In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df=pd.read_csv(r"c:\Users\user\Downloads\1_ionosphere.csv")
```

In [3]:
```
df['g'].value_counts()
```

Out[3]:
```
g    224
b    126
Name: g, dtype: int64
```

In [4]:
```
x=df.drop('g',axis=1)
y=df['g']
```

In [6]:
```
g1={"g":{'g':1,'b':2}}
df=df.replace(g1)
print(df)
```

```
     1  0  0.99539  -0.05889  0.85243  0.02306  0.83398  -0.37708      1.1  \
0    1  0  1.00000  -0.18829  0.93035 -0.36156 -0.10868  -0.93597  1.00000
1    1  0  1.00000  -0.03365  1.00000  0.00485  1.00000  -0.12062  0.88965
2    1  0  1.00000  -0.45161  1.00000  1.00000  0.71216  -1.00000  0.00000
3    1  0  1.00000  -0.02401  0.94140  0.06531  0.92106  -0.23255  0.77152
4    1  0  0.02337  -0.00592 -0.09924 -0.11949 -0.00763  -0.11824  0.14706
..  .. ..      ...       ...      ...      ...      ...       ...      ...
345  1  0  0.83508   0.08298  0.73739 -0.14706  0.84349  -0.05567  0.90441
346  1  0  0.95113   0.00419  0.95183 -0.02723  0.93438  -0.01920  0.94590
347  1  0  0.94701  -0.00034  0.93207 -0.03227  0.95177  -0.03431  0.95584
348  1  0  0.90608  -0.01657  0.98122 -0.01989  0.95691  -0.03646  0.85746
349  1  0  0.84710   0.13533  0.73638 -0.06151  0.87873   0.08260  0.88928

     0.03760  ...  -0.51171  0.41078  -0.46168  0.21266  -0.34090  0.42267  \
0   -0.04549  ...  -0.26569 -0.20468  -0.18401 -0.19040  -0.11593 -0.16626
1    0.01198  ...  -0.40220  0.58984  -0.22145  0.43100  -0.17365  0.60436
2    0.00000  ...   0.90695  0.51613   1.00000  1.00000  -0.20099  0.25682
3   -0.16399  ...  -0.65158  0.13290  -0.53206  0.02431  -0.62197 -0.05707
4    0.06637  ...  -0.01535 -0.03240   0.09223 -0.07859   0.00732  0.00000
..       ...  ...       ...      ...       ...      ...       ...      ...
345 -0.04622  ...  -0.04202  0.83479   0.00123  1.00000   0.12815  0.86660
346  0.01606  ...   0.01361  0.93522   0.04925  0.93159   0.08168  0.94066
347  0.02446  ...   0.03193  0.92489   0.02542  0.92120   0.02242  0.92459
348  0.00110  ...  -0.02099  0.89147  -0.07760  0.82983  -0.17238  0.96022
349 -0.09139  ...  -0.15114  0.81147  -0.04822  0.78207  -0.00703  0.75747

     -0.54487  0.18641  -0.45300  g
0    -0.06288 -0.13738  -0.02447  2
1    -0.24180  0.56045  -0.38238  1
2     1.00000 -0.32382   1.00000  2
3    -0.59573 -0.04608  -0.65697  1
4     0.00000 -0.00039   0.12011  2
..        ...      ...       ... ..
345  -0.10714  0.90546  -0.04307  1
346  -0.00035  0.91483   0.04712  1
347   0.00442  0.92697  -0.00577  1
348  -0.03757  0.87403  -0.16243  1
349  -0.06678  0.85764  -0.06151  1

[350 rows x 35 columns]
```

In [7]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,train_size=0.70)
```

In [11]:
```
from sklearn.ensemble import RandomForestClassifier
rfc=RandomForestClassifier()
rfc.fit(x_train,y_train)
```

Out[11]:
```
RandomForestClassifier()
```

In [30]:
```
paramets = {'max_depth':[1,2,3,4,5],
              'min_samples_leaf':[5,10,15,20,25],
              'n_estimators':[10,20,30,40,50]}
```

In [31]:
```
from sklearn.model_selection import GridSearchCV
grid_search= GridSearchCV(estimator = rfc,param_grid=paramets,cv=2,scoring="accuracy")
grid_search.fit(x_train,y_train)
```

