**Nazariy Mexanika Test Masalalari**

**1. Garmonik ossilator va tebranishlar**

**Test 1**

Massasi m bo'lgan jism bikrligi k bo'lgan prujinaga osilgan. Jismning muvozanat vaziyatidan x = A amplituda bilan tebranishi uchun tezlik qiymati qanday?

A. v = ω⋅A⋅cos(ωt)

B. v = ω⋅A⋅sin(ωt)

C. v = -ω⋅A⋅sin(ωt)

D. v = -ω²⋅A⋅cos(ωt)

**Test 2**

Garmonik ossilatorning to'liq energiyasi qanday?

1. E = mω²A²/2
2. E = kA²/2
3. E = mω²A²
4. E = kA²

**Test 3**

Massasi m bo'lgan jism bikrligi k bo'lgan prujinaga osilgan. Agar jism muvozanat holatidan A masofaga siqib qo'yib yuborilsa, tebranish davrini toping.

1. T = 2π√(m/k)
2. T = 2π√(k/m)
3. T = 2π√(mk)
4. T = π√(m/k)

**Test 4**

Garmonik tebranuvchi jism tezlanishi qanday?

1. a = -ω²A⋅cos(ωt)
2. a = -ω²A⋅sin(ωt)
3. a = ω²A⋅cos(ωt)
4. a = ω²A⋅sin(ωt)

**2. Lagrang funksiyasi va uning qo'llanishi**

**Test 5**

Gorizontal tekislikdagi matematik mayatnik uchun Lagrang funksiyasi qanday?

1. L = mℓ²θ̇²/2 - mgℓ(1-cos(θ))
2. L = mℓ²θ̇²/2
3. L = mℓ²θ̇²/2 - mgℓcos(θ)
4. L = mℓ²θ̇²/2 + mgℓcos(θ)

**Test 6**

Ikki erkinlik darajasiga ega bo'lgan mexanik sistema uchun Lagrang tenglamalari nechta bo'ladi?

1. 1
2. 2
3. 3
4. 4

**Test 7**

Markaziy kuch maydonida harakatlanayotgan nuqta uchun Lagrang funksiyasi qanday?

1. L = mv²/2 - U(r)
2. L = mv²/2 + U(r)
3. L = mv²/2
4. L = -U(r)

**Test 8**

Qarshilik kuchlari ta'sir etayotgan sistema uchun Lagrang tenglamalari qanday ko'rinishda bo'ladi?

1. d/dt(∂L/∂q̇ᵢ) - ∂L/∂qᵢ = 0
2. d/dt(∂L/∂q̇ᵢ) - ∂L/∂qᵢ = Qᵢ
3. d/dt(∂L/∂q̇ᵢ) + ∂L/∂qᵢ = 0
4. d/dt(∂L/∂q̇ᵢ) + ∂L/∂qᵢ = Qᵢ

**3. Qattiq jismning inersiya momentlari va inersiya tenzori**

**Test 9**

Massasi m, uzunligi ℓ bo'lgan bir jinsli sterjenning o'z markazidan o'tuvchi, sterjenga perpendikulyar o'q atrofidagi inersiya momenti qanday?

1. J = mℓ²/12
2. J = mℓ²/6
3. J = mℓ²/3
4. J = mℓ²/2

**Test 10**

Radiusi R, massasi m bo'lgan diskni diametri atrofidagi inersiya momenti qanday?

1. J = mR²/4
2. J = mR²/2
3. J = mR²
4. J = 2mR²

**Test 11**

Uchburchakli prizma uchun inersiya tensorining nechta mustaqil komponenti mavjud?

1. 3
2. 6
3. 9
4. 12

**Test 12**

Bir jinsli kub uchun inersiya tensorining bosh inersiya momentlari qanday nisbatda bo'ladi?

1. J₁:J₂:J₃ = 1:2:3
2. J₁:J₂:J₃ = 1:1:1
3. J₁:J₂:J₃ = 1:1:2
4. J₁:J₂:J₃ = 1:2:2

**4. Nuqtaning egri chiziqli, silindrik va sferik koordinatalardagi tezlik va tezlanishi**

**Test 13**

Nuqta silindrik koordinatalarda r = at, φ = ωt, z = bt qonun bo'yicha harakatlanmoqda. Uning tezligining kattaligini toping.

1. v = √(a² + ω²r² + b²)
2. v = √(a² + b²)
3. v = √(a² + ω²a²t² + b²)
4. v = a + ω⋅r + b

**Test 14**

Sferik koordinatalarda harakat qilayotgan nuqta tezligining radiusga tik komponenti qanday ifodalanadi?

1. vₜ = √(v₀² + vᵩ²)
2. vₜ = r⋅θ̇
3. vₜ = r⋅√(θ̇² + sin²θ⋅φ̇²)
4. vₜ = r⋅sin²θ⋅φ̇

**Test 15**

Egrilik radiusi R bo'lgan aylana trayektoriya bo'ylab doimiy v tezlik bilan harakatlanayotgan nuqtaning tezlanishining moduli qanday?

1. a = v²/R
2. a = v/R
3. a = v²/2R
4. a = 0

**Test 16**

Silindrik koordinatalarda r = const, φ = ωt, z = vt bo'lganda, nuqtaning tezlanishining radial komponenti qanday?

1. ar = rω²
2. ar = -rω²
3. ar = r²ω²
4. ar = 0

**5. Chegaralangan ikki jism masalasi, Nyuton qonunlari va harakat tenglamalari**

**Test 17**

Ikki jism masalasida keltirilgan massaning ifodasi qanday?

1. μ = m₁ + m₂
2. μ = m₁m₂/(m₁ + m₂)
3. μ = (m₁ + m₂)/m₁m₂
4. μ = m₁m₂

**Test 18**

Keplerning 3-qonuniga ko'ra, planetaning orbital davri T va orbitasining katta yarim o'qi a orasidagi bog'lanish qanday?

1. T² ∝ a³
2. T ∝ a²
3. T² ∝ a
4. T ∝ a³

**Test 19**

Ikki jism masalasining harakat tenglamasini qanday yordamchi koordinatalarga ajratish mumkin?

1. Faqat massalar markazi koordinatalariga
2. Faqat nisbiy harakat koordinatalariga
3. Massalar markazi va nisbiy harakat koordinatalariga
4. Massalar markazidan o'tuvchi aylanma koordinatalarga

**Test 20**

Nyutonning 2-qonunini vektor ko'rinishda ifodalang.

1. F = m·a
2. F = dp/dt
3. F = m·v
4. F = m·dr/dt