In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import MultinomialNB
from sklearn.tree import DecisionTreeClassifier
from sklearn.svm import SVC
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```
Titanic=pd.read_csv('Titanic.csv')
```

In [3]:

```
Titanic
```

Out[3]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

891 rows × 12 columns

In [4]:

```
Titanic.describe()
```

Out[4]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [5]:

```
Titanic.dtypes
```

Out[5]:

```
PassengerId      int64
Survived         int64
Pclass           int64
Name            object
Sex             object
Age            float64
SibSp            int64
Parch            int64
Ticket          object
Fare           float64
Cabin           object
Embarked        object
dtype: object
```

In [60]:

```
Titanic=Titanic.drop(['Name','Ticket','Cabin','PassengerId'],axis=1)
```

In [61]:

```
Titanic
```

Out[61]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	1	22.000000	0.526589	0.000000	2.110213	2
1	1	1	0	38.000000	0.526589	0.000000	4.280593	0
2	1	3	0	26.000000	0.000000	0.000000	2.188856	2
3	1	1	0	35.000000	0.526589	0.000000	3.990834	2
4	0	3	1	35.000000	0.000000	0.000000	2.202765	2
...	...	...	...	...	...	...	...	...
886	0	2	1	27.000000	0.000000	0.000000	2.639057	2
887	1	1	0	19.000000	0.000000	0.000000	3.433987	2
888	0	3	0	29.699118	0.526589	0.741276	3.196630	2
889	1	1	1	26.000000	0.000000	0.000000	3.433987	0
890	0	3	1	32.000000	0.000000	0.000000	2.169054	1

891 rows × 8 columns

In [63]:

```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
list1=['Sex','Embarked']
for val in list1:
    Titanic[val]=le.fit_transform(Titanic[val].astype(str))
```

In [64]:

```
Titanic
```

Out[64]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	1	22.000000	0.526589	0.000000	2.110213	2

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
1	1	1	0	38.000000	0.526589	0.000000	4.280593	0
2	1	3	0	26.000000	0.000000	0.000000	2.188856	2
3	1	1	0	35.000000	0.526589	0.000000	3.990834	2
4	0	3	1	35.000000	0.000000	0.000000	2.202765	2
...	...	...	...	...	...	...	...	...
886	0	2	1	27.000000	0.000000	0.000000	2.639057	2
887	1	1	0	19.000000	0.000000	0.000000	3.433987	2
888	0	3	0	29.699118	0.526589	0.741276	3.196630	2
889	1	1	1	26.000000	0.000000	0.000000	3.433987	0
890	0	3	1	32.000000	0.000000	0.000000	2.169054	1

891 rows × 8 columns

In [65]:

```
Titanic.Survived.unique()
```

Out[65]:

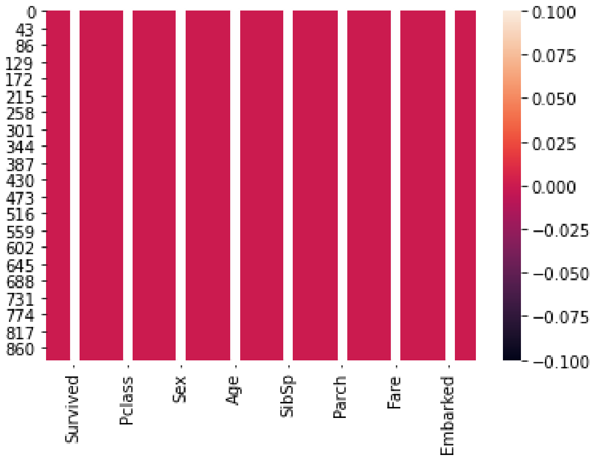
```
array([0, 1], dtype=int64)
```

In [66]:

```
sns.heatmap(Titanic.isnull(),annot=True)
```

Out[66]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x208990a9c70>
```



In [67]:

```
Titanic.isnull().sum()
```

Out[67]:

```
Survived    0
Pclass      0
Sex         0
Age         0
SibSp       0
Parch       0
Fare        0
Embarked    0
dtype: int64
```

In [68]:

```
from sklearn.impute import SimpleImputer
from sklearn.impute import SimpleImputer
imp=SimpleImputer(strategy='mean')
Titanic['Age']=imp.fit_transform(Titanic['Age'].values.reshape(-1,1))
```

In [69]:

```
Titanic
```

Out[69]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	1	22.000000	0.526589	0.000000	2.110213	2
1	1	1	0	38.000000	0.526589	0.000000	4.280593	0
2	1	3	0	26.000000	0.000000	0.000000	2.188856	2
3	1	1	0	35.000000	0.526589	0.000000	3.990834	2
4	0	3	1	35.000000	0.000000	0.000000	2.202765	2
...	...	...	...	...	...	...	...	...
886	0	2	1	27.000000	0.000000	0.000000	2.639057	2
887	1	1	0	19.000000	0.000000	0.000000	3.433987	2
888	0	3	0	29.699118	0.526589	0.741276	3.196630	2
889	1	1	1	26.000000	0.000000	0.000000	3.433987	0
890	0	3	1	32.000000	0.000000	0.000000	2.169054	1

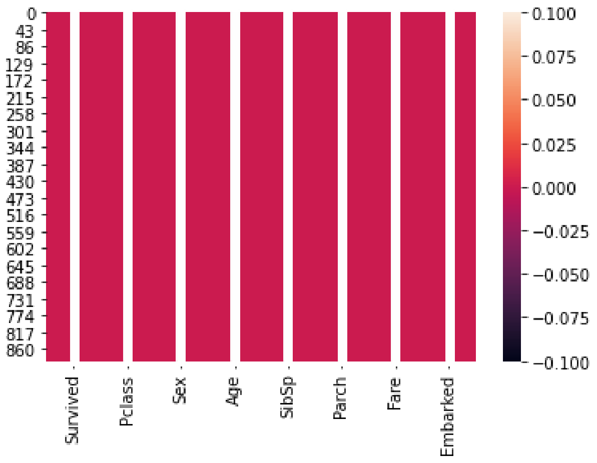
891 rows × 8 columns

In [70]:

```
sns.heatmap(Titanic.isnull(),annot=True)
```

Out[70]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2089bde4d00>
```



In [71]:

```
Titanic.skew()
```

Out[71]:

```
Survived     0.478523
Pclass      -0.630548
Sex         -0.618921
Age          0.434488
SibSp        1.178905
Parch        1.443387
Fare         0.394928
Embarked    -1.246689
dtype: float64
```

In [72]:

```
for col in Titanic.columns:
    if Titanic.skew().loc[col]>0.55:
        Titanic[col]=np.log1p(Titanic[col])
```

In [73]:

```
Titanic.skew()
```

Out[73]:

```
Survived     0.478523
Pclass      -0.630548
Sex         -0.618921
Age          0.434488
SibSp        1.002587
Parch        1.354107
Fare         0.394928
Embarked    -1.246689
dtype: float64
```

In [74]:

```
Titanic.corr()
```

Out[74]:

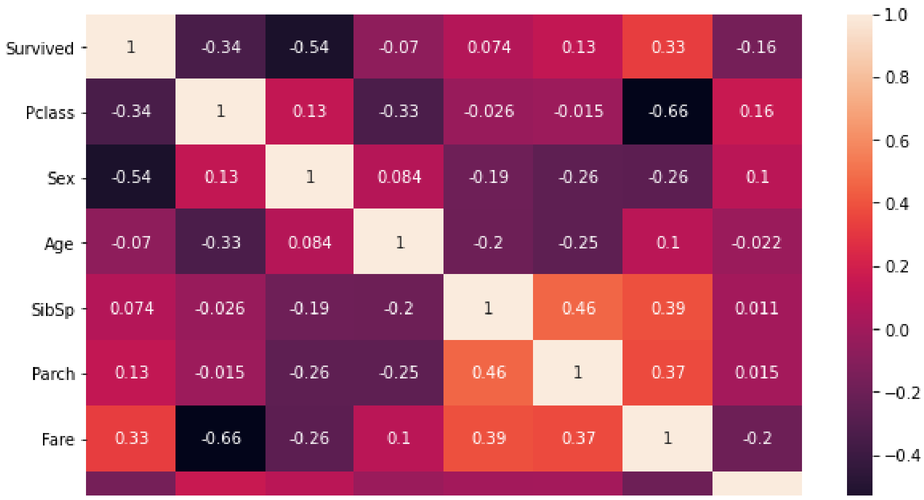
	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
Survived	1.000000	-0.338481	-0.543351	-0.069809	0.073601	0.132436	0.329862	-0.163517
Pclass	-0.338481	1.000000	0.131900	-0.331339	-0.025682	-0.014980	-0.661022	0.157112
Sex	-0.543351	0.131900	1.000000	0.084153	-0.189147	-0.256102	-0.263276	0.104057
Age	-0.069809	-0.331339	0.084153	1.000000	-0.199877	-0.252707	0.102485	-0.022239
SibSp	0.073601	-0.025682	-0.189147	-0.199877	1.000000	0.463057	0.393265	0.010906
Parch	0.132436	-0.014980	-0.256102	-0.252707	0.463057	1.000000	0.370655	0.014507
Fare	0.329862	-0.661022	-0.263276	0.102485	0.393265	0.370655	1.000000	-0.197567
Embarked	-0.163517	0.157112	0.104057	-0.022239	0.010906	0.014507	-0.197567	1.000000

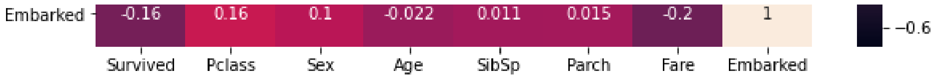
In [75]:

```
plt.figure(figsize=(10,6))
sns.heatmap(Titanic.corr(),annot=True)
```

Out[75]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2089bde4b20>
```



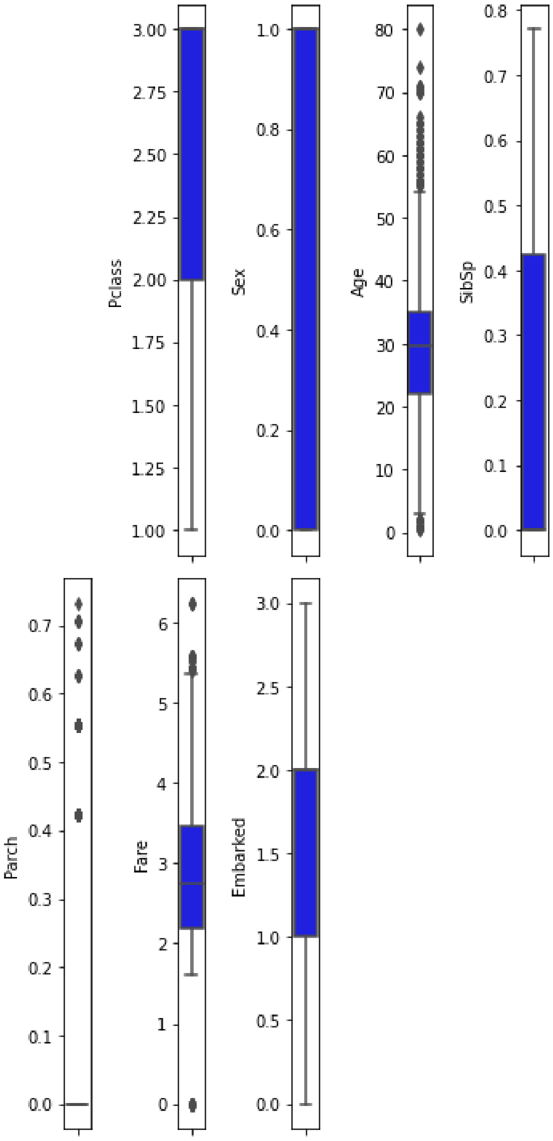


In [76]:

```
col=Titanic.columns.values
ncol=5
nrow=5
```

In [77]:

```
plt.figure(figsize=(ncol,5*ncol))
for i in range(1,len(col)):
    plt.subplot(nrow,ncol,i+1)
    sns.boxplot(Titanic[col[i]],color='blue',orient='v')
    plt.tight_layout()
```



In [78]:

```
from scipy.stats import zscore
z_score=abs(zscore(Titanic))
print(Titanic.shape)
Tit=Titanic.loc[(z_score<3).all(axis=1)]
print(Tit.shape)
```

```
(891, 8)
(866, 8)
```

In [79]:

```
Tit
```

Out[79]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	1	22.000000	0.423036	0.000000	2.110213	2
1	1	1	0	38.000000	0.423036	0.000000	4.280593	0
2	1	3	0	26.000000	0.000000	0.000000	2.188856	2
3	1	1	0	35.000000	0.423036	0.000000	3.990834	2
4	0	3	1	35.000000	0.000000	0.000000	2.202765	2
...	...	...	...	...	...	...	...	...
886	0	2	1	27.000000	0.000000	0.000000	2.639057	2
887	1	1	0	19.000000	0.000000	0.000000	3.433987	2
888	0	3	0	29.699118	0.423036	0.554618	3.196630	2
889	1	1	1	26.000000	0.000000	0.000000	3.433987	0
890	0	3	1	32.000000	0.000000	0.000000	2.169054	1

866 rows × 8 columns

In [80]:

```
Tit=pd.DataFrame(data=Tit)
```

In [81]:

```
x=Tit.iloc[:,1:-1]
```

In [82]:

```
x
```

Out[82]:

	Pclass	Sex	Age	SibSp	Parch	Fare
0	3	1	22.000000	0.423036	0.000000	2.110213
1	1	0	38.000000	0.423036	0.000000	4.280593
2	3	0	26.000000	0.000000	0.000000	2.188856
3	1	0	35.000000	0.423036	0.000000	3.990834
4	3	1	35.000000	0.000000	0.000000	2.202765
...	...	...	...	...	...	...
886	2	1	27.000000	0.000000	0.000000	2.639057
887	1	0	19.000000	0.000000	0.000000	3.433987
888	3	0	29.699118	0.423036	0.554618	3.196630
889	1	1	26.000000	0.000000	0.000000	3.433987
890	3	1	32.000000	0.000000	0.000000	2.169054

866 rows × 6 columns

In [83]:

```
x.shape
```

Out[83]:

```
(866, 6)
```

In [84]:

```
y=Tit.iloc[:,0]
```

In [85]:

```
y
```

Out[85]:

```
0      0
1      1
2      1
3      1
4      0
      ..
886    0
887    1
888    0
889    1
890    0
Name: Survived, Length: 866, dtype: int64
```

In [86]:

```
y.shape
```

Out[86]:

```
(866,)
```

In [87]:

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.30,random_state=45)
```

In [88]:

```
lr=LogisticRegression()
```

In [89]:

```
lr.fit(x_train,y_train)
lr.score(x_train,y_train)
pred=lr.predict(x_test)
print(accuracy_score(y_test,pred))
print(confusion_matrix(y_test,pred))
print(classification_report(y_test,pred))
```

```
0.7692307692307693
[[131  36]
 [ 24  69]]
              precision    recall  f1-score   support

           0       0.85      0.78      0.81       167
           1       0.66      0.74      0.70        93

    accuracy                           0.77       260
   macro avg       0.75      0.76      0.76       260
weighted avg       0.78      0.77      0.77       260
```

In [90]:

```
from sklearn.neighbors import KNeighborsClassifier
knn=KNeighborsClassifier()
knn.fit(x_train,y_train)
knn.score(x_train,y_train)
predknn=knn.predict(x_test)
print(accuracy_score(y_test,predknn))
print(accuracy_score(y_test,predknn))
print(confusion_matrix(y_test,predknn))
print(classification_report(y_test,predknn))
```

```
0.7692307692307693
[[142  25]
 [ 35  58]]
              precision    recall  f1-score   support

           0       0.80      0.85      0.83       167
           1       0.70      0.62      0.66        93

    accuracy                           0.77       260
   macro avg       0.75      0.74      0.74       260
weighted avg       0.77      0.77      0.77       260
```

In [91]:

```
mnb=MultinomialNB()
mnb.fit(x_train,y_train)
mnb.score(x_train,y_train)
predmnb=mnb.predict(x_test)
print(accuracy_score(y_test,predmnb))
print(confusion_matrix(y_test,predmnb))
print(classification_report(y_test,predmnb))
```

```
0.7730769230769231
[[153  14]
 [ 45  48]]
              precision    recall  f1-score   support

           0       0.77      0.92      0.84       167
           1       0.77      0.52      0.62        93

    accuracy                           0.77       260
   macro avg       0.77      0.72      0.73       260
weighted avg       0.77      0.77      0.76       260
```

In [92]:

```
svc=SVC(kernel='rbf')
svc.fit(x_train,y_train)
svc.score(x_train,y_train)
predsvc=svc.predict(x_test)
print(accuracy_score(y_test,predsvc))
print(confusion_matrix(y_test,predsvc))
print(classification_report(y_test,predsvc))
```

```
0.65
[[158   9]
 [ 82  11]]
              precision    recall  f1-score   support

           0       0.66      0.95      0.78       167
           1       0.55      0.12      0.19        93

    accuracy                           0.65       260
   macro avg       0.60      0.53      0.49       260
weighted avg       0.62      0.65      0.57       260
```

In [93]:

```
rf=RandomForestClassifier()
rf.fit(x_train,y_train)
rf.score(x_train,y_train)
predrf=rf.predict(x_test)
print(accuracy_score(y_test,predrf))
print(confusion_matrix(y_test,predrf))
print(classification_report(y_test,predrf))
```

```
0.823076923076923
[[144  23]
 [ 23  70]]
              precision    recall  f1-score   support

           0       0.86      0.86      0.86       167
           1       0.75      0.75      0.75        93

    accuracy                           0.82       260
   macro avg       0.81      0.81      0.81       260
weighted avg       0.82      0.82      0.82       260
```

In [94]:

```
from sklearn.ensemble import AdaBoostClassifier
ad=AdaBoostClassifier()
ad.fit(x_train,y_train)
ad.score(x_train,y_train)
predad=ad.predict(x_test)
print(accuracy_score(y_test,predad))
print(confusion_matrix(y_test,predad))
print(classification_report(y_test,predad))
```

```
0.7884615384615384
[[137  30]
 [ 25  68]]
              precision    recall  f1-score   support

           0       0.85      0.82      0.83       167
           1       0.69      0.73      0.71        93

    accuracy                           0.79       260
   macro avg       0.77      0.78      0.77       260
weighted avg       0.79      0.79      0.79       260
```

In [95]:

```
import joblib
joblib.dump(rf,'Titanic.pkl')
```

Out[95]:

```
['Titanic.pkl']
```

In [ ]: