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TEST-MASALA IMKONIYATLARIDAN NAZARIY MEXANIKA FANI DARSLARINI TASHKIL ETISHDA FOYDALANISH

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Annotatsiya. Test-masala imkoniyatlaridan nazariy mexanika fani bo‘yicha ma’ruza va amaliy mashg‘ulotlarida foydalanish, u vositasida o‘quv jarayonini ko‘rgazmali, ko‘p variantli tashkil etish haqida so‘z yuritiladi.

Kalit so‘zlar. Nazariy mexanika, test-masala, ma’ruza, amaliy mashg‘ulot, talaba, bilim darajasi, statika, tenglama, reaksiya kuchi, balka, ferma, muvozanat tenglamasi, kuch momenti, tebranma harakat.

Аннотация. Рассматривается использование тестовых задач на лекциях и практических занятиях по теоретической механике, а также их применение для наглядной, многовариантной организации учебного процесса.

Ключевые слова. Теоретическая механика, тестовая задача, лекция, практическое занятие, студент, уровень знаний, статика, уравнение, сила реакции, балка, ферма, уравнение равновесия, момент силы, колебательное движение.

Abstract: This article examines the use of test problems in lectures and practical classes on theoretical mechanics, as well as their application for visual, multi-variant organization of the educational process.

Keywords: Theoretical mechanics, test problem, lecture, practical lesson, student, knowledge level, statics, equation, reaction force, beam, truss, equilibrium equation, moment of force, oscillatory motion.

Kirish

Mamlakatimizda oliy o‘quv yurtlari professor-o‘qituvchilari oldiga qo‘yiladigan asosiy talablardan biri talaba yoshlarga mashg‘ulotlarni yuqori darajada tushunarli, ko‘rgazmali va zamonaviy pedagogik hamda information texnologiyalarni qo‘llab tashkil etish belgilangan. Bu vazifalarni amalga oshirish uchun ular oldiga tashkil etiladigan darslarni o‘tkazish jarayonida interfaol usullardan keng foydalanish talabi qo‘yilgan. Xozirgi davrda ko‘pchilik olimlar tomonidan mashg‘ulotlarni o‘tkazish jarayonida keng qo‘llanib kelinayotgan miya hujumi, klaster, Venn diagrammasi, chalkashgan mantiqiy zanjir usullari yoniga yangilarini jalb etish vaqti keldi. Ana shunday usullardan biri test-masalalar tuzib, ulardan o‘quv jarayonida samarali foydalanish hisoblanadi. Chunki test-masalalar talabalar uchun qiziqarli, ko‘r javobli, ko‘rgazmali va oson qabul qilinadigan bo‘lganligi uchun ularni o‘quv jarayoniga qo‘llash taklif etiladi

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Nazariy mexanika fani texnik oliy o‘quv yurtlarida mutaxassislik fanlari uchun bazaviy fanlar qatoriga kiradi. Ushbu fandan tashkil etiladigan ma’ruza va amaliy mashg‘ulotlarida talabalar bilim darajasini oshirish, berilayotgan materialning ular tomonidan yuqori darajada o‘zlashtirilishini ta’minlash uchun test-masalalardan foydalanish tavsiya etiladi.

Test-masala tarkibi va darajasiga qarab asosan uch toifaga bo‘linadi. Birinchi toifaga sodda, ta’rif va tushunchalarga asoslangan masalalar kiradi. Ular odatda talabalar tomonidan qiyinchiliksiz yechiladi. Quyida birinchi toifa test-masalaga ikkita misol keltiramiz.

1. Test-masala. Nuqtaga nisbatan kuch momentining musbat yo‘nalishi tekislikda qanday tanlanadi? To‘g‘ri javob ko‘rsatigan qatorni belgilang.

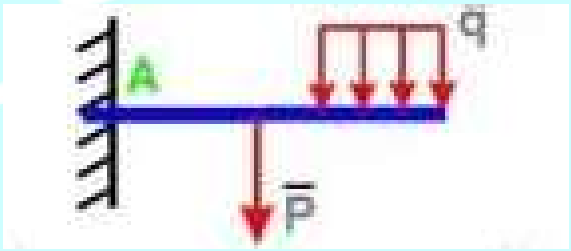
A) Berilgan kuch jismni moment markaziga nisbatan soat strelkasiga teskari aylantirishga harakat qilsa.

