In [68]:

```
import pandas as pd
import numpy as np
import random
import matplotlib.pyplot as plt
```

1) Dataset used is car.data

In [69]:

```
df=pd.read_csv('car.data')
```

In [70]:

```
df.head(100)
```

Out[70]:

	vhigh	vhigh.1	2	2.1	small	low	unacc
0	vhigh	vhigh	2	2	small	med	unacc
1	vhigh	vhigh	2	2	small	high	unacc
2	vhigh	vhigh	2	2	med	low	unacc
3	vhigh	vhigh	2	2	med	med	unacc
4	vhigh	vhigh	2	2	med	high	unacc
...	...	...	...	...	...	...	...
95	vhigh	vhigh	5more	4	big	low	unacc
96	vhigh	vhigh	5more	4	big	med	unacc
97	vhigh	vhigh	5more	4	big	high	unacc
98	vhigh	vhigh	5more	more	small	low	unacc
99	vhigh	vhigh	5more	more	small	med	unacc

100 rows × 7 columns

2)

In [71]:

```
X=df.drop('unacc',axis=1)
```

In [72]:

```
X
```

Out[72]:

	vhigh	vhigh.1	2	2.1	small	low
0	vhigh	vhigh	2	2	small	med
1	vhigh	vhigh	2	2	small	high
2	vhigh	vhigh	2	2	med	low
3	vhigh	vhigh	2	2	med	med
4	vhigh	vhigh	2	2	med	high
...	...	...	...	...	...	...

	vhigh	vhigh.1	2	2.1	small	low
1722	low	low	5more	more	med	med
1723	low	low	5more	more	med	high
1724	low	low	5more	more	big	low
1725	low	low	5more	more	big	med
1726	low	low	5more	more	big	high

1727 rows × 6 columns

In [73]:

```
from sklearn.preprocessing import LabelEncoder
```

In [74]:

```
X=np.array(X)
```

In [75]:

```
le=LabelEncoder()
```

In [76]:

```
X[:,0]=le.fit_transform(X[:,0])
X[:,1]=le.fit_transform(X[:,1])
X[:,2]=le.fit_transform(X[:,2])
X[:,3]=le.fit_transform(X[:,3])
X[:,4]=le.fit_transform(X[:,4])
X[:,5]=le.fit_transform(X[:,5])
```

In [77]:

```
X
```

Out[77]:

```
array([[3, 3, 0, 0, 2, 2],
       [3, 3, 0, 0, 2, 0],
       [3, 3, 0, 0, 1, 1],
       ...,
       [1, 1, 3, 2, 0, 1],
       [1, 1, 3, 2, 0, 2],
       [1, 1, 3, 2, 0, 0]], dtype=object)
```

In [78]:

```
from sklearn.preprocessing import LabelEncoder
```

In [79]:

```
le=LabelEncoder()
```

In [80]:

```
Y=df.iloc[:,-1].values
```

In [81]:

```
Y
```

Out[81]:

```
array(['unacc', 'unacc', 'unacc', ..., 'unacc', 'good', 'vgood'],
      dtype=object)
```

In [82]:

```
from sklearn.preprocessing import LabelEncoder
```

In [83]:

```
le=LabelEncoder()
```

In [84]:

```
Y=le.fit_transform(Y)
```

In [85]:

```
Y
```

Out[85]:

```
array([2, 2, 2, ..., 2, 1, 3])
```

In [86]:

```
from sklearn.model_selection import train_test_split
```

In [87]:

```
X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size=0.33, random_state=4
2)
```

In [88]:

```
print("Train shape",X_train.shape)
print("Test shape",X_test.shape)
print(y_train.shape)
print(y_test.shape)
```

```
Train shape (1157, 6)
Test shape (570, 6)
(1157,)
(570,)
```

In [89]:

```
X_train=np.asarray(X_train).astype(np.int)

y_train=np.asarray(y_train).astype(np.int)
```

```
C:\Users\Surya\AppData\Local\Temp/ipykernel_9300/2533269013.py:1: DeprecationWarning: `np
.int` is a deprecated alias for the builtin `int`. To silence this warning, use `int` by
itself. Doing this will not modify any behavior and is safe. When replacing `np.int`, you
may wish to use e.g. `np.int64` or `np.int32` to specify the precision. If you wish to re
view your current use, check the release note link for additional information.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/releas
e/1.20.0-notes.html#deprecations
  X_train=np.asarray(X_train).astype(np.int)
C:\Users\Surya\AppData\Local\Temp/ipykernel_9300/2533269013.py:3: DeprecationWarning: `np
.int` is a deprecated alias for the builtin `int`. To silence this warning, use `int` by
itself. Doing this will not modify any behavior and is safe. When replacing `np.int`, you
may wish to use e.g. `np.int64` or `np.int32` to specify the precision. If you wish to re
view your current use, check the release note link for additional information.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/releas
e/1.20.0-notes.html#deprecations
  y_train=np.asarray(y_train).astype(np.int)
```

In [90]:

```
X_test=np.asarray(X_test).astype(np.int)

y_test=np.asarray(y_test).astype(np.int)
```

```
C:\Users\Surya\AppData\Local\Temp/ipykernel_9300/1019634495.py:1: DeprecationWarning: `np
.int` is a deprecated alias for the builtin `int`. To silence this warning, use `int` by
itself. Doing this will not modify any behavior and is safe. When replacing `np.int`, you
may wish to use e.g. `np.int64` or `np.int32` to specify the precision. If you wish to re
view your current use, check the release note link for additional information.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/releas
```

```
e/1.20.0-notes.html#deprecations
  X_test=np.asarray(X_test).astype(np.int)
C:\Users\Surya\AppData\Local\Temp/ipykernel_9300/1019634495.py:3: DeprecationWarning: `np
.int` is a deprecated alias for the builtin `int`. To silence this warning, use `int` by
itself. Doing this will not modify any behavior and is safe. When replacing `np.int`, you
may wish to use e.g. `np.int64` or `np.int32` to specify the precision. If you wish to re
view your current use, check the release note link for additional information.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/releas
e/1.20.0-notes.html#deprecations
  y_test=np.asarray(y_test).astype(np.int)
```

In [91]:

```
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Flatten
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Activation
```

In [92]:

```
model=Sequential()
```

In [93]:

```
model.add(Dense(10, input_shape = (6,), activation = 'sigmoid'))
model.add(Dense(10, activation = 'sigmoid'))
model.add(Dense(10, activation = 'sigmoid'))
model.add(Dense(10, activation = 'sigmoid'))
model.add(Dense(10, activation = 'sigmoid'))
model.add(Dense(4))
```

In [94]:

```
model.summary()
```

```
Model: "sequential_2"

_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_12 (Dense)             (None, 10)                70

_________________________________________________________________
dense_13 (Dense)             (None, 10)                110

_________________________________________________________________
dense_14 (Dense)             (None, 10)                110

_________________________________________________________________
dense_15 (Dense)             (None, 10)                110

_________________________________________________________________
dense_16 (Dense)             (None, 10)                110

_________________________________________________________________
dense_17 (Dense)             (None, 4)                 44
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0

_________________________________________________________________
```

In [95]:

```
from tensorflow.keras import optimizers
sgd = optimizers.SGD(learning_rate = 0.01)
model.compile(optimizer = sgd, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [96]:

```
train=model.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 3s 8ms/step - loss: 17.3546 - accuracy: 0.7001
Epoch 2/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
```

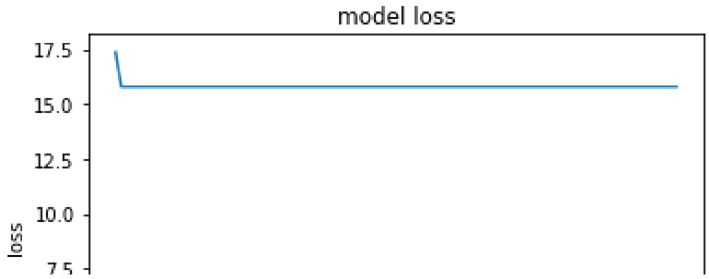
```
Epoch 3/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 5ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 6/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 7/100
24/24 [==============================] - 0s 5ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 8/100
24/24 [==============================] - 0s 5ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 9/100
24/24 [==============================] - 0s 5ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 10/100
24/24 [==============================] - 0s 5ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 11/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 12/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 14/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 16/100
24/24 [==============================] - 0s 6ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 17/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 18/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 19/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 20/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 23/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 26/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 27/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 28/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 29/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 31/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 32/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 33/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 34/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 35/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 36/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 37/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

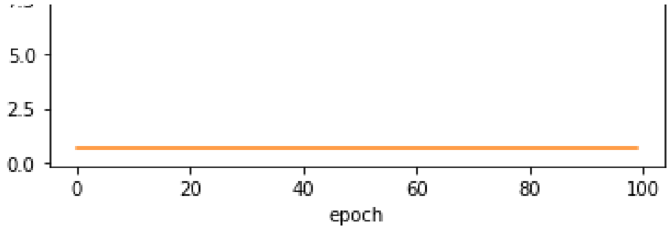
```
Epoch 39/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 40/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 41/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 42/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 43/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 44/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 45/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 47/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 48/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 50/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 51/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 53/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 54/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 56/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 57/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 58/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 60/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 61/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 62/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 63/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 64/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 68/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 69/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 70/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 73/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 74/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
```

```
Epoch 75/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 77/100
24/24 [==============================] - 0s 12ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 83/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 84/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 85/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 87/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 88/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 89/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 91/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 92/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 93/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 94/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 96/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 99/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

In [297]:

```python
import matplotlib.pyplot as plt
plt.plot(train.history['loss'])
plt.plot(train.history['accuracy'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```





In [98]:

```
results = model.evaluate(X_test, y_test)
```

```
18/18 [==============================] - 0s 4ms/step - loss: 15.9776 - accuracy: 0.7000
```

In [99]:

```
print(model.metrics_names)      # list of metric names the model is employing
print(results)
```

```
['loss', 'accuracy']
[15.977612495422363, 0.699999988079071]
```

In [100]:

```
print("The Accuracy is ",results[1]*100,"%")
```

```
The Accuracy is  69.9999988079071 %
```

3)

In [134]:

```
model1=Sequential()
```

In [122]:

```
from tensorflow.keras import initializers
```

In [109]:

```
# Initializing Initializers
initializer1 = tf.keras.initializers.RandomNormal(mean=0., stddev=1.)
initializer2 = tf.keras.initializers.RandomUniform(minval=0., maxval=1.)
initializer3 = tf.keras.initializers.TruncatedNormal(mean=0., stddev=1.)
initializer4 = tf.keras.initializers.Zeros()
initializer5 = tf.keras.initializers.Ones()
initializer6 = tf.keras.initializers.GlorotNormal()
initializer7 = tf.keras.initializers.GlorotUniform()
initializer8 = tf.keras.initializers.HeNormal()
initializer9 = tf.keras.initializers.HeUniform()
initializer10 = tf.keras.initializers.Identity()
initializer11 = tf.keras.initializers.Orthogonal()
```

Random Normal Entropy

In [135]:

```
model1.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer1))
model1.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer1))
model1.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer1))
model1.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer1))
model1.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer1))
model1.add(Dense(4))
```

In [136]:

```
model1.summary()
```

```
Model: "sequential_8"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_48 (Dense)             (None, 10)                70
_________________________________________________________________
dense_49 (Dense)             (None, 10)                110
_________________________________________________________________
dense_50 (Dense)             (None, 10)                110
_________________________________________________________________
dense_51 (Dense)             (None, 10)                110
_________________________________________________________________
dense_52 (Dense)             (None, 10)                110
_________________________________________________________________
dense_53 (Dense)             (None, 4)                 44
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [137]:

```
sgd1 = optimizers.SGD(learning_rate = 0.01)
model1.compile(optimizer = sgd1, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [138]:

```
train1=model1.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 11.0838 - accuracy: 0.4512
Epoch 2/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 3/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 7/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 8/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 9/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 20/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
```

