**AlGaAs\_2D.py fayli**

"""  
AlGaAs/GaAs/AlGaAs  
  
restart; n:=1; m:=0.067\*9.1e-31; e:=1.6e-19; pi:=3.14; h:=1.06e-34;  
d:=12e-9;  
  
E:=proc(B,N,d);  
h\*B\*(N+0.5)/m+pi^2\*h^2\*n^2/(2\*m\*e\*d^2);  
end proc:  
  
plot3d([E(B,0,d), E(B,1),E(B,2),E(B,3),E(B,4)],  
B=0..20,  
d=2..12,  
numpoints=100,  
linestyle=[1,1,1,1,1],  
thickness=2, color=[blue,red,green,black,pink]);  
"""  
  
**import** tkinter  
**from** math **import pi  
  
  
class DisabledEntry(**tkinter**.**Entry**):  
 def \_\_init\_\_(self, parent, text="", \***args**, \*\***kwargs**):** tkinter**.**Entry**.\_\_init\_\_(self, parent, \*args, \*\*kwargs)  
 if** type**(text) !=** str**(123): text =** str**(text)  
 self.insert(0, text)  
 self.config(**state**=**tkinter**.**DISABLED**)  
  
  
class Calculator(**tkinter**.**Frame**):  
 def \_\_init\_\_(self, parent=None, title='untitled', \*\***kwargs**):** tkinter**.**Frame**.**\_\_init\_\_**(self, parent, \*\*kwargs)  
  
 self.**title **= title  
  
 self.**parent **= parent  
 self.**parent**.title("Namangan Engineering Technological Institute: IT: Drawer: " + title)  
 self.**parent**.bind('<Return>', self.**calc\_button**)  
  
 self.**free\_row **= 0  
 self.**frame **=** tkinter**.Frame(self,** bg**="green").grid(**row**=0,** column**=0)  
  
 self.**c **= { # CONSTANTS  
 'n':** tkinter**.IntVar(**value**=1),  
 'm':** tkinter**.DoubleVar(**value**=6.097e-32),  
 'e':** tkinter**.DoubleVar(**value**=1.6e-19),  
 'pi':** tkinter**.DoubleVar(**value**=pi),  
 'h':** tkinter**.DoubleVar(**value**=1.06e-34),  
 'd':** tkinter**.DoubleVar(**value**=12e-9),  
 # 'Eg': tkinter.DoubleVar(value=0.414),  
 }  
  
 self.**v **= { # VARIABLES  
 'B': (**tkinter**.IntVar(**value**=1),** tkinter**.IntVar(**value**=10),** tkinter**.IntVar(**value**=2)),  
 'N': (**tkinter**.IntVar(**value**=0),** tkinter**.IntVar(**value**=4),** tkinter**.IntVar(**value**=1)),  
 }  
 self.grid(**row**=0,** column**=0)  
  
 self.gui()  
 self.calc\_button()  
  
 def func(self, B, N):  
 n, m, e, h, d = self.**c**['n'].get(), self.**c**['m'].get(), self.**c**['e'].get(),** \  
 **self.**c**['h'].get(), self.**c**['d'].get()  
  
 ans = h \* B \* (N + .5) / m + (self.**c**['pi'].get() \* h \* n)\*\*2 / (2 \* m \* e \* d\*\*2)  
  
  
 # ans = (N + .5) \* h \* B / m + \  
 # (self.c['pi'].get() \* h \* n)\*\*2 / (2 \* m \* e \* d\*\*2)  
 # ans = self.c['Eg'].get()\*\*2 \* 4 \* self.c['Eg'].get() \* ans  
 #  
 # ans = ans\*\*.5 \* .5 - self.c['Eg'].get() / 2  
  
 return ans  
  
 def gui(self):** tkinter**.Label(self.**frame**,** text**="O'zgarmas qiymatlar",** relief**=**tkinter**.**GROOVE**).grid(**row**=0,** column**=0,** columnspan**=4,** sticky**='ew',** pady**=(30, 1),** padx**=(10, 0))  
 r = 1  
 for key in self.**c**.keys():  
 frm =** tkinter**.Frame(self.**frame**)** tkinter**.Label(frm,** text**=key,** width**=4).grid(**row**=r,** column**=0)  
 DisabledEntry(frm,** text**=self.**c**[key].get()).grid(**row**=r,** column**=1,** columnspan**=3)  
 frm.grid(**row**=r,** column**=0,** columnspan**=4,** sticky**=**tkinter**.**W**)  
 r += 1** tkinter**.Label(self.**frame**,** text**="O'zgaruvchi qiymatlar",** relief**=**tkinter**.**GROOVE**).grid(**row**=r,** column**=0,** columnspan**=4,** sticky**='ew',** pady**=(30, 1),** padx**=(10, 0)  
 )  
 r += 1** tkinter**.Label(self.**frame**,** text**="dan").grid(**row**=r,** column**=1)** tkinter**.Label(self.**frame**,** text**="gacha").grid(**row**=r,** column**=2)** tkinter**.Label(self.**frame**,** text**="qadam").grid(**row**=r,** column**=3)  
 r += 1  
 for key in self.**v**.keys():  
 frm =** tkinter**.Frame(self.**frame**)** tkinter**.Label(frm,** text**=key,** width**=4).grid(**row**=r,** column**=0)  
 for c in** range**(1, 4):** tkinter**.Entry(frm,** textvariable**=self.**v**[key][c-1],** width**=6).grid(**row**=r,** column**=c)  
  
 frm.grid(**row**=r,** column**=0,** columnspan**=4)  
 r += 1** tkinter**.Button(self.**frame**,** command**=self.**calc\_button**,** bg**='#66FF66',** text**='Hisobla').grid(**row**=r,** column**=0,** columnspan**=4,** sticky**='we',** padx**=20,** pady**=(20, 2))  
  
 self.**free\_row **= r + 1  
  
 def calc\_button(self,** event**=None):  
 import** matplotlib**.**pyplot **as plt  
 from** matplotlib**.**backends**.**backend\_tkagg **import** FigureCanvasTkAgg  
  
 tkinter**.Label(self.**parent**,** text**=self.**title**).grid(**row**=0,** column**=6)  
  
 figure2 =** plt**.Figure(**figsize**=(6, 5),** dpi**=100)  
 ax2 = figure2.add\_subplot(111)  
 line2 = FigureCanvasTkAgg(figure2, self.**parent**)  
 line2.get\_tk\_widget().grid(**row**=1,** column**=6,** rowspan**=12,** padx**=10,** pady**=10, ) # sticky='nwse')  
  
 # ax2.set\_title('AlGaAs 2D')  
 ax2.set\_xlabel('Magnit maydon (B)')  
 ax2.set\_ylabel('Funksiyaning qiymati')  
  
 x =** list**(**range**(self.**v**['B'][0].get(), self.**v**['B'][1].get()+1, self.**v**['B'][2].get()))  
  
 for N in** range**(  
 self.**v**['N'][0].get(),  
 self.**v**['N'][1].get()+1,  
 self.**v**['N'][2].get(),  
 ):  
  
 y = []  
 for B in x:  
 y.append(self.func(B, N))  
  
 ax2.plot(x, y,** label**=**str**(N))  
  
 ax2.legend(**loc**='upper center',** bbox\_to\_anchor**=(0.5, 1.1),** ncol**=4,** fancybox**=True,** shadow**=True)  
 # print('CALC')  
  
 pass  
  
  
if** \_\_name\_\_ **== '\_\_main\_\_':  
 win =** tkinter**.Tk()  
  
 calc = Calculator(win, 'AlGaAs/GaAs/AlGaAs')  
  
 win.mainloop()**