B)Berilgan kuch jismni moment markaziga nisbatan soat strelkasi bo‘yicha aylantirishga harakat qilsa.

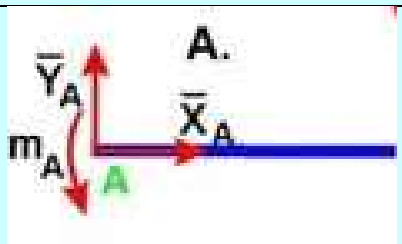
C)Berilgan kuchning proeksiyasi musbat bo‘lsa.

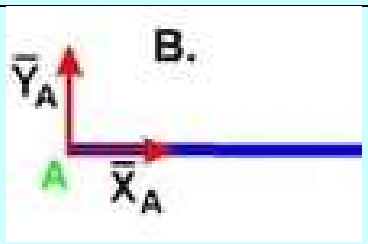
D) Berilgan kuchning proeksiyasi manfiy bo‘lsa.

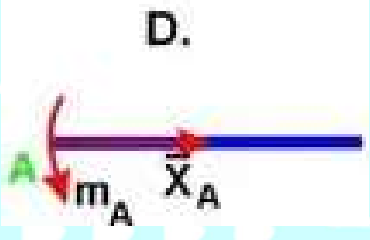
2. Test-masala. Quyidagi 2-shaklda tasvirlangan devorga qistirib mahkamlangan gorizontal balka unga qo‘yilgan kuchlar sistemasi ta’sirida muvozanatda turadi. Balkaning tayanch reaksiya kuchlari qaysi javobda to‘g‘ri ko‘rsatilgan (javoblar variantlari shakllarda keltirilgan). Javobingizni asoslab bering.

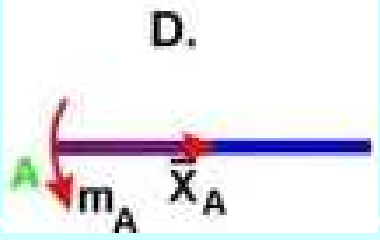


2-shakl









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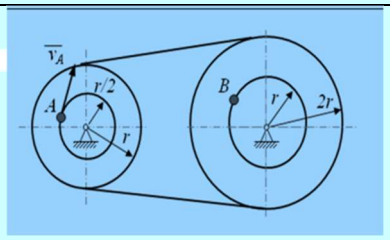
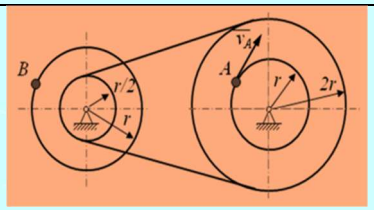
Ikkinchi toifaga formulalarga, kichikroq topshiriqlarga bag‘ishlangan masalalar kiradi. Bu ko‘rinishdagi test-masalalarni hal etish uchun talaba fan mavzularini etarli darajada puhta egallagan o‘lish talab etiladi. Quyidagi ikki masala bu toifaga misol bo‘la oladi.

3. Test-masala. Quyida keltirilgan moddiy nuqtaning to‘g‘ri chiziqli tebranma harakati mavzusiga tegishli harakat differensial tenglamalari ichidan erkin tebranma harakat differensial tenglamasi to‘g‘ri ko‘rsatilgan javobni aniqlang

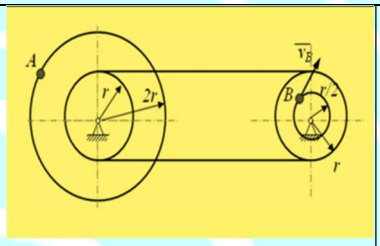
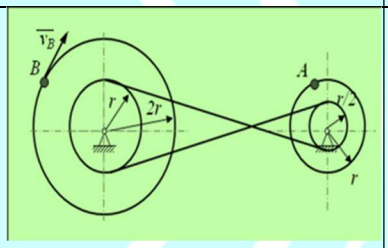
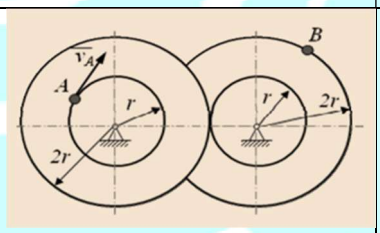
A $\ddot{x}+2b\dot{x}+k^2x=0$	B $\ddot{x}+k^2x=Q_0\sin(pt+\delta)$
C $\ddot{x}+k^2x=0$	D $\ddot{x}+2b\dot{x}+k^2x=Q_0\sin(pt+\delta)$

4. Test-masala. Shaklda tasvirlangan mexanizm pog‘onali g‘ildiraklar harakatni biri-biriga uzatishga hizmat qiladi. Ular bir-birlari bilan cho‘zilmaydigan arqon bilan birlashtirilgan. Birinchi pog‘onali g‘ildirak *A* nuqtasi tezligi v_A ma’lum bo‘lsa (2,4-variantlarda *B* nuqtasi v_B tezligi), ikkinchi pog‘onali g‘ildirakdagi *B* nuqta v_B tezligi (2,4-variantlarda *A* nuqtasi v_A tezligi) to‘g‘ri ko‘rsatilgan javobni toping. Mexanizm hisob sxemasi , kattaliklar va javob variantlari 4-jadvalda keltirilgan.

4 -jadval

№	Hisob sxemasi	Berilgan nuqta tezligi	Javob variantlari
1		V_A=4 sm/s	A) V_B =4 sm/s B) V_B =2 sm/s C) V_B =8 sm/s D) V_B =1 sm/s
2		V_A=12 sm/s	A) V_B =24 sm/s B) V_B =12 sm/s C) V_B =6 sm/s D) V_B =48 sm/s

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3		V_B=12 sm/s	A) V_A =3 sm/s B) V_A =48 sm/s C) V_A =24 sm/s D) V_A =6 sm/s
4		V_B=30 sm/s	A) V_A =15 sm/s B) V_A =120 sm/s C) V_A =60 sm/s D) V_A =30 sm/s
5		V_A=20 sm/s	A) V_B =10 sm/s B) V_B =20 sm/s C) V_B =80 sm/s D) V_B =40 sm/s

Uchinchi toifaga hisob-kitob ishlari, tenglamalar tuzish orqali yechiladigan test-masalalar kiradi. Ushbu tipdagi test-masalani hal qilish uchun talaba mavzuni nazariy jihatdan chuqur egallagan bo‘lishi, olingan bilimlarni amalda qo‘llashni uddalashi lozim. Ushbu toifaga doir masala keltiramiz.

5. Test-masala. *AC* balka shakl tekisligida *A* nuqtada gorizontal sterjen bilan devorga mahkamlangan, *B* nuqtasida esa vertikal sterjen bilan yuqoriga tortib mahkamlangan, *C* nuqtada esa vertikal sterjen bilan yerga mahkamlangan va unga qo‘yilgan kuchlar sistemasi ta’sirida muvozanatda turadi (5-shakl). Balkaga uning chap uchidan *a=2 m* masofada $\alpha=60^0$ burchak ostida *F=20 kN* kuchi, vertikal pastga yo‘nalgan *P=10 kN* kuchi o‘ng uchidan *a=2 m* masofada ta’sir qiladi. Kuchlar qo‘yilish nuqtalari va masofalar 5-shaklda ko‘rsatilgan. Balkaning *C* nuqtasidagi reaksiya kuchi miqdori to‘g‘ri ko‘rsatilgan qatorni belgilang.

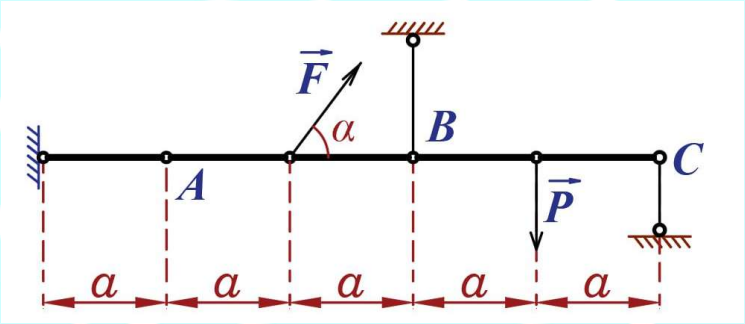
A). $5(1+\sqrt{3})$

B). 9

C). $10(1+\sqrt{2})$

D). 16

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5-shakl

Nazariy mexanika fani mashg‘ulotlarida test-masalalardan foydalanish uchun kafedra professor-o‘qituvchilari tomonidan oldindan tayyorgarlik ishlari olib borilishi kerak. Kafedrada professor-o‘qituvchilari tomonidan test-masalalar banki shakllantirilgan va doimiy ravishda yangilanib, takomillashtirilib borilishi kerak. Ana shularni e’tiborga olib, test-masalaladan foydalanishda quyidagilarga e'tibor berish kerak:

- fanga doir test-masalalar bankini mavzular bo‘yicha kengaytirib tuzib olish kerak.

- test-masalalar bankini fanning har bir mavzusi, bobi va bo‘lagi uchun aloxida tuzib olish kerak.

- mavzularga tegishli ta’riflarga, kattaliklarga bag‘ishlangan va osonroq yechiladigan test-masalalar bankini ham tuzib olish kerak.

- fan mavzulariga tegishli , mantiqiy fikrlashga undaydigan, tenglamalar tuzib yechimi topiladigan test-masalalar banki ham alohida shakllantirilib olinadi.

- fan mavzusini o‘zlashtirganlik darajasini aniqlash uchun 5-10 ta test-masaladan iborat jadvallar variantlarini kamida gurux talabalari soniga teng qilib tuzib olish kerak.

- oraliq nazoratni baxolash uchun talabalarga 10-15 ta test-masalalardan iborat jadvallar varianti professor-o‘qituvchi tomonidan oldindan tuzib olinadi.

- yakuniy nazorat baholashini o‘tkazish uchun 15-20 ta test-masalalardan iborat jadvallar tuzib olish tavsiya etiladi.

- test-masalalar banki namunalari va ularni yechish va bajarish tartibi kafedra saytida muntazam e'lon qilib borilishi kerak.

- har bir o‘quv yilida test-masalalarlar banki yangilanib borishi kerak.

O‘rni kelganda ta’kidlash lozimki, ushbu maqolada keltirilgan barcha test-masalalar muallif tomonidan tuzib chiqilgan. Nazariy mexanika fani barcha mavzularini qamrab olgan test-masalalar to‘plami ustidagi izlanishlar yakuniy bisqichga kirgan.

Xulosa qilib aytganda, nazariy mexanika fanidan o‘tkaziladigan ma’ruza va amaliy mashg‘ulotilarida test-masalalardan foydalanish orqali talabalarning bilim darajasi sifat jixatidan oshadi, ularning mushoxada qilish qobiliyati kengayadi, kattaliklarni taqqoslash va bo‘laklarga ajratish hissi shakllanadi, avvalo mavzuni,

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keyinchalik esa bobni, undan so‘ng fanni bir butun va bo‘laklar vositasida tasvirlash va tasavvur etish imkoniyatiga ega bo‘ladi. Bu xolatlarning barchasi ohir-oqibatda talaba bilim darajasini oshirishga olib keladi.

Talabalarga nazariy mexanika fanidan ma’ruza, amaliy mashg‘ulot darslarini o‘tkazish jarayonida test-masalalardan foydalanib o‘qitish natijasida talabalar bilim darajasi sezilarli darajada oshganligi o‘tkazilgan pedagogic tajribalarda kuzatildi. Demak, test-masalalardan dars jarayonida foydalanish orqali talabalar bilimi darajasini oshirish mumkinligi ko‘rsatildi.

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