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Epoch 21/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 23/100
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Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 37/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 39/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 40/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 43/100
24/24 [==============================] - 0s 10ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
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24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 52/100
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24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 54/100
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Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
```

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Epoch 57/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 58/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 63/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 65/100
24/24 [==============================] - 0s 12ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 66/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 67/100
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Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 73/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 78/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 79/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 80/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 81/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 85/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 86/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 87/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 88/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 89/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
```
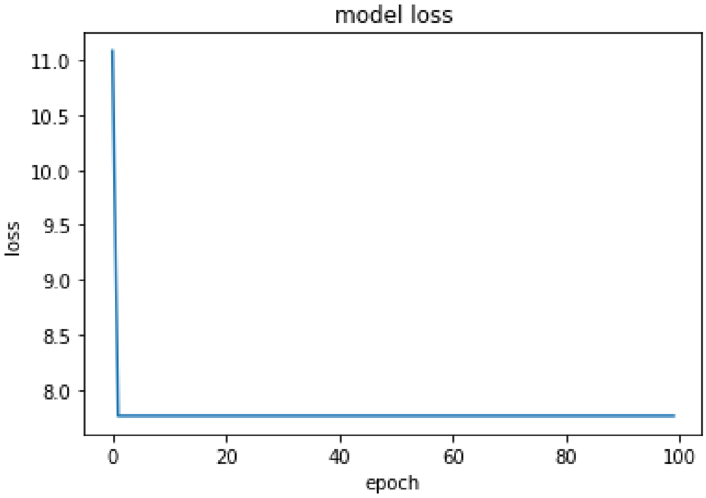

```
Epoch 93/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.0337
```

In [144]:

```
plt.plot(train1.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [291]:

```
results1 = model1.evaluate(X_test, y_test)
print(model1.metrics_names)
print(results1)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 6ms/step - loss: 7.7624 - accuracy: 0.0456
['loss', 'accuracy']
[7.7624125480651855, 0.045614033937454224]
The Accuracy is  4.561403393745422 %
```

RandomUniform

In [116]:

```
model2=Sequential()
```

In [117]:

```
model2.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer2))
model2.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer2))
model2.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer2))
model2.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer2))
model2.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer2))
model2.add(Dense(4))
```

In [118]:

```
model2.summary()
```

```
Model: "sequential_5"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_30 (Dense)             (None, 10)                70
_________________________________________________________________
dense_31 (Dense)             (None, 10)                110
_________________________________________________________________
dense_32 (Dense)             (None, 10)                110
_________________________________________________________________
dense_33 (Dense)             (None, 10)                110
_________________________________________________________________
dense_34 (Dense)             (None, 10)                110
_________________________________________________________________
dense_35 (Dense)             (None, 4)                 44
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [119]:

```
sgd2 = optimizers.SGD(learning_rate = 0.01)
model2.compile(optimizer = sgd2, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [120]:

```
train2=model2.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 10ms/step - loss: 0.2854 - accuracy: 0.7001
Epoch 2/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 6/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 7/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 8/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 9/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 11/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 12/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 13/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 14/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 15/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 16/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 17/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 18/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 19/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
```

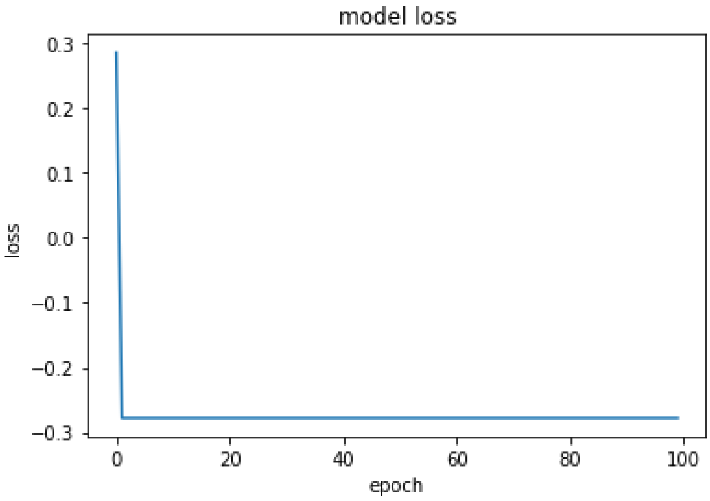
```
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 22/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 23/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 24/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 25/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 26/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 27/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 29/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 30/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 31/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 32/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 33/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 34/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 35/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 37/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 38/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 39/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 40/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 41/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 42/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 43/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 44/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 45/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 46/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 47/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 48/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 49/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 50/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 51/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 52/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 53/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 54/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 55/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
```

```
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 57/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 59/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 60/100
24/24 [==============================] - 0s 11ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 61/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 63/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 64/100
24/24 [==============================] - 0s 12ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 65/100
24/24 [==============================] - 0s 12ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 66/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 67/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 69/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 71/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 72/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 73/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 74/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 75/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 76/100
24/24 [==============================] - 0s 14ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 77/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 79/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 80/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 81/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 82/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 84/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 86/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 87/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
```

```
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 92/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 94/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 96/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 97/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 99/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 100/100
24/24 [==============================] - 0s 12ms/step - loss: -0.2781 - accuracy: 0.7001
```

In [127]:

```
import matplotlib.pyplot as plt
plt.plot(train2.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [173]:

```
results2= model2.evaluate(X_test, y_test)
print(model2.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 10ms/step - loss: -0.4528 - accuracy: 0.7000
['loss', 'accuracy']
[-0.45278728008270264, 0.699999988079071]
The Accuracy is  69.9999988079071 %
```

TruncatedNormal

In [139]:

```
model3=Sequential()
```

In [140]:

```
model3.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer3))
model3.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer3))
```

```
model3.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer3))
model3.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer3))
model3.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer3))
model3.add(Dense(4))
```

In [141]:

```
model3.summary()
```

```
Model: "sequential_9"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_54 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_55 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_56 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_57 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_58 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_59 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [142]:

```
sgd3 = optimizers.SGD(learning_rate = 0.01)
model3.compile(optimizer = sgd3, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [143]:

```
train3=model3.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 11ms/step - loss: 8.5157 - accuracy: 0.1426
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 4/100
24/24 [==============================] - 0s 11ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 5/100
24/24 [==============================] - 0s 11ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 6/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 7/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 8/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 17/100
```

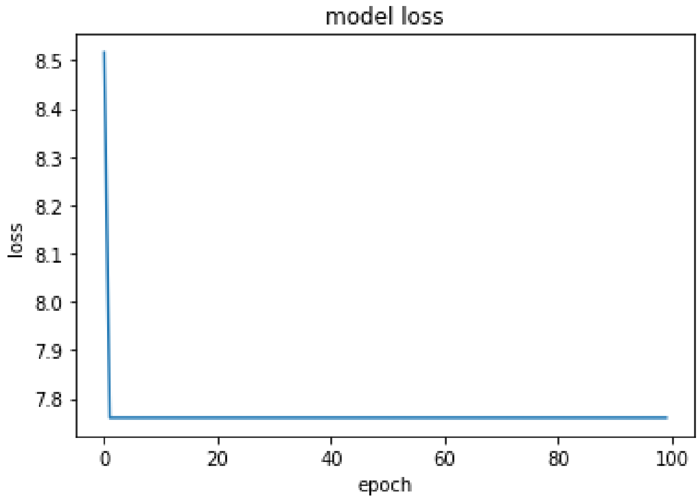
```
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 27/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 33/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 35/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 53/100
```

```
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 55/100
24/24 [==============================] - 0s 10ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 56/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 57/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 58/100
24/24 [==============================] - 0s 10ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 59/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 61/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 65/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 67/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 75/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 77/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 82/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 84/100
24/24 [==============================] - 0s 7ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 87/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 89/100
```

```
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2221
Epoch 100/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2221
```

In [146]:

```
import matplotlib.pyplot as plt
plt.plot(train3.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [170]:

```
results3 = model3.evaluate(X_test, y_test)
print(model3.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 8ms/step - loss: 7.7624 - accuracy: 0.2228
['loss', 'accuracy']
[-8.667988777160645, 0.22280701994895935]
The Accuracy is  22.280701994895935 %
```

Zeros

In [148]:

```
model4=Sequential()
```

In [149]:

```
model4.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer4))
model4.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer4))
model4.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer4))
model4.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer4))
model4.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer4))
model4.add(Dense(4))
```

In [150]:

```
model4.summary()
```

```
Model: "sequential_10"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_60 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_61 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_62 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_63 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_64 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_65 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [151]:

```
sgd4 = optimizers.SGD(learning_rate = 0.01)
model4.compile(optimizer = sgd4, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [152]:

```
train4=model4.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: -2.7261 - accuracy: 0.1798
Epoch 2/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 3/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 6/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 7/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 8/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 15/100
```

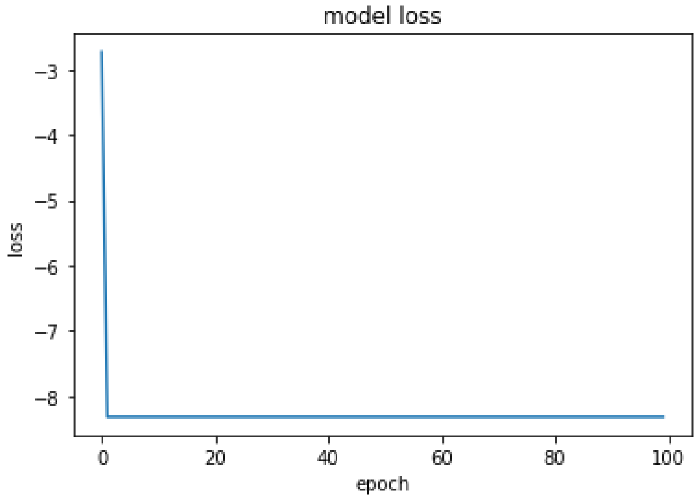
```
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 27/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 28/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 32/100
24/24 [==============================] - 0s 10ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 33/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 43/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 45/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 46/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 51/100
```

```
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 72/100
24/24 [==============================] - 0s 10ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 73/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 75/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 87/100
```

```
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 90/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
```

In [154]:

```
import matplotlib.pyplot as plt
plt.plot(train4.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [169]:

```
results4 = model4.evaluate(X_test, y_test)
print(model.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 5ms/step - loss: -8.6680 - accuracy: 0.2228
['loss', 'accuracy']
[-8.667988777160645, 0.22280701994895935]
The Accuracy is  22.280701994895935 %
```

Ones

In [156]:

```
model5=Sequential()
```

In [157]:

```
model5.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer5))
model5.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer5))
model5.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer5))
model5.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer5))
model5.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer5))
model5.add(Dense(4))
```

In [158]:

```
model5.summary()
```

```
Model: "sequential_11"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_66 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_67 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_68 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_69 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_70 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_71 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [159]:

```
sgd5 = optimizers.SGD(learning_rate = 0.01)
model5.compile(optimizer = sgd5, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [160]:

```
train5=model5.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 8ms/step - loss: 16.3390 - accuracy: 0.7001
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 3/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 7/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 9/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 10/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

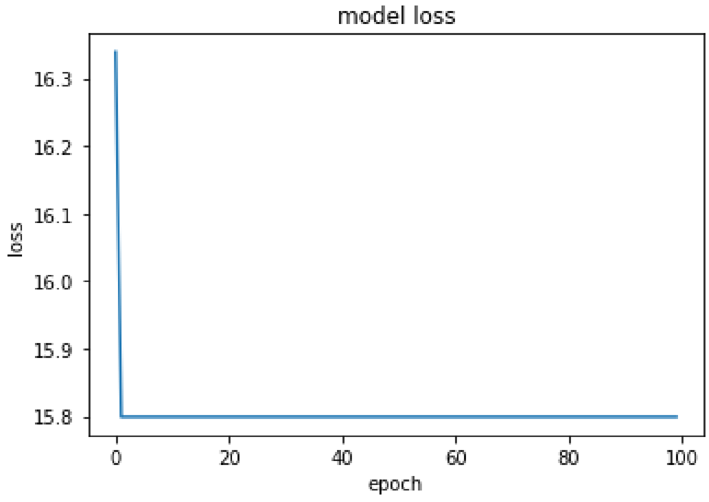
```
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 16/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 33/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 41/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 42/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 43/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 47/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

```
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 53/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 55/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 77/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 83/100
24/24 [==============================] - 0s 10ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 84/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

```
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 89/100
24/24 [==============================] - 0s 15ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 90/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 91/100
24/24 [==============================] - 0s 11ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 92/100
24/24 [==============================] - 0s 14ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 94/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 95/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 97/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 98/100
24/24 [==============================] - 0s 7ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```

In [161]:

```
import matplotlib.pyplot as plt
plt.plot(train5.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [166]:

```
results5 = model5.evaluate(X_test, y_test)
print(model5.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 13ms/step - loss: 15.9776 - accuracy: 0.7000
['loss', 'accuracy']
[15.977612495422363, 0.699999988079071]
The Accuracy is  69.9999988079071 %
```

GlorotNormal

GlorotNormal

In [179]:

```
model6=Sequential()
```

In [180]:

```
model6.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer6))
model6.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer6))
model6.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer6))
model6.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer6))
model6.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer6))
model6.add(Dense(4))
```

In [181]:

```
model6.summary()
```

```
Model: "sequential_12"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_72 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_73 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_74 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_75 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_76 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_77 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [182]:

```
sgd6 = optimizers.SGD(learning_rate = 0.01)
model6.compile(optimizer = sgd6, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [183]:

```
train6=model6.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 10ms/step - loss: 1.7196 - accuracy: 0.0458
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 3/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 4/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 7/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
```

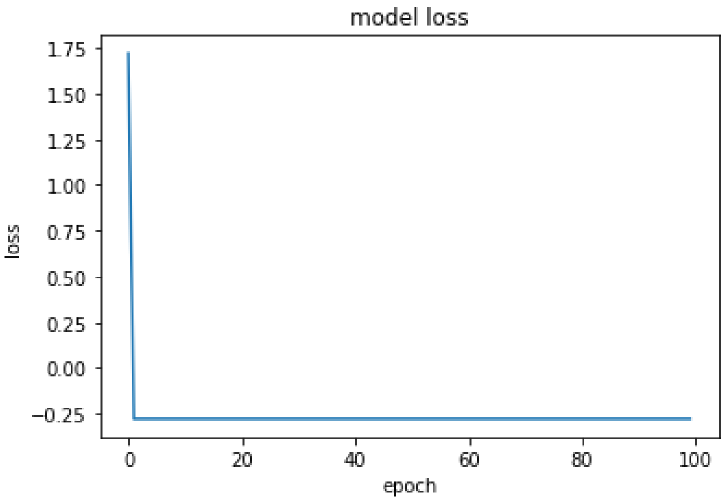
```
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 33/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 35/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
```

```
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 49/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 71/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 81/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 82/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
```

```
Epoch 84/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.0337
```

In [185]:

```
import matplotlib.pyplot as plt
plt.plot(train6.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [186]:

```
results6 = model6.evaluate(X_test, y_test)
print(model6.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: -0.4528 - accuracy: 0.0456
['loss', 'accuracy']
[7.7624125480651855, 0.045614033937454224]
The Accuracy is  4.561403393745422 %
The Accuracy is  4.56140353937454222 %
```

GlorotUniform

In [187]:

```
model7=Sequential()
```

In [188]:

```
model7.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer7))
model7.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer7))
model7.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer7))
model7.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer7))
model7.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer7))
model7.add(Dense(4))
```

In [189]:

```
model7.summary()
```

```
Model: "sequential_13"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_78 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_79 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_80 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_81 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_82 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_83 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [190]:

```
sgd7 = optimizers.SGD(learning_rate = 0.01)
model7.compile(optimizer = sgd7, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [191]:

```
train7=model7.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: -3.1739 - accuracy: 0.1858
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 4/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 7/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 9/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
```

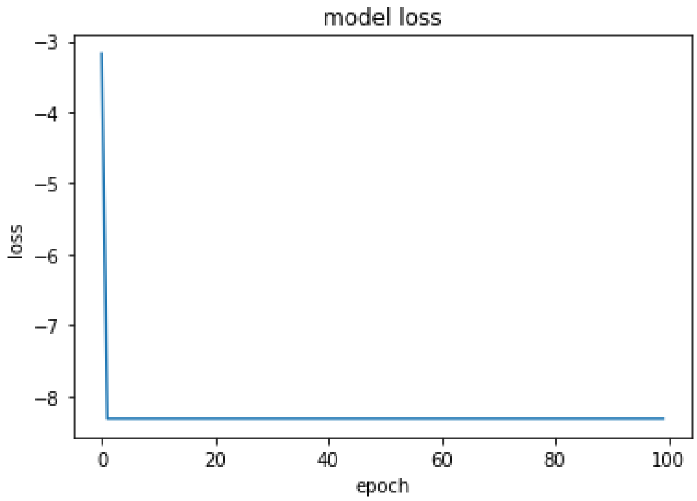
```
Epoch 10/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 15/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 22/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 27/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 28/100
24/24 [==============================] - 0s 11ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 29/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 31/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 32/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 33/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 40/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
```

```
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 50/100
24/24 [==============================] - 0s 7ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 55/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 69/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
```

```
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.2221
```

In [192]:

```python
import matplotlib.pyplot as plt
plt.plot(train7.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [193]:

```python
results = model7.evaluate(X_test, y_test)
print(model7.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 6ms/step - loss: -8.6680 - accuracy: 0.2228
['loss', 'accuracy']
[-8.667988777160645, 0.22280701994895935]
The Accuracy is  22.280701994895935 %
```

HeNormal

In [194]:

```
model8=Sequential()
```

In [195]:

```
model8.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initi
alizer8))
model8.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer8))
model8.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer8))
model8.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer8))
model8.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer8))
model8.add(Dense(4))
```

In [196]:

```
model8.summary()
```

```
Model: "sequential_14"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_84 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_85 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_86 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_87 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_88 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_89 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [197]:

```
sgd8 = optimizers.SGD(learning_rate = 0.01)
model8.compile(optimizer = sgd8, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

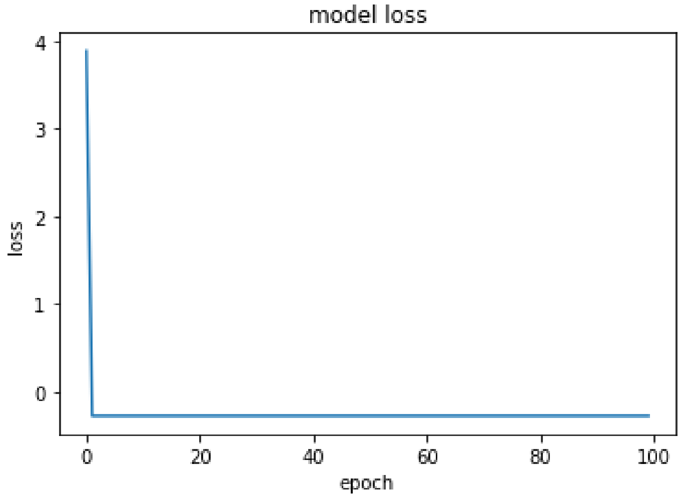
In [198]:

```
train8=model8.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 10ms/step - loss: 3.8847 - accuracy: 0.6154
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 7/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 8/100
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 9/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 10/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 33/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 43/100
24/24 [==============================] - 0s 10ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 44/100
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 45/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 49/100
24/24 [==============================] - 0s 9ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 80/100
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 96/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: -0.2781 - accuracy: 0.7001
```

In [199]:

```python
import matplotlib.pyplot as plt
plt.plot(train8.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



In [200]:

```python
results = model8.evaluate(X_test, y_test)
results = model8.evaluate(X_test, y_test)
print(model8.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 5ms/step - loss: -0.4528 - accuracy: 0.7000
['loss', 'accuracy']
[-0.45278728008270264, 0.699999988079071]
The Accuracy is  69.9999988079071 %
```

HeUniform

In [202]:

```
model9=Sequential()
```

In [203]:

```
model9.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=initializer9))
model9.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer9))
model9.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer9))
model9.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer9))
model9.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer9))
model9.add(Dense(4))
```

In [204]:

```
model9.summary()
```

```
Model: "sequential_16"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_90 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_91 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_92 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_93 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_94 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_95 (Dense)             (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [205]:

```
sgd9 = optimizers.SGD(learning_rate = 0.01)
model9.compile(optimizer = sgd9, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

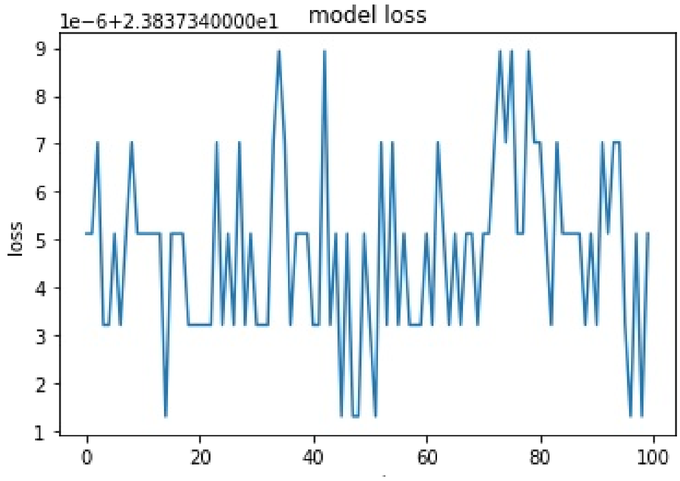
In [206]:

```
train9=model9.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 2/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 3/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 4/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 5/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 6/100
Epoch 6/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 7/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 10/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 28/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 29/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 30/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 32/100
24/24 [==============================] - 0s 11ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 33/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 34/100
24/24 [==============================] - 0s 11ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 35/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 36/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 39/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 40/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 42/100
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 47/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 48/100
24/24 [==============================] - 0s 7ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 56/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 57/100
24/24 [==============================] - 0s 11ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 58/100
24/24 [==============================] - 0s 11ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 60/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 61/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 70/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 78/100
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 79/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 80/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 91/100
24/24 [==============================] - 0s 7ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 93/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221A:
0s - loss: 23.4459 - accuracy: 0.2
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 96/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 99/100
24/24 [==============================] - 0s 9ms/step - loss: 23.8373 - accuracy: 0.2221
Epoch 100/100
24/24 [==============================] - 0s 10ms/step - loss: 23.8373 - accuracy: 0.2221
```

In [207]:

```
import matplotlib.pyplot as plt
plt.plot(train9.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```



epoch

In [208]:

```
results = model9.evaluate(X_test, y_test)
print(model9.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: 24.1928 - accuracy: 0.2228
['loss', 'accuracy']
[24.192813873291016, 0.22280701994895935]
The Accuracy is  22.280701994895935 %
```

Identity

In [209]:

```
model10=Sequential()
```

In [210]:

```
model10.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=init
ializer10))
model10.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer10))
model10.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer10))
model10.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer10))
model10.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer10))
model10.add(Dense(4))
```

In [211]:

```
model10.summary()
```

```
Model: "sequential_17"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_96 (Dense)             (None, 10)                70        
_________________________________________________________________
dense_97 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_98 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_99 (Dense)             (None, 10)                110       
_________________________________________________________________
dense_100 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_101 (Dense)            (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [212]:

```
from tensorflow.keras import optimizers
sgd10 = optimizers.SGD(learning_rate = 0.01)
model10.compile(optimizer = sgd10, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [213]:

```
train10=model10.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 16.1462 - accuracy: 0.7001
Epoch 2/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 3/100
```

```
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 6/100
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Epoch 75/100
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Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```
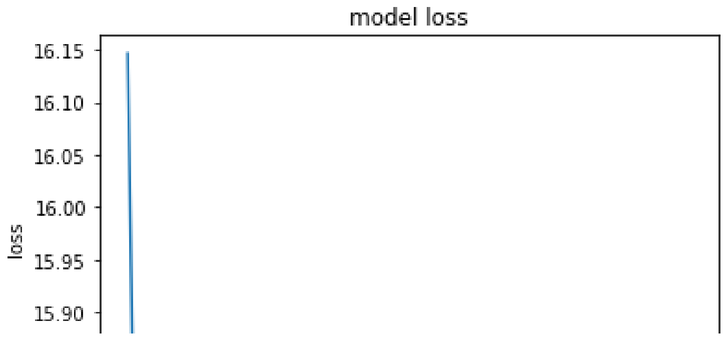
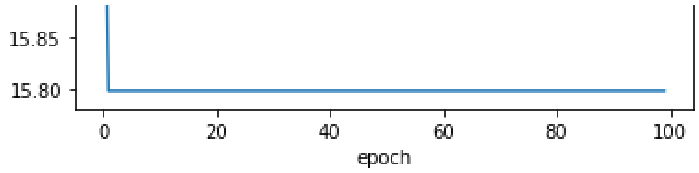

In [214]:

```
import matplotlib.pyplot as plt
plt.plot(train10.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```





In [215]:

```
results = model10.evaluate(X_test, y_test)
print(model10.metrics_names)
print(results)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: 15.9776 - accuracy: 0.7000
['loss', 'accuracy']
[15.977612495422363, 0.699999988079071]
The Accuracy is  69.9999988079071 %
```

Orthogonal

In [216]:

```
model11=Sequential()
```

In [217]:

```
model11.add(Dense(10, input_shape = (6,), activation = 'sigmoid',kernel_initializer=init
ializer11))
model11.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer11))
model11.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer11))
model11.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer11))
model11.add(Dense(10, activation = 'sigmoid',kernel_initializer=initializer11))
model11.add(Dense(4))
```

In [218]:

```
model11.summary()
```

```
Model: "sequential_18"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_102 (Dense)            (None, 10)                70        
_________________________________________________________________
dense_103 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_104 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_105 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_106 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_107 (Dense)            (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [219]:

```
sgd11 = optimizers.SGD(learning_rate = 0.01)
model11.compile(optimizer = sgd11, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [220]:

```
train11=model11.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

```
Epoch 1/100
```

```
24/24 [==============================] - 1s 10ms/step - loss: 17.3560 - accuracy: 0.7001
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: 15.7989 - accuracy: 0.7001
Epoch 3/100
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Epoch 4/100
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Epoch 5/100
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Epoch 37/100
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Epoch 73/100
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Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 15.7989 - accuracy: 0.7001
```
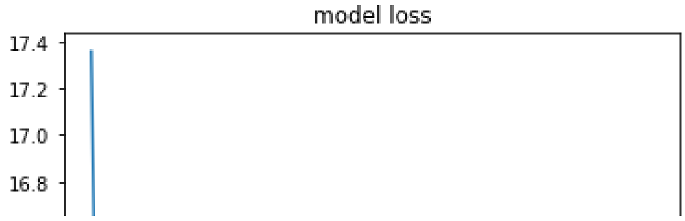
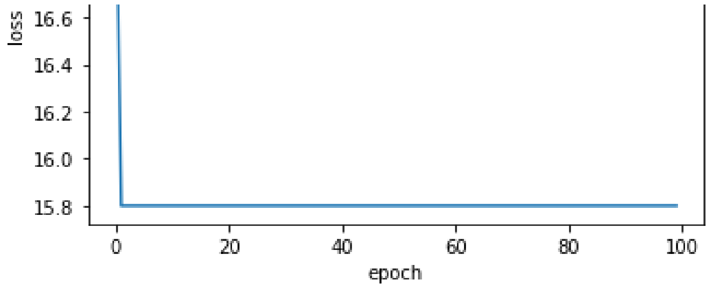

In [221]:

```
import matplotlib.pyplot as plt
plt.plot(train11.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```





In [286]:

```
results11 = model11.evaluate(X_test, y_test)
print(model11.metrics_names)
print(results11)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: 15.9776 - accuracy: 0.7000
['loss', 'accuracy']
[15.977612495422363, 0.699999988079071]
The Accuracy is  69.9999988079071 %
```

Random Uniform, Ones , HeNormal , Identity and Orthogonal Gives an accuracy of 70% accuracy

4)

In [243]:

```
modela1=Sequential()
```

In [245]:

```
modela1.add(Dense(10, input_shape = (6,), activation = 'relu',kernel_initializer=initial
izer11))
modela1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modela1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modela1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modela1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modela1.add(Dense(4))
```

In [246]:

```
modela1.summary()
```

```
Model: "sequential_23"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_132 (Dense)            (None, 10)                70        
_________________________________________________________________
dense_133 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_134 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_135 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_136 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_137 (Dense)            (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Non-trainable params: 0
_________________________________________________________________
```

In [247]:

```
sgda1 = optimizers.SGD(learning_rate = 0.01)
```

```
modela1.compile(optimizer = sgda1, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [248]:

```
traina1=modela1.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

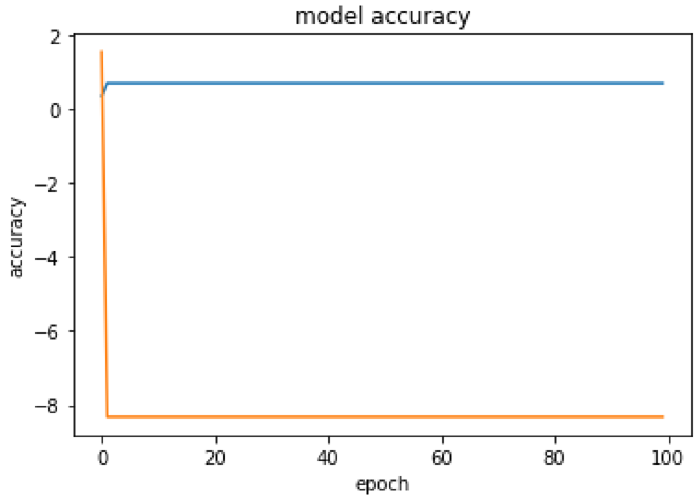
```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 1.5398 - accuracy: 0.3518
Epoch 2/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 6/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 7/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 11/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 12/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 20/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 21/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 23/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 24/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 28/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 31/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 33/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
```

```
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 41/100
24/24 [==============================] - 0s 11ms/step - loss: -8.3166 - accuracy: 0.7001:
0s - loss: -7.7771 - accuracy: 0.6
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 44/100
24/24 [==============================] - 0s 10ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 45/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 46/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 66/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 69/100
```

```
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 70/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 71/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 82/100
24/24 [==============================] - 0s 9ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 83/100
24/24 [==============================] - 0s 7ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 87/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 88/100
24/24 [==============================] - 0s 7ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 93/100
24/24 [==============================] - 0s 7ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 96/100
24/24 [==============================] - 0s 7ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: -8.3166 - accuracy: 0.7001
```

In [295]:

```
import matplotlib.pyplot as plt
plt.plot(traina1.history['accuracy'])
plt.plot(traina1.history['loss'])
plt.title('model accuracy')
plt.ylabel('accuracy')
plt.xlabel('epoch')
plt.show()
```



In [277]:

```
resultsa1 = modela1.evaluate(X_test, y_test)
print(modela1.metrics_names)
print(resultsa1)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: -8.6680 - accuracy: 0.7000
['loss', 'accuracy']
[-8.667988777160645, 0.6999999880790710]
The Accuracy is  69.99999880790710 %
```

5)

In [265]:

```
modelb1=Sequential()
```

In [266]:

```
modelb1.add(Dense(10, input_shape = (6,), activation = 'relu',kernel_initializer=initial
izer11))
modelb1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modelb1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modelb1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modelb1.add(Dense(10, activation = 'relu',kernel_initializer=initializer11))
modelb1.add(Dense(4))
```

In [267]:

```
modelb1.summary()
```

```
Model: "sequential_26"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
dense_150 (Dense)            (None, 10)                70        
_________________________________________________________________
dense_151 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_152 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_153 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_154 (Dense)            (None, 10)                110       
_________________________________________________________________
dense_155 (Dense)            (None, 4)                 44        
=================================================================
Total params: 554
Trainable params: 554
Trainable params: 601
Non-trainable params: 0
_________________________________________________________________
```

In [269]:

```
adam = optimizers.Adam(learning_rate = 0.01)
modelb1.compile(optimizer = adam, loss = 'binary_crossentropy', metrics = ['accuracy'])
```

In [270]:

```
trainb1=modelb1.fit(X_train, y_train, batch_size = 50, epochs = 100, verbose = 1)
```

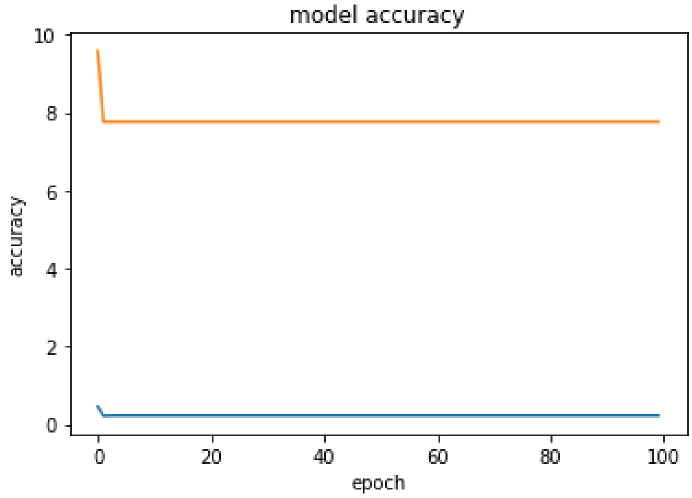
```
Epoch 1/100
24/24 [==============================] - 1s 9ms/step - loss: 9.5747 - accuracy: 0.4633
Epoch 2/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2239
Epoch 3/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2290
Epoch 4/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 5/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 6/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 7/100
24/24 [==============================] - 0s 10ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 8/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 9/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 10/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 11/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 12/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 13/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 14/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 15/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 16/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 17/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 18/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 19/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 20/100
24/24 [==============================] - 0s 11ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 21/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 22/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 23/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 24/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 25/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 26/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 27/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 28/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 29/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 30/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
```

```
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 31/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 32/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 33/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 34/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 35/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 36/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 37/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 38/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 39/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 40/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 41/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 42/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 43/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 44/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 45/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 46/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 47/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 48/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 49/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 50/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 51/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 52/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 53/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 54/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 55/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 56/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 57/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 58/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 59/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 60/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 61/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 62/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 63/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 64/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 65/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 66/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
```

```
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 67/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 68/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 69/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 70/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 71/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 72/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 73/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 74/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 75/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 76/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 77/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 78/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 79/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 80/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 81/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 82/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 83/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 84/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 85/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 86/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 87/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 88/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 89/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 90/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 91/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 92/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 93/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 94/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 95/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 96/100
24/24 [==============================] - 0s 9ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 97/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 98/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 99/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
Epoch 100/100
24/24 [==============================] - 0s 8ms/step - loss: 7.7604 - accuracy: 0.2316
```

In [296]:

```
import matplotlib.pyplot as plt
plt.plot(trainb1.history['accuracy'])
plt.plot(trainb1.history['loss'])
plt.title('model accuracy')
plt.ylabel('accuracy')
plt.xlabel('epoch')
plt.show()
```



In [282]:

```
resultsb = modelb1.evaluate(X_test, y_test)
print(modelb1.metrics_names)
print(resultsb)
print("The Accuracy is ",results[1]*100,"%")
```

```
18/18 [==============================] - 0s 7ms/step - loss: 7.7624 - accuracy: 0.2246
['loss', 'accuracy']
[7.7624125480651855, 0.224561408162117]
The Accuracy is  22.4561408162117 %
```

Write down your inferences.

From the above experiments we infer that the relu function gives an accuracy of 69% with Orthogonal Initializer.