblar soni N marta ortganda, tokning o'zgarish chastotasining ortishi	$N\ marta$
40. Elektromagnit to'lqinlarning muhitda tarqalish tezligi	$\vartheta = \frac{c}{n}; \quad n = \sqrt{\varepsilon\mu}$
41.Elektromagnit to'lqinning muhitdagi to'lqin uzunligi	$\lambda = \frac{\lambda_0}{n} = \frac{\lambda_0}{\sqrt{\varepsilon\mu}}$
42. Elektromagnit to'lqinlarning tarqalish tezligi	$\vartheta = \lambda \cdot \nu; \quad \vartheta = \frac{E}{B}$
43. Elektromagnit to'lqin uzunligi	$\lambda = 2\pi \cdot c \sqrt{LC}$
44. Ikki to'lqinning fazalar farqi bo'yicha yo'llar farqi	$\Delta x = \frac{\lambda}{2\pi} \cdot \Delta\varphi$
45. Ikki to'lqinning yo'llar farqi bo'yicha fazalar farqi	$\Delta\varphi = \frac{2\pi}{\lambda} \cdot \Delta x$
46. Radiolakatorning ob'ektni sezish uzoqligi	$S = \frac{c \cdot t}{2 \cdot N}$

GEOMETRIK OPTIKA

1. Yorug'likning vakuumdagi tezligi	$$c = \frac{1}{\sqrt{\varepsilon_0 \cdot \mu_0}}$$
2. Yorug'likning muhitdagi tezligi	$$v = \frac{c}{n} = \frac{c}{\sqrt{\varepsilon \cdot \mu}}$$
3. Yorug'lik oqimi	$$\Phi = \frac{W}{S \cdot t}$$
4. Sfera uchun fazoviy burchak	$$\Delta\Omega = \frac{\Delta S}{r^2}$$
5. Yorug'lik kuchi	$$I = \frac{\Phi}{\Delta\Omega}$$
6. Yoritilganlik	$$E = \frac{\Phi}{\Delta S}$$
7. Ravshanlik	$$B = \frac{I}{\Delta S}$$
8. Yorug'likning 1 – qonuni	$$\Phi_0 = 4\pi \cdot I; \quad E_0 = \frac{I}{r^2}$$
9. Yorug'likning 2 – qonuni	$$E = E_0 \cdot \cos\alpha$$
10. Yorug'likning qaytish qonuni	$$\sin\alpha = \sin\beta$$
11. Yorug'likning sinish qonuni	$$\frac{\sin\alpha}{\sin\gamma} = \frac{n_2}{n_1}$$
12. Yorug'lik 1 – muhitdan 2 – muhitga o'tganda	$$\frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2} = \frac{n_2}{n_1}$$ $$\nu_1 = \nu_2 = const$$
13. Nur 1 – muhitdan 2 – muhitga o'tganda qytgan nur va singan nur o'zaro perpendikulyar bo'lsa	$$\tan\alpha = \frac{n_2}{n_1}$$
14. To'la ichki qaytishning chegaraviy burchagi	$$\sin\alpha_0 = \frac{n_2}{n_1}$$
15. O'zaro a burchak ostida yotgan ko'zgularga tushayotgan va ulardan qaytayotgan nurlar orasidagi burchak	$$\varphi = 2 \cdot \alpha$$
16. O'zaro a burchak ostida	

tushirilgan 2ta ko'zgu orasidagi nuqtaning tasvirlar soni	$N = \frac{360^\circ}{\alpha}$
17.Nurning prizmadan o'tgandagi og'ish burchagi	$\delta = \alpha + \beta - \varphi$ $\sin\varphi \approx \varphi \Rightarrow \delta = (n-1)\cdot\varphi$
18.Parallel plastinada nurning yo'li	$x = \frac{d \cdot \sin(\alpha - \beta)}{\cos\beta}$
19.Linzaning optik kuchi	$D = \pm\frac{n_m}{F} = (n - n_m)\cdot\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$
20. Linza formulasi - yig'uvchi linza (qavariq) - sochuvchi linza (botiq)	$\frac{1}{F} = \frac{1}{f} + \frac{1}{d}$ $\frac{1}{F} = \frac{1}{f} - \frac{1}{d}$
21.Linzaning kattalashtirishi - yig'uvchi linza uchun - sochuvchi linza uchun - lupa uchun	$k = \frac{f}{d} = \frac{f-F}{F} = \frac{F}{d-F}$ $k = \frac{f}{d} = \frac{F-f}{F} = \frac{F}{d+F}$ $k = \frac{d_0}{F};\quad d_0 = 0.25m$
22. Ketma-ket ikkita yig'uvchi linzalar tizimiga tushayotgan parallel nurlar dastasi linzalardan chiqib parallelligicha qolishi uchun	$l = F_1 + F_2$
23. Yonma-yon turuvchi ikkita yupqa linza uchun - linzalar orasidagi masofa l ga teng bo'lsa	$D = D_1 + D_2$ $D = D_1 + D_2 - l\cdot D_1 D_2$
24. Fotoapparatda $d_1$masofadan suratga olingan jism tasvirining o'lchami h_1, $d_2$masofada esa $h_2$bo'lsa, ob'ektiv linzaning focus	$F = \frac{h_1 d_1 - h_2 d_2}{h_1 - h_2}$

masofasi	
25. Mikroskopning kattalashtirishi	$k = \frac{H}{h} = \frac{l}{F_1} \cdot \frac{d_0}{F_2}$
26. Optik asboblarning ko'rinma kattalashtirishi	$N = \frac{\tan \varphi_2}{\tan \varphi_1}$
27. Nuqsonli ko'z foydalanishi kerak bo'lgan ko'zoynakning optik kuchi	$D = 4 - \frac{1}{L}$

TO'LQIN OPTIKASI

1. Yorug'lik dispersiyasi	$n_{qiz} < \cdots < n_{bin}$ $\nu_{qiz} < \cdots < \nu_{bin}$ $\vartheta_{qiz} > \cdots > \vartheta_{bin}$
2. Buger qonuni	$I = I_0 e^{\alpha x}$
3. Absolyut qora jismning nur yutish qobiliyati	$E_q = \sigma T^4$ $\sigma = 5.67 \cdot 10^{-8} \frac{W}{m^2 \cdot K^2}$
4. Rentgen trubkasiga oid formullalar	$\frac{m\vartheta^2}{2} = \frac{h \cdot c}{\lambda_{min}} = h \cdot \nu_{max} = e \cdot U$
5. Quvvati N bo'lgan FIKi η bo'lgan renten trubkasidan t vaqtda chiqqan fotonlar soni	$m = \frac{\eta \cdot N \cdot t}{h \cdot \nu}$
6. Interferensiyalanuvchi yorug'lik to'lqinlari, yo'llarning optik farqi yorug'lik to'lqinining yarim uzunligiga juft karrali bo'lgan holda yorug'lik intensivligining maksimumi kuzatiladi	$\delta = 2k\frac{\lambda}{2} \quad k = 0, 1, 2, \ldots$ $n \cdot \Delta x = m \cdot \lambda \quad m \epsilon Z$
7. Interferensiyalanuvchi yorug'lik to'lqinlari, yo'llarning optik farqi yorug'lik to'lqinining yarim uzunligiga toq karrali bo'lgan holda	$\delta = (2k+1)\frac{\lambda}{2} \quad k = 0, 1, 2, \ldots$

yorug'lik intensivligining minumimi kuzatiladi	$n \cdot \Delta x = \ 2m+1 \ \cdot \frac{\lambda}{2} \quad m \epsilon Z$
8. Yorug'lik tolqinlarining superpoziysiya prinsipi; $x_1 = A_1 \cos \ \omega t + \varphi_1$ va $x_2 = A_2 \cos \ \omega t + \varphi_2$ kogerent yassi yorug'lik tolqinlari qo'shilganda	$A^2 = A_1^2 + A_2^2 + 2A_1A_2 \cos \ \varphi_2 - \varphi_1$
9. Agar to'lqin intensivligi amplitude kvadratiga proporsionalligini e'tiborga olsak, u holda	$I = I_1 + I_2 + 2 \ \overline{I_1 I_2} \cos \ \varphi_2 - \varphi_1$
10. Ikki yo'lqin intensivligi o'zaro teng bo'lib ular uchrashganda optik yo'llar farqi yorug'lik to'lqinining yarim uzunligiga juft karrali bo'lgan holda natijaviy intensivlik	$I_{nat} = 4 \cdot I_0$
11. Ikki yo'lqin intensivligi o'zaro teng bo'lib ular uchrashganda optik yo'llar farqi yorug'lik to'lqinining yarim uzunligiga toq karrali bo'lgan holda natijaviy intensivlik	$I_{nat} = 0$
12. Egrilik radusi R ga teng bo'lgan sferik sirtda(linzada) kuzatiladigan Nyuton halqalarining qorong'u dog'larining radiusi	$r = \ \overline{\frac{mR\lambda}{n}}$
13. Yorug' dog'larining radiusi	$r = \ \overline{2m-1 \ \frac{R\lambda}{2n}}$

14. Difraksion panjarada maksimumlar sharti	$d \cdot \sin\varphi = k \cdot \lambda$
15. Difraksion panjarada minimumlar sharti	$d \cdot \sin\varphi = (2k+1) \cdot \frac{\lambda}{2}$
16. Kuzatilishi mumkin bo'lgan eng katta tartib	$k_{max} = \frac{d}{\lambda}$
17. Maksimumlar soni	$N_{max} = 2\left(\frac{d}{\lambda} + 1\right)$
18. Difraksion panjarada ekrangacha bo'lgan masofa L markaziy maksimumdan k tartibli maksimumgacha bo'lgan masofa x ga teng bo'lsa maksimumlar sharti	$d \cdot \frac{x}{\sqrt{L^2 + x^2}} = k \cdot \lambda$
19. Difraksion panjarada nurlarning og'ish burchagi	$\varphi_{qiz} > \cdots > \varphi_{bin}$
20. Qutblagichdan o'tgan yorug'lik intensivligi	$I = \frac{I_0}{2}$
21. Yorug'lik ikki muhit chegarasiga i_B burchak ostida tushsa, qutblanish sharti	$\tan i_B = n_{21}$
22. Molyus qonuni	$I = I_o \cos^2\alpha$

NISBIYLIK NAZARIYASI VA KVANT MEXANIKASI

1. Nisbiylik nazariyasidagi tezliklarni qo'shishning realistik qonuni	$u = \frac{v_1 + v_2}{1 + \frac{v_1 \cdot v_2}{c^2}}$
2. Vaqt qonuni	$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$

3. Uzunlik qonuni	$$l = l_0 \sqrt{1 - \frac{v^2}{c^2}}$$
4. Massaning tezlikka bog'liqlik qonuni	$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$
5. Tinchlikdagi energiya	$$E_0 = m_0 c^2$$
6. Kinetik energiya	$$T = m_0 c^2 \left(\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} - 1 \right)$$
7. To'liq energiya	$$W = E_0 + T = m_0 c^2 + \frac{m_0 v^2}{2}$$ $$W = \frac{m_0 c^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$
8. Massa defekti	$$\Delta m = \frac{\Delta E}{c^2}$$
9. Impuls	$$P = \frac{m_0 c}{\sqrt{1 - \frac{v^2}{c^2}}}$$
10. Zichlik	$$\rho = \frac{\rho_0}{1 - \frac{v^2}{c^2}}$$
11. Hajm qonuni	$$V = V_0 \sqrt{1 - \frac{v^2}{c^2}}$$
12. Foton energiyasi	$$E = \nu \cdot h$$
13. Fotoefekt uchun Eynshteyen tenglamasi	$$\nu h = A_{ch} + \frac{m v^2}{2}$$
14. Fotoefektning qizil chegarasi	$$\nu_{min} = \frac{A}{h}; \quad \lambda_{max} = \frac{c \cdot h}{A}$$
15. Fotoefektning qizil chegarasini hisobga olgan holda Eynshteyen tenglamasi	$$h\nu = h\nu_q + \frac{m v^2}{2} = h\nu_q + eU$$
16. Foton massasi	$$m = \frac{E}{c^2} = \frac{\nu \cdot h}{c^2}$$
17. Foton impulsi	$$P = \frac{\nu \cdot h}{c}$$

18.Foton sirtga a burchak ostida tushganda sirt oladigan kuch impulsi, yoki foton impulsining o'zgarishi; - sirtda to'liq yutilganda - sirtdan to'liq qaytganda	$\Delta p = \frac{\nu \cdot h}{c} \cdot \cos\alpha$ $\Delta p = 2 \cdot \frac{\nu \cdot h}{c} \cdot \cos\alpha$
19.Nurlanish va yutilish chastotalari; - nurlanish - yutilish	$\nu = \frac{W_m - W_n}{h}$ $\nu > 0$ $\nu < 0$
23. Quvvati N bo'lgan FIKi η bo'lgan manbadan t vaqtda chiqqan fotonlar soni	$n = \frac{\eta \cdot N \cdot t}{h \cdot \nu}$
20. Yorug'lik bosimi	$P = \frac{E}{c}(1 + R) = \frac{I}{c}$
21.Yorug'lik bosimi; - sirtda to'liq yutilganda - sirtdan to'liq qaytganda	$P = \frac{W}{ctS}$ $P = 2 \cdot \frac{W}{ctS}$

ATOM VA YADRO FIZIKASI

1. Kvant energiyasi	$E = h \cdot \nu = \frac{hc}{\lambda}$
2. n- orbitadagi elektronning aylanish radiusi va tezligi	$r_n = n^2 \frac{\varepsilon_0 h^2}{\pi m_0 e^2} = \frac{nh}{2\pi m_e v}$ $v_n = \frac{e^2}{2\varepsilon_0 h} \cdot \frac{1}{n}$
3. Atomning statsionar holatlar energiyalari	$W_n = -\frac{m_0 e^4}{8\varepsilon_0^2 h^2} \cdot \frac{1}{n^2}$
4. Borning 2-postulati	$h\nu_{mn} = W_m - W_n$ $\nu_{mn} = \frac{m_0 e^4}{8\varepsilon_0^2 h^3} \cdot \left(\frac{1}{n^2} - \frac{1}{m^2}\right)$
5. Yadroning massa soni	$A = Z + N$
6. Alfa siljish qonuni	${}^A_Z X \longrightarrow {}^{A-4}_{Z-2} Y + {}^4_2 He$
7. Betta siljish qonuni	${}^A_Z X \longrightarrow {}^A_{Z+1} Y + {}^0_{-1} e$
8. Betta yemirilish 3 xil; - β^- yemirilish - β^+ yemirilish - elektron qamrash	${}^A_Z X \longrightarrow {}^A_{Z+1} Y + e^- + \nu_e$ ${}^A_Z X \longrightarrow {}^A_{Z+1} Y + e^+ + \nu_e$ $p \longrightarrow n + e^+ + \nu_e$
9. Annigilyatsiya	$e^- + e^+ \longrightarrow 2\gamma$
10. Radioaktiv yemirilish qonuni	$N = N_0 \cdot 2^{-\frac{t}{T}}$
11. Radioaktiv moddaning yarim yemirilish davri	$T = \frac{\ln 2}{\lambda} = \frac{0.693}{\lambda}$
12. Radioaktiv moddaning o'rtacha yashash vaqti	$\tau = \frac{1}{\lambda} = 1.44 \cdot T$
13. Radioaktiv yadrolarning aktivligi	$A = \frac{\Delta N}{\Delta t} = \lambda N$
14. Δt vaqt ichida radioaktiv yadrolarning aktivligi n marta kamaygan bo'lsa;	$n = \frac{A_2}{A_1} = 2^{-\frac{\Delta t}{T}}$
15. Massa defekti	$\Delta M = Z \cdot m_p + N \cdot m_n - M_{ya}$
16. Bog'lanish energiyasi	$E = \Delta M c^2$

17. Yadroning solishtirma bog'lanish energiyasi	$$\varepsilon = \frac{Z \cdot m_p + N \cdot m_n - M_{ya} \cdot c^2}{A}$$
18. Yadro reaksiyasi zaryadning va massaning saqlanish qonuniga bo'ysunadi	$$^{A_1}_{Z_1}X + {}^{A_2}_{Z_2}Y \longrightarrow {}^{A_3}_{Z_3}F + {}^{A_4}_{Z_4}W$$ $$A_1 + A_2 = A_3 + A_4$$ $$Z_1 + Z_2 = Z_3 + Z_4$$
19. Massa sonlari A_1 va A_2 bo'lgan izotoplar aralashmasidan tashkil topgan qotishmaning massa soni A, tarkibiy qismlarining massa ulushlari η_1 va η_2	$$A = \eta_1 A_1 + \eta_2 A_2$$
20. Nurlanish dozasi	$$D = \frac{W}{m}$$
21. Nurlanishning ekspozitsion dozasi	$$D_e = \frac{q}{m}$$

JADVALLAR

Doimiy fizik kattaliklar		
Nomi	Belgilanishi	Son qiymati va birligi
1. Erkin tushish tezlanishi	g	$9.80665\ \frac{m}{s^2}$
2. Gravitatsion doimiysi	G	$6.672 \cdot 10^{-11}\ \frac{N \cdot m^2}{kg^2}$
3. Atom massa birligi	$a.m.b.$	$1.6605655 \cdot 10^{-27}\ kg$
4. Avagadro soni	N_A	$6.022045 \cdot 10^{23}\ mol^{-1}$
5. Boltsman doimiysi	k	$1.380662 \cdot 10^{-23}\ \frac{J}{K}$
6. Universal gaz doimiysi	R	$8.31441\ \frac{J}{mol \cdot K}$
7. Normal sharoitda bir mol ideal gazning hajmi		$22.41383 \cdot 10^{-3}\ \frac{m^3}{mol}$
8. Loshmit soni	N_L	$2.68719 \cdot 10^{25}\ m^{-3}$
9. Normal sharoitda quruq havoning zichligi	ρ_{havo}	$1.293\ \frac{kg}{m^3}$
10. Elekton zaryadi	e	$1.6021892 \cdot 10^{-19}\ C$
11. Elektron massasi	m_e	$9.109534 \cdot 10^{-31}\ kg$
12. Protoning tinchlikdagi massasi	m_p	$1.6726485 \cdot 10^{-27}\ kg$
13. Neytronning tinchlikdagi massasi	m_n	$1.6749543 \cdot 10^{-27}\ kg$
14. Elektr doimiysi	ε_0	$8.854188 \cdot 10^{-12}\ \frac{F}{m}$
15. Kulon qonunidagi proporsionallik koeffisiyenti	k	$9 \cdot 10^9\ \frac{N \cdot m_2}{C^2}$
16. Magnit doimiysi	μ_0	$12.566371 \cdot 10^{-7}\ \frac{H}{m}$
17. Plank doimiysi	h	$6.626176 \cdot 10^{-34}\ J \cdot s$
18. Bor radiusi	r_0	$5.291771 \cdot 10^{-11}\ m$

Ba'zi kattaliklarning sistemadan tashqaridagi birliklari	
Sistemadan tashqaridagi	Sistemadagi
1. 1 kaloriya	$4.2\,J$
2. 1 ot kuchi	$736.2\,W$
3. 1 kW·soat	$3.6 \cdot 10^6\,J$
4. 1 mm.sim.ust.	$133.3\,Pa$
5. 1 atm	$101325\,Pa$
6. 1 bar	$10^5\,Pa$
7. 1 dina	$10^5\,N$
8. 1 rad	$10^{-2}Gy$
9. 1 rentgen (R)	$2.58 \cdot 10^{-4}\ \frac{C}{kg}$
10.1 zivert (Zv)	$1\ \frac{J}{kg}$
11. 1 ber	$10^{-2}\ \frac{J}{kg}$

Foydalanilgan adabiyotlar:

M.Usmonov - ,,Fizika oliy o'quv yurtlariga kiruvchilar uchun ma'lumotnoma''

M.H.O'lmasova - ,,Mexanika va molekulyar fizika''

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