Out[31]:
```
GridSearchCV(cv=2, estimator=RandomForestClassifier(),
             param_grid={'max_depth': [1, 2, 3, 4, 5],
                         'min_samples_leaf': [5, 10, 15, 20, 25],
                         'n_estimators': [10, 20, 30, 40, 50]},
             scoring='accuracy')
```

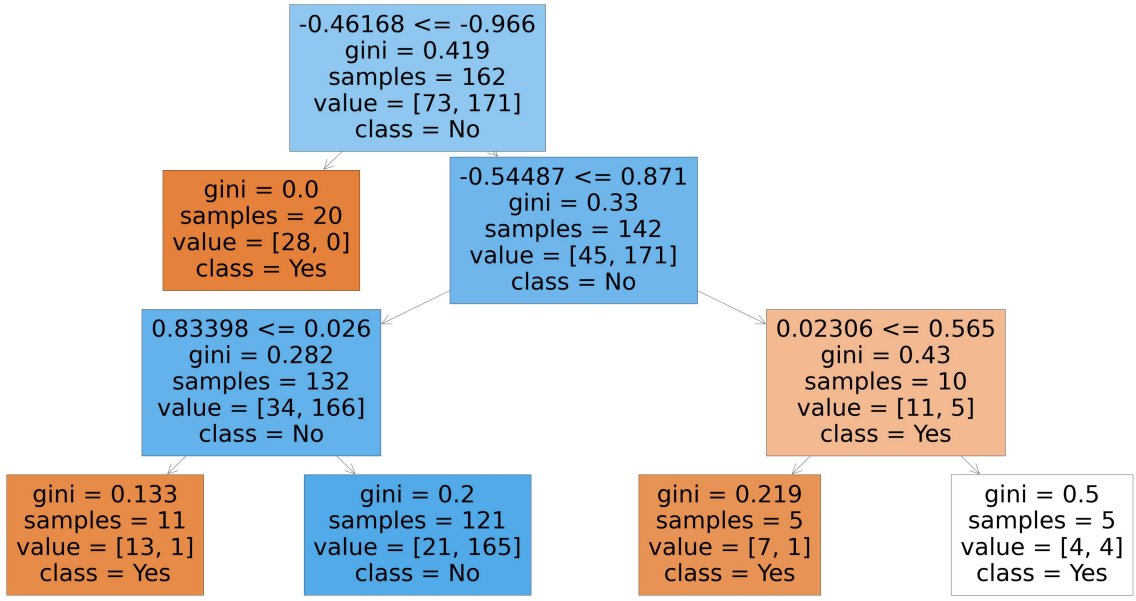
In [32]:
```
grid_search.best_score_
```

Out[32]:
```
0.9344262295081968
```

In [33]:
```
rfc_best=grid_search.best_estimator_
```

In [36]:
```
from sklearn.tree import plot_tree
plt.figure(figsize=(80,40))
plot_tree(rfc_best.estimators_[5],feature_names=x.columns,class_names=['Yes','No'],filled=
```

Out[36]:
```
[Text(1674.0, 1902.6000000000001, '-0.46168 <= -0.966\ngini = 0.419\nsamples = 162\nvalue
= [73, 171]\nclass = No'),
 Text(1116.0, 1359.0, 'gini = 0.0\nsamples = 20\nvalue = [28, 0]\nclass = Yes'),
 Text(2232.0, 1359.0, '-0.54487 <= 0.871\ngini = 0.33\nsamples = 142\nvalue = [45, 171]\n
class = No'),
 Text(1116.0, 815.4000000000001, '0.83398 <= 0.026\ngini = 0.282\nsamples = 132\nvalue =
[34, 166]\nclass = No'),
 Text(558.0, 271.79999999999995, 'gini = 0.133\nsamples = 11\nvalue = [13, 1]\nclass = Ye
s'),
 Text(1674.0, 271.79999999999995, 'gini = 0.2\nsamples = 121\nvalue = [21, 165]\nclass =
No'),
 Text(3348.0, 815.4000000000001, '0.02306 <= 0.565\ngini = 0.43\nsamples = 10\nvalue = [1
1, 5]\nclass = Yes'),
 Text(2790.0, 271.79999999999995, 'gini = 0.219\nsamples = 5\nvalue = [7, 1]\nclass = Ye
s'),
 Text(3906.0, 271.79999999999995, 'gini = 0.5\nsamples = 5\nvalue = [4, 4]\nclass = Ye
s')]
```



In [ ]:

In [ ]: