In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
from IPython import get_ipython
import warnings
warnings.filterwarnings("ignore")
```

In [2]:

```
data = pd.read_csv('iit_nit_data.csv')
```

In [3]:

```
data.head()
```

Out[3]:

| | id | year | institute_type | round_no | quota | pool | institute_short | program_name | program_d |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 2016 | IIT | 6 | AI | Gender-Neutral | IIT-Bombay | Aerospace Engineering | |
| **1** | 2 | 2016 | IIT | 6 | AI | Gender-Neutral | IIT-Bombay | Aerospace Engineering | |
| **2** | 3 | 2016 | IIT | 6 | AI | Gender-Neutral | IIT-Bombay | Aerospace Engineering | |
| **3** | 4 | 2016 | IIT | 6 | AI | Gender-Neutral | IIT-Bombay | Aerospace Engineering | |
| **4** | 5 | 2016 | IIT | 6 | AI | Gender-Neutral | IIT-Bombay | Aerospace Engineering | |

In [4]:

```
1 data.tail()
```

Out[4]:

| | id | year | institute_type | round_no | quota | pool | institute_short | program_name | pr |
|---|---|---|---|---|---|---|---|---|---|
| **64953** | 31136 | 2021 | NIT | 1 | JK | Female-Only | NIT-Srinagar | Electronics and Communication Engineering | |
| **64954** | 31137 | 2021 | NIT | 1 | JK | Gender-Neutral | NIT-Srinagar | Electronics and Communication Engineering | |
| **64955** | 31138 | 2021 | NIT | 1 | JK | Female-Only | NIT-Srinagar | Electronics and Communication Engineering | |
| **64956** | 31139 | 2021 | NIT | 1 | LA | Gender-Neutral | NIT-Srinagar | Electronics and Communication Engineering | |
| **64957** | 31140 | 2021 | NIT | 1 | LA | Female-Only | NIT-Srinagar | Electronics and Communication Engineering | |

In [5]:

```
1 data.shape
```

Out[5]:

```
(64958, 14)
```

In [6]:

```
1 data.columns
```

Out[6]:

```
Index(['id', 'year', 'institute_type', 'round_no', 'quota', 'pool',
       'institute_short', 'program_name', 'program_duration', 'degree_shor
t',
       'category', 'opening_rank', 'closing_rank', 'is_preparatory'],
      dtype='object')
```

In [7]:

```
1 data.duplicated().sum()
```

Out[7]:

```
39500
```

In [8]:

```
1 data.isnull().sum()
```

Out[8]:

```
id                  0
year                0
institute_type      0
round_no            0
quota               0
pool                0
institute_short     0
program_name        0
program_duration    0
degree_short        0
category            0
opening_rank        0
closing_rank        0
is_preparatory      0
dtype: int64
```

In [9]:

```
1 data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 64958 entries, 0 to 64957
Data columns (total 14 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   id                64958 non-null  int64 
 1   year              64958 non-null  int64 
 2   institute_type    64958 non-null  object
 3   round_no          64958 non-null  int64 
 4   quota             64958 non-null  object
 5   pool              64958 non-null  object
 6   institute_short   64958 non-null  object
 7   program_name      64958 non-null  object
 8   program_duration  64958 non-null  object
 9   degree_short      64958 non-null  object
 10  category          64958 non-null  object
 11  opening_rank      64958 non-null  int64 
 12  closing_rank      64958 non-null  int64 
 13  is_preparatory    64958 non-null  int64 
dtypes: int64(6), object(8)
memory usage: 6.9+ MB
```

In [10]:

```
1 data.describe()
```

Out[10]:

| | id | year | round_no | opening_rank | closing_rank | is_preparatory |
|---|---|---|---|---|---|---|
| **count** | 64958.000000 | 64958.000000 | 64958.000000 | 6.495800e+04 | 6.495800e+04 | 64958.000000 |
| **mean** | 18171.173389 | 2020.421580 | 2.609348 | 8.259642e+03 | 1.070497e+04 | 0.047631 |
| **std** | 9619.123659 | 1.149762 | 2.422558 | 2.679448e+04 | 3.788101e+04 | 0.212985 |
| **min** | 1.000000 | 2016.000000 | 1.000000 | 0.000000e+00 | 0.000000e+00 | 0.000000 |
| **25%** | 10378.000000 | 2020.000000 | 1.000000 | 6.710000e+02 | 8.320000e+02 | 0.000000 |
| **50%** | 13084.500000 | 2021.000000 | 1.000000 | 2.309000e+03 | 2.764500e+03 | 0.000000 |
| **75%** | 28434.000000 | 2021.000000 | 6.000000 | 6.932000e+03 | 8.190000e+03 | 0.000000 |
| **max** | 31140.000000 | 2021.000000 | 7.000000 | 1.082601e+06 | 1.144790e+06 | 1.000000 |

In [11]:

```
1 data.nunique()
```

Out[11]:

```
id                  25458
year                    6
institute_type          2
round_no                4
quota                   7
pool                    2
institute_short        54
program_name          130
program_duration        2
degree_short           13
category               10
opening_rank        10984
closing_rank        11940
is_preparatory          2
dtype: int64
```

In [12]:

```
1 data_cat = data[['year', 'institute_type', 'institute_short',
2                  'round_no', 'quota','pool', 'program_duration',
3                  'degree_short', 'category',
4                 'is_preparatory']]
```

In [13]:

```
for i in data_cat.columns:
    print(data_cat[i].unique())
```

```
[2016 2017 2018 2019 2020 2021]
['IIT' 'NIT']
['IIT-Bombay' 'IIT-Delhi' 'IIT-Kharagpur' 'IIT-Kanpur' 'IIT-Madras'
 'IIT-Roorkee' 'IIT-Guwahati' 'IIT-Indore' 'IIT-Hyderabad'
 'IIT-(BHU) Varanasi' 'IIT-Patna' 'IIT-(ISM) Dhanbad' 'IIT-Bhubaneswar'
 'IIT-Mandi' 'IIT-Gandhinagar' 'IIT-Ropar' 'IIT-Jodhpur' 'IIT-Tirupati'
 'IIT-Bhilai' 'IIT-Dharwad' 'IIT-Goa' 'IIT-Jammu' 'IIT-Palakkad'
 'NIT-Warangal' 'NIT-Tiruchirappalli' 'NIT-Uttarakhand' 'NIT-Surat'
 'NIT-Nagpur' 'NIT-Andhra-Pradesh' 'NIT-Jalandhar' 'NIT-Jaipur'
 'NIT-Bhopal' 'NIT-Allahabad' 'NIT-Calicut' 'NIT-Agartala' 'NIT-Delhi'
 'NIT-Durgapur' 'NIT-Goa' 'NIT-Hamirpur' 'NIT-Meghalaya'
 'NIT-Karnataka-Surathkal' 'NIT-Patna' 'NIT-Nagaland' 'NIT-Puducherry'
 'NIT-Raipur' 'NIT-Sikkim' 'NIT-Arunachal-Pradesh' 'NIT-Jamshedpur'
 'NIT-Kurukshetra' 'NIT-Manipur' 'NIT-Mizoram' 'NIT-Rourkela'
 'NIT-Silchar' 'NIT-Srinagar']
[6 7 1 2]
['AI' 'HS' 'OS' 'AP' 'GO' 'JK' 'LA']
['Gender-Neutral' 'Female-Only']
['4 Years' '5 Years']
['B.Tech' 'BSc' 'B.Tech + M.Tech (IDD)' 'Int MSc.' 'B.Arch' 'Int M.Tech'
 'B.Pharm' 'B.Pharm + M.Pharm' 'BS + MS (IDD)' 'Int Msc.' 'B.Plan'
 'Btech + M.Tech (IDD)' 'BSc + MSc (IDD)']
['GEN' 'OBC-NCL' 'SC' 'ST' 'GEN-PWD' 'OBC-NCL-PWD' 'SC-PWD' 'ST-PWD'
 'GEN-EWS' 'GEN-EWS-PWD']
[0 1]
```

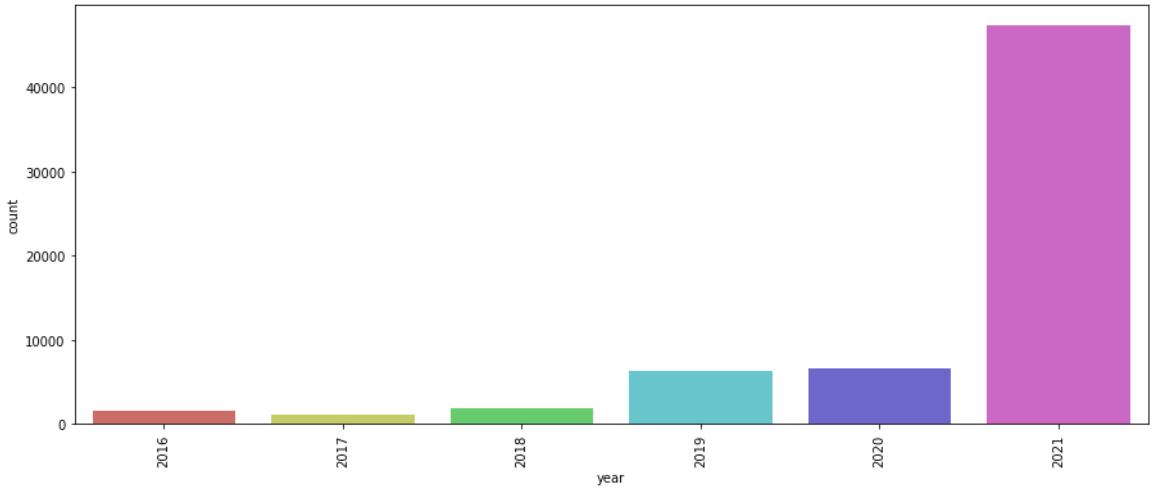
In [14]:

```
for i in data_cat.columns:
    print(data_cat[i].value_counts())
```

```
2021    47400
2020     6604
2019     6254
2018     1917
2016     1578
2017     1205
Name: year, dtype: int64
IIT    32905
NIT    32053
Name: institute_type, dtype: int64
IIT-Kharagpur              5865
IIT-Delhi                  2953
IIT-Bombay                 2879
NIT-Rourkela               2869
IIT-Roorkee                2739
IIT-Madras                 2454
IIT-Kanpur                 2424
IIT-(BHU) Varanasi         2293
NIT-Raipur                 2053
```

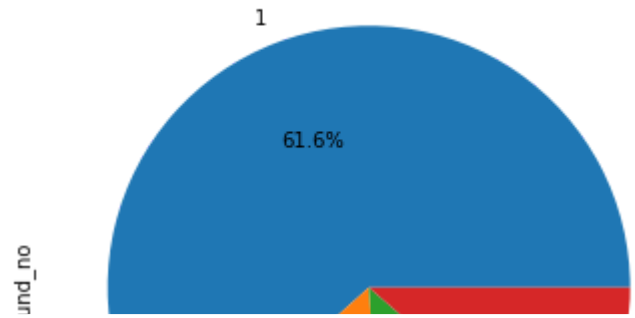
In [15]:

```
for i in data_cat.columns:
    plt.figure(figsize=(15,6))
    sns.countplot(data_cat[i], data = data_cat,
                  palette = 'hls')
    plt.xticks(rotation = 90)
    plt.show()
```



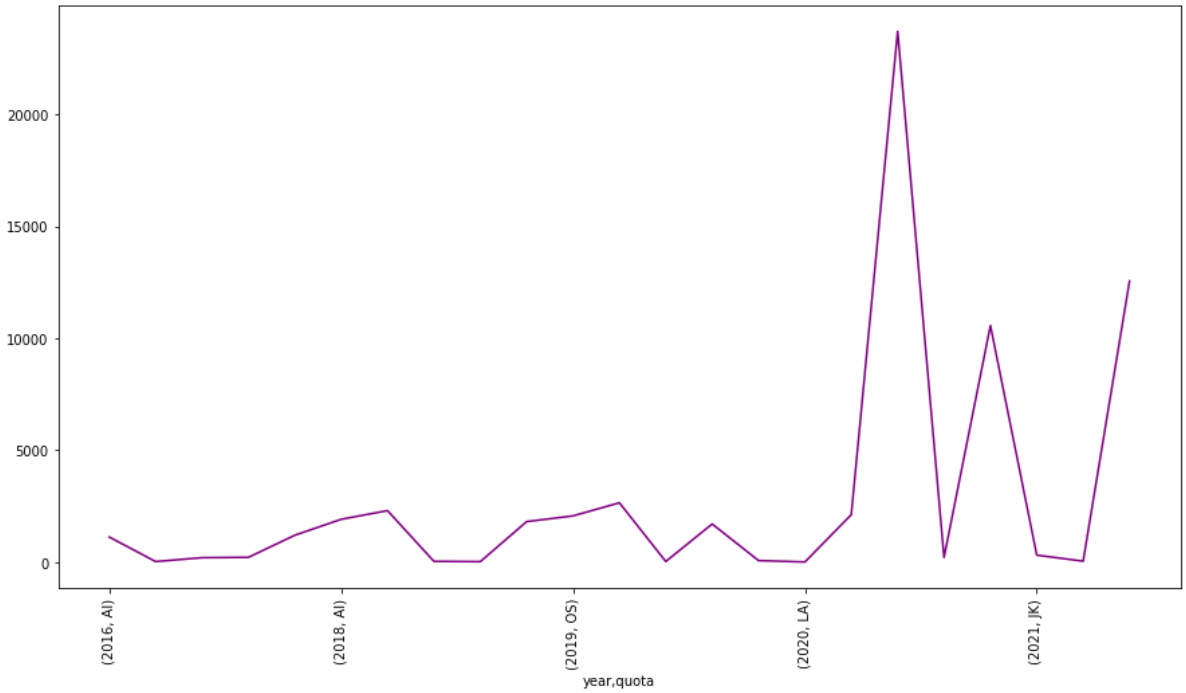

In [16]:

```
for i in data_cat.columns:
    plt.figure(figsize=(15,6))
    data_cat[i].value_counts().plot(kind = 'pie',
                                    autopct = '%1.1f%%')
    plt.xticks(rotation = 90)
    plt.show()
```



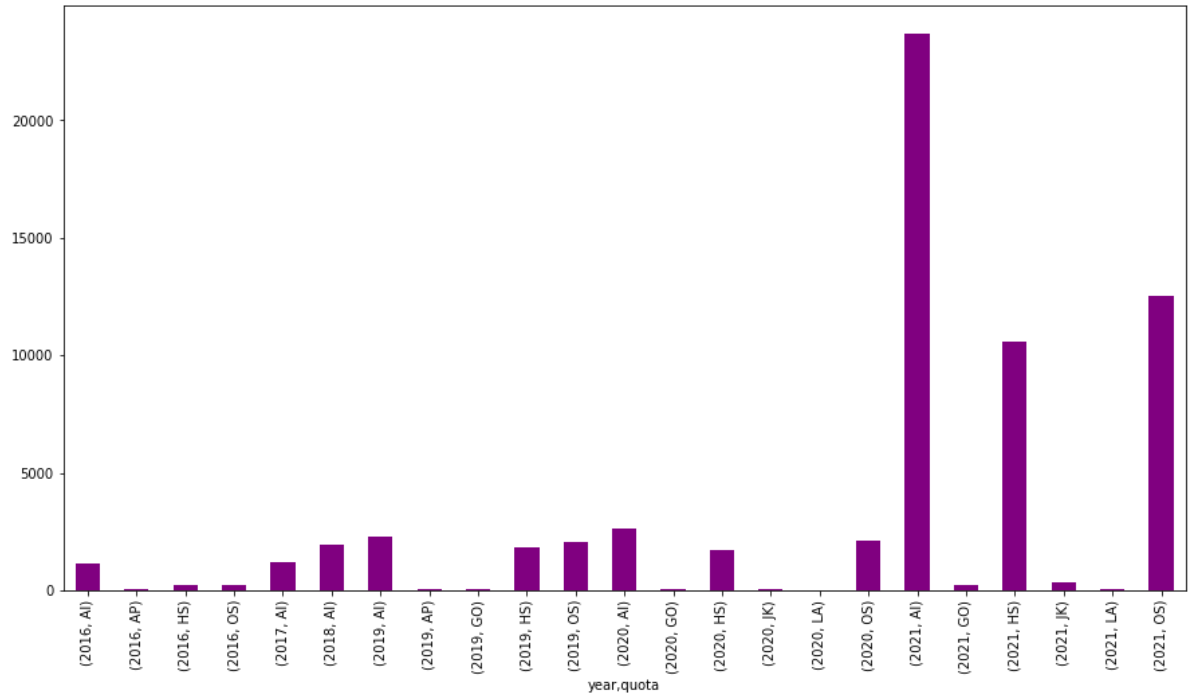
In [17]:

```
plt.figure(figsize=(15,8))
data_year_quota = data.groupby(['year', 'quota']).size().plot(kind = 'line',
                                                              color = 'purple')
plt.xticks(rotation = 90)
plt.show()
```



In [18]:

```
plt.figure(figsize=(15,8))
data_year_quota = data.groupby(['year', 'quota']).size().plot(kind = 'bar',
                                                              color = 'purple')
plt.xticks(rotation = 90)
plt.show()
```




In [19]:

```
avg_opening_rank = data['opening_rank'].mean(axis = 0)
avg_open_rank = round(avg_opening_rank)
print("Average opening rank over the years has been:", avg_open_rank)
```

```
Average opening rank over the years has been: 8260
```

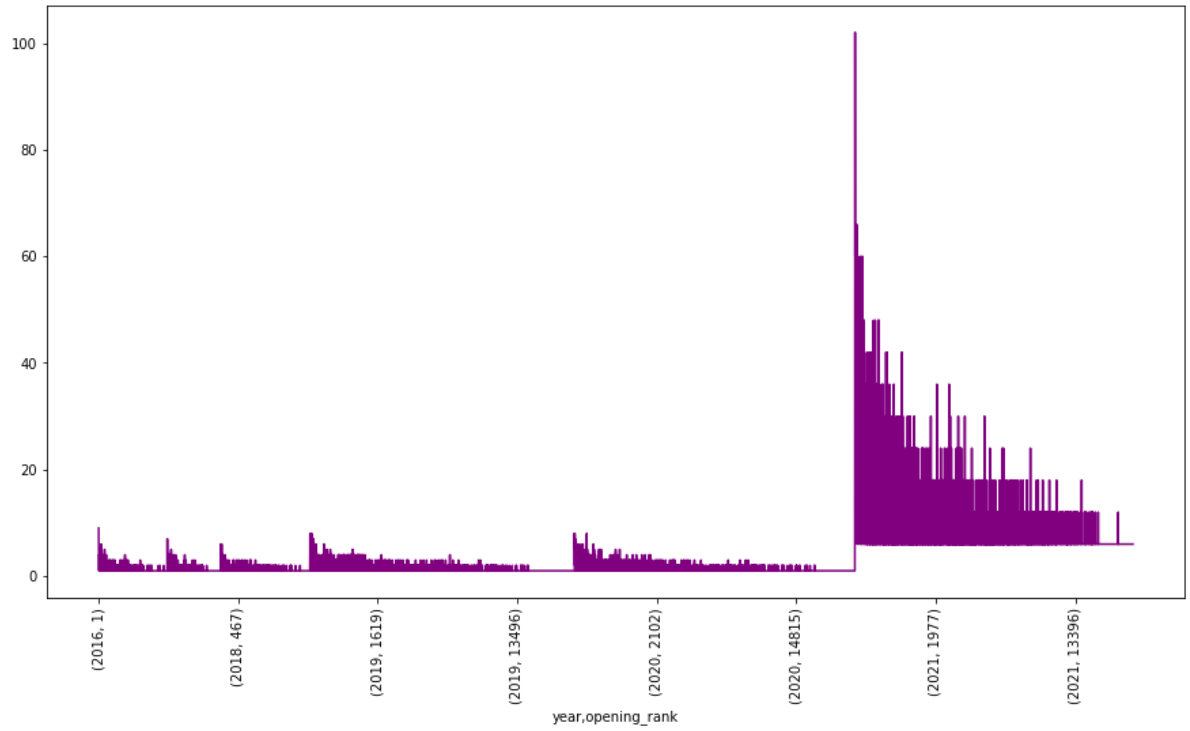
In [20]:

```
min_opening_rank = data['opening_rank'].min()
max_opening_rank = data['opening_rank'].max()
print("Minimum Opening Rank:", min_opening_rank, " Maximum Opening Rank:", max_open
```

```
Minimum Opening Rank: 0  Maximum Opening Rank: 1082601
```

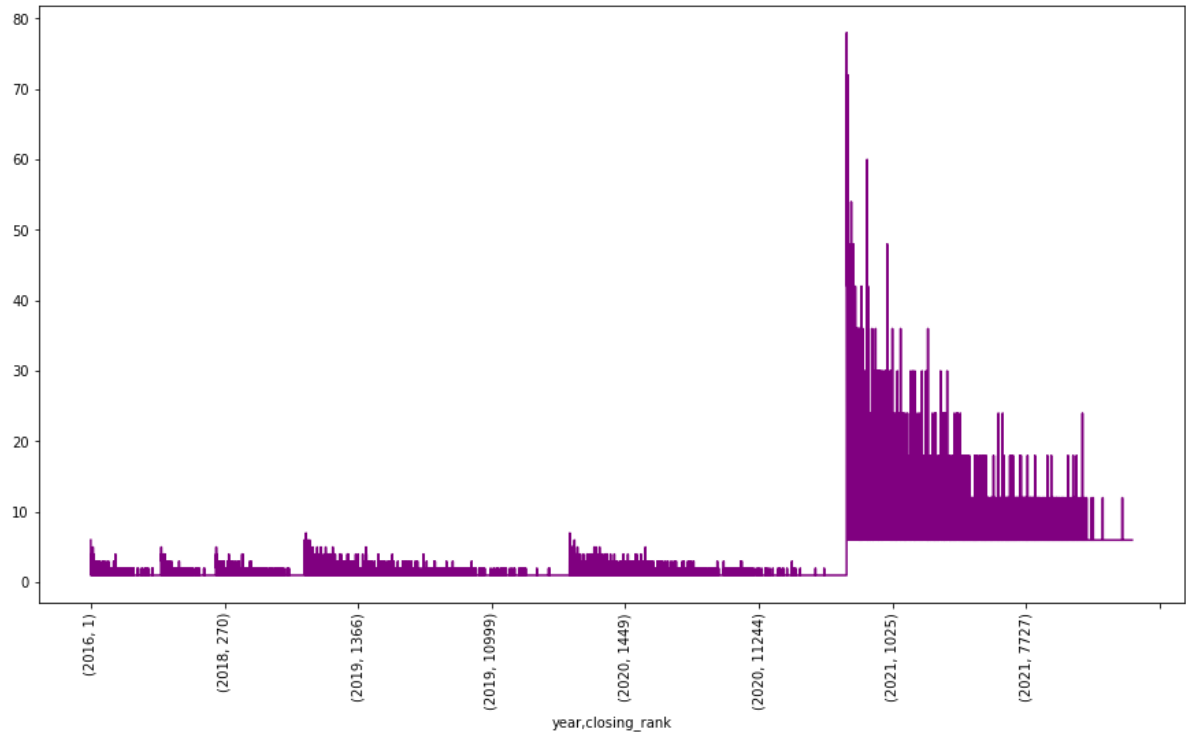
In [21]:

```
plt.figure(figsize=(15,8))
data_year_rank = data.groupby(['year', 'opening_rank']).opening_rank.count().plot(k
plt.xticks(rotation = 90)
plt.show()
```



In [22]:

```
plt.figure(figsize=(15,8))
data_year_rank = data.groupby(['year', 'closing_rank']).closing_rank.count().plot(k
plt.xticks(rotation = 90)
plt.show()
```



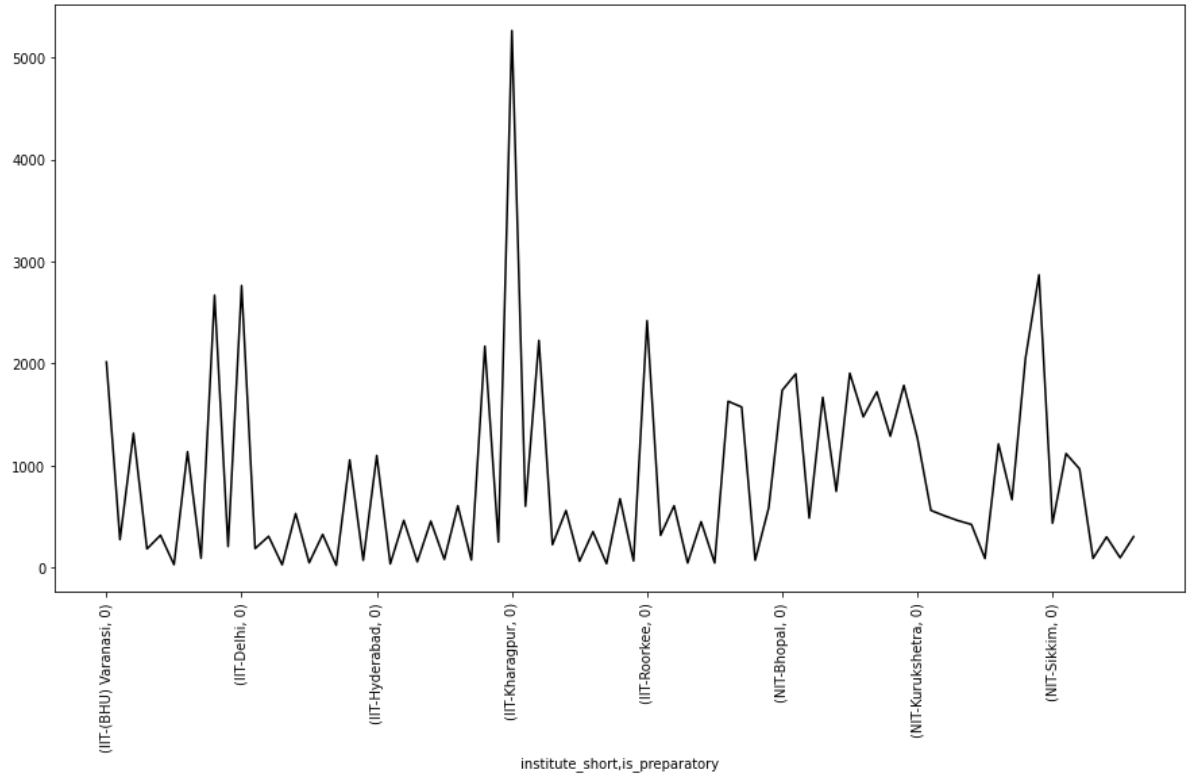

In [23]:

```
avg_closing_rank = round(data['closing_rank'].mean(axis = 0))
print("Average closing rank over the years has been:", avg_closing_rank)
```

```
Average closing rank over the years has been: 10705
```

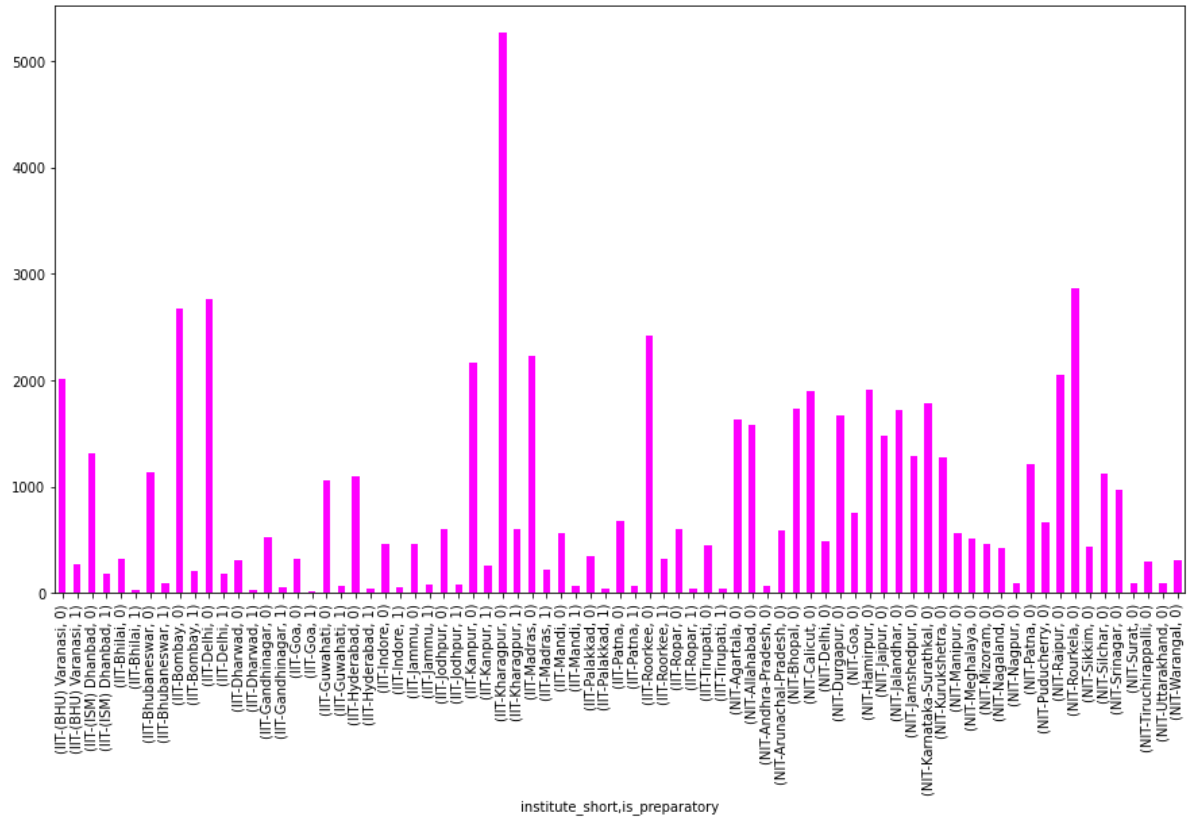
In [37]:

```
1 plt.figure(figsize=(15,8))
2 yearly_opening_rank = data.groupby(['institute_short', 'is_preparatory']).is_prepar
3 plt.xticks(rotation = 90)
4 plt.show()
```



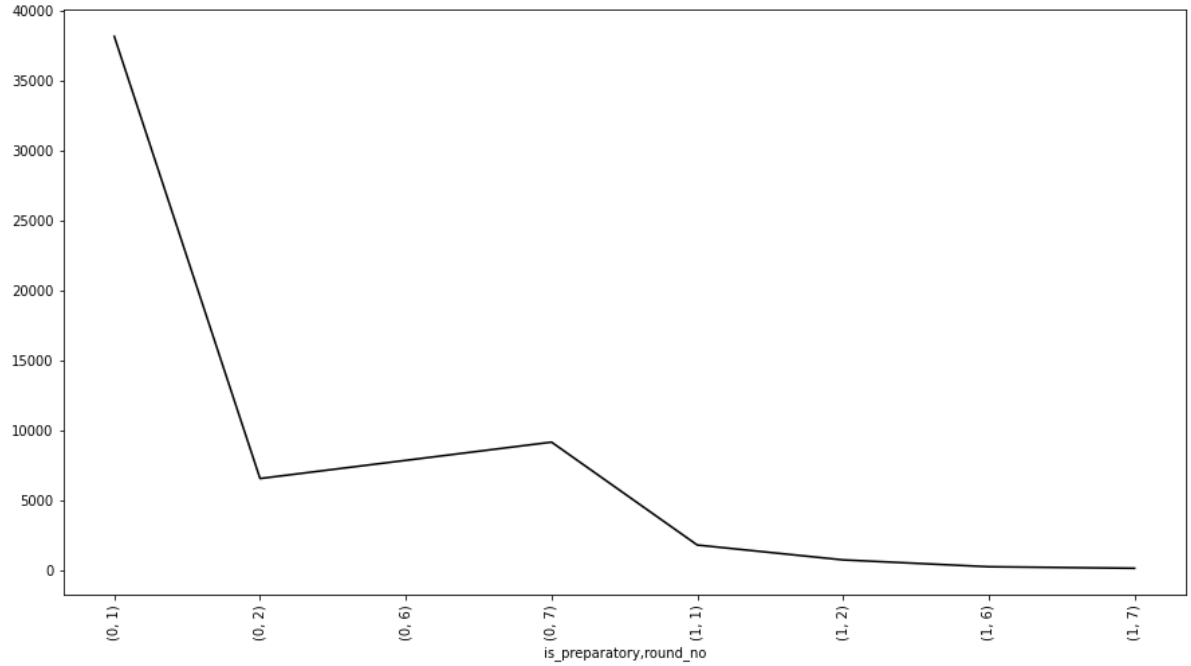
In [24]:

```
plt.figure(figsize=(15,8))
yearly_opening_rank = data.groupby(['institute_short', 'is_preparatory']).is_prepar
plt.xticks(rotation = 90)
plt.show()
```



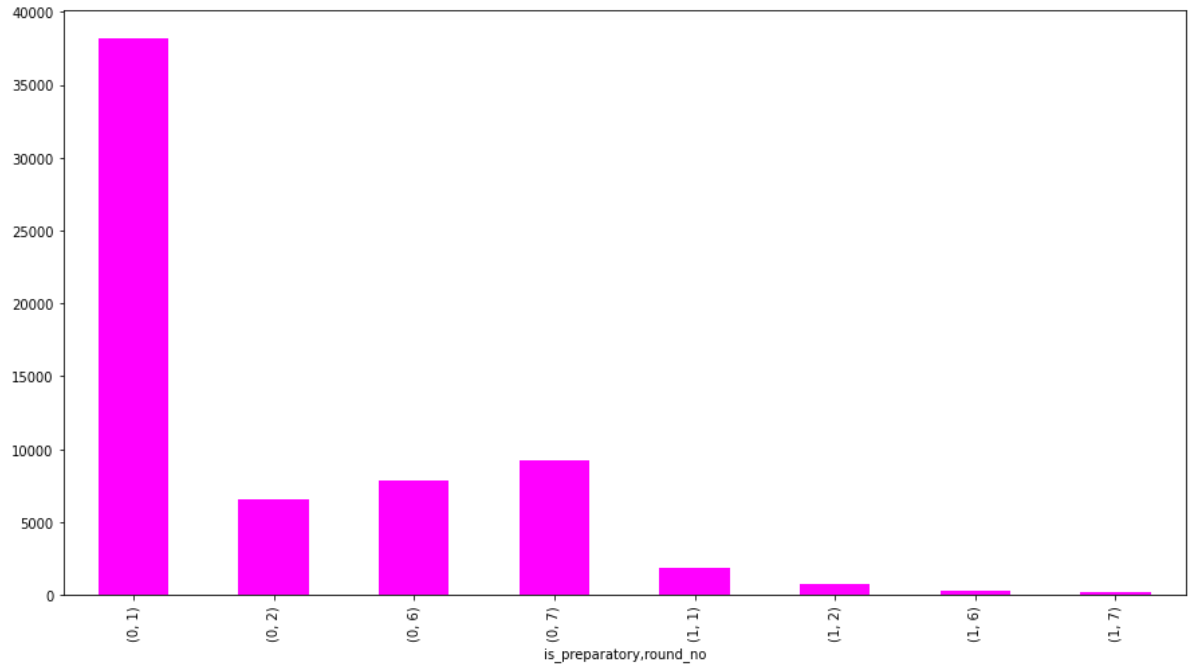
In [26]:

```
plt.figure(figsize=(15,8))
data_preparatory_round = data.groupby(['is_preparatory','round_no']).round_no.count
plt.xticks(rotation = 90)
plt.show()
```



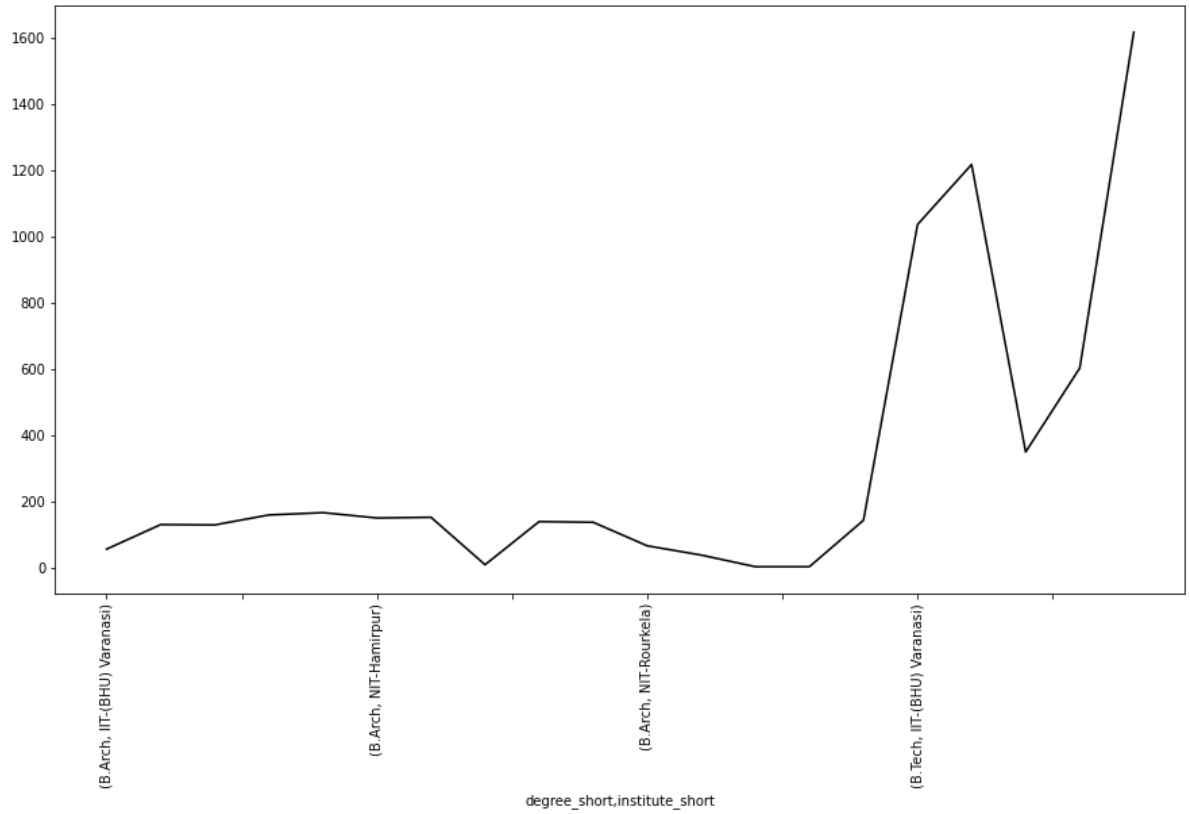

In [29]:

```
plt.figure(figsize=(15,8))
data_preparatory_round = data.groupby(['is_preparatory','round_no']).round_no.count
plt.xticks(rotation = 90)
plt.show()
```



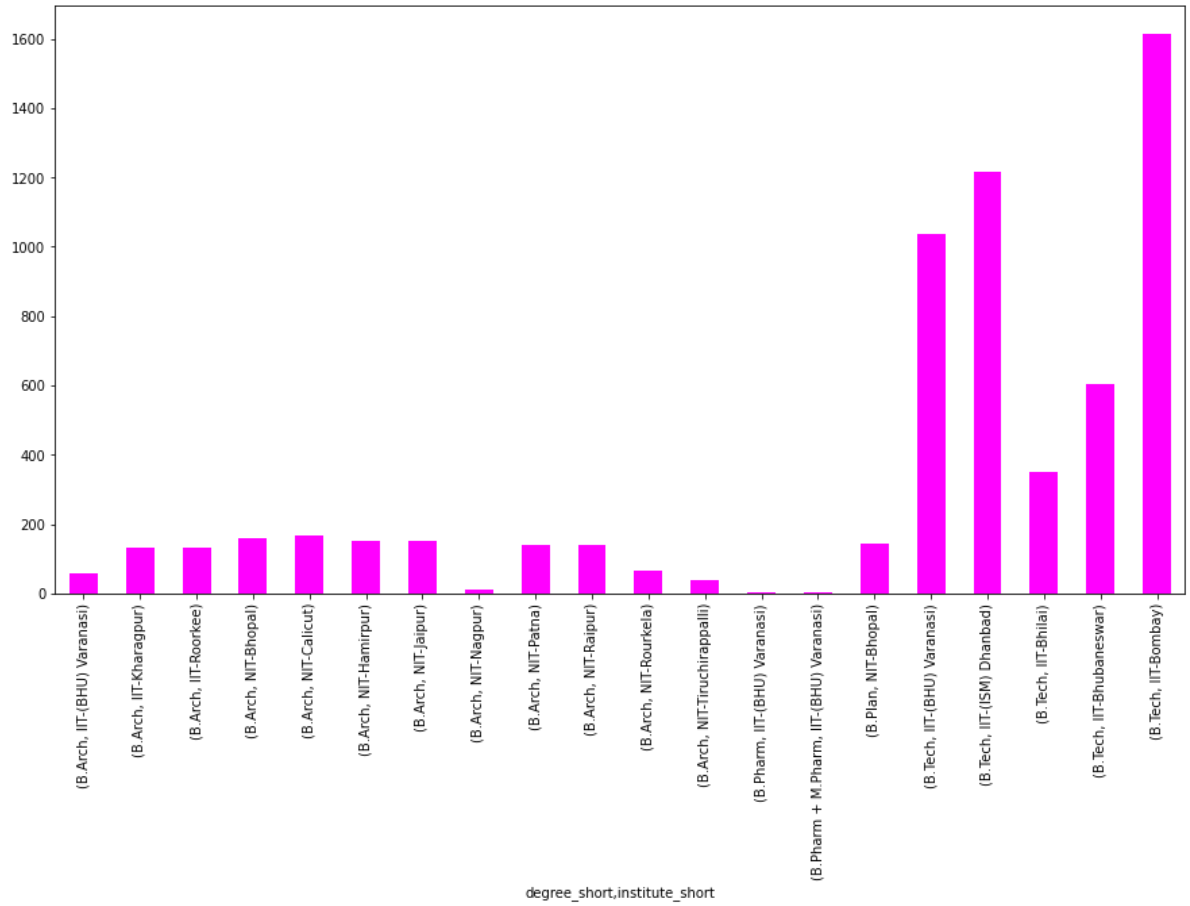
In [30]:

```
plt.figure(figsize=(15,8))
data_degree_institute = data.groupby(['degree_short','institute_short']).institute_
plt.xticks(rotation = 90)
plt.show()
```



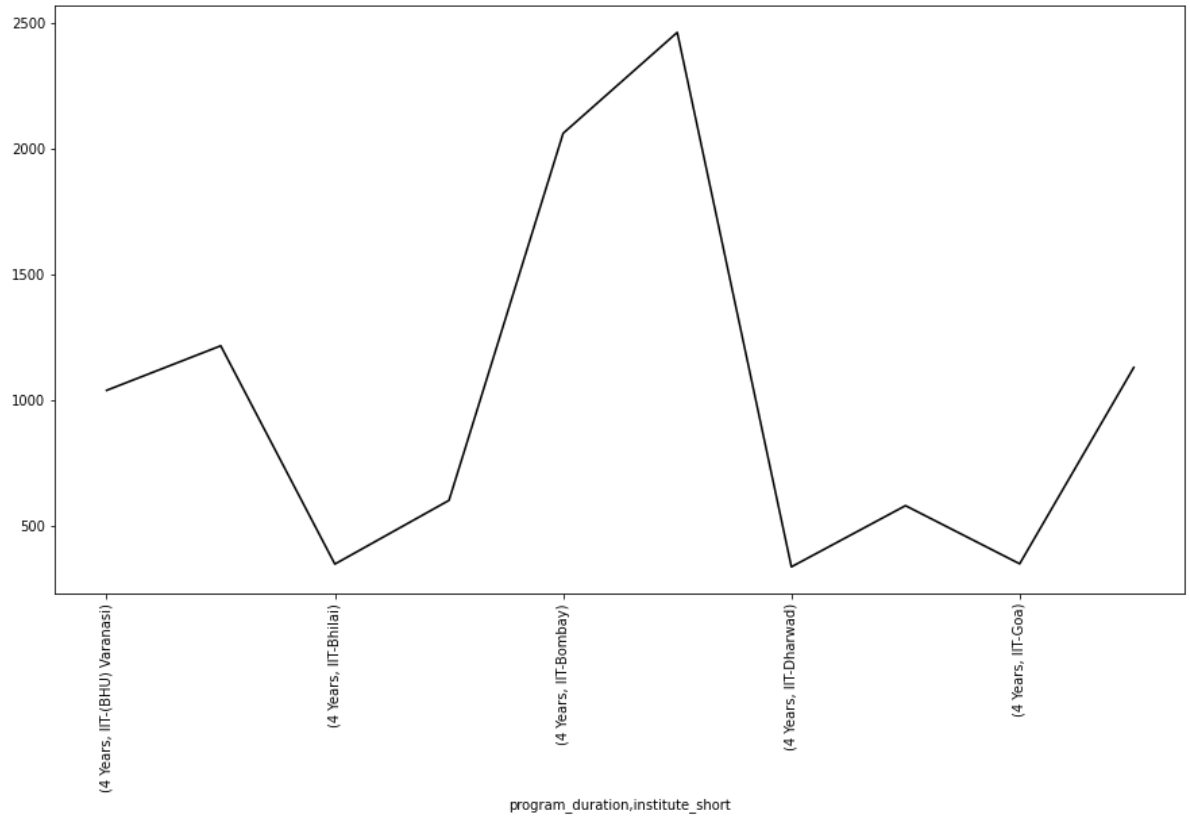
In [31]:

```
plt.figure(figsize=(15,8))
data_degree_institute = data.groupby(['degree_short','institute_short']).institute_
plt.xticks(rotation = 90)
plt.show()
```



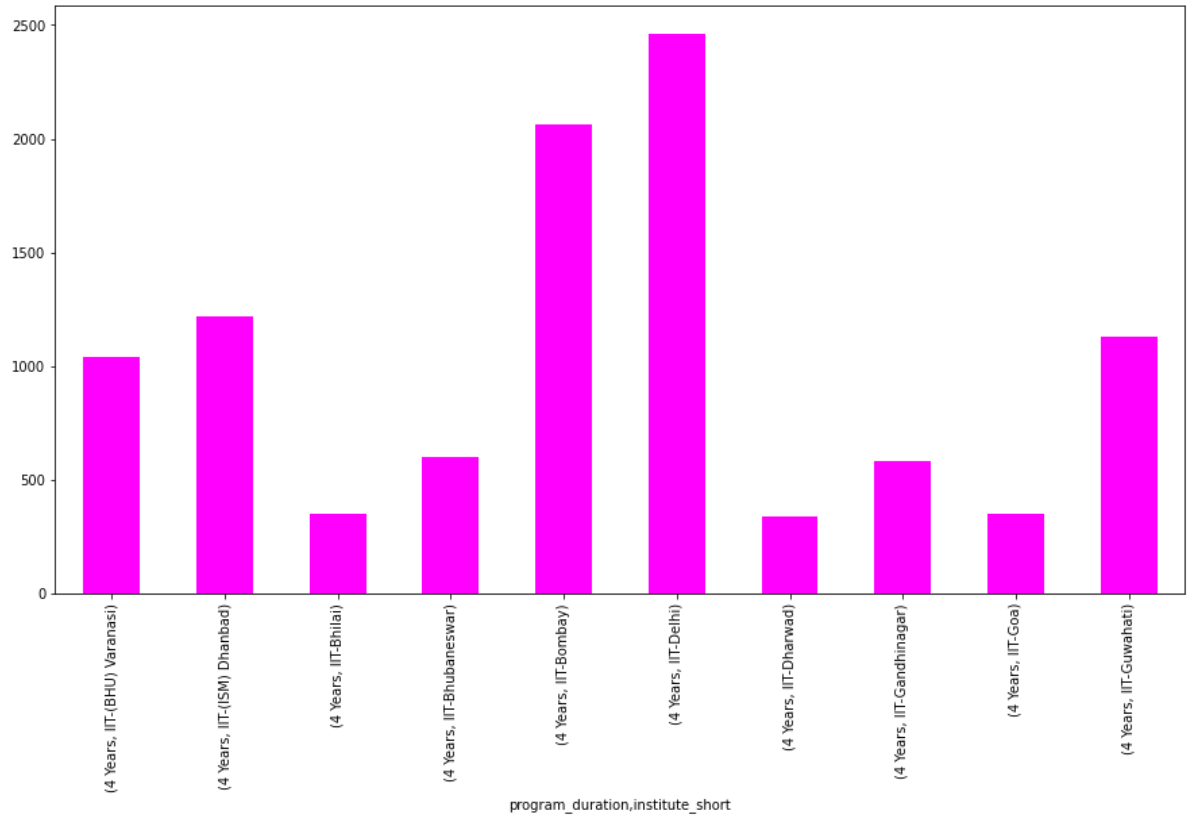
In [32]:

```
plt.figure(figsize=(15,8))
data_program_institute = data.groupby(['program_duration','institute_short']).insti
plt.xticks(rotation = 90)
plt.show()
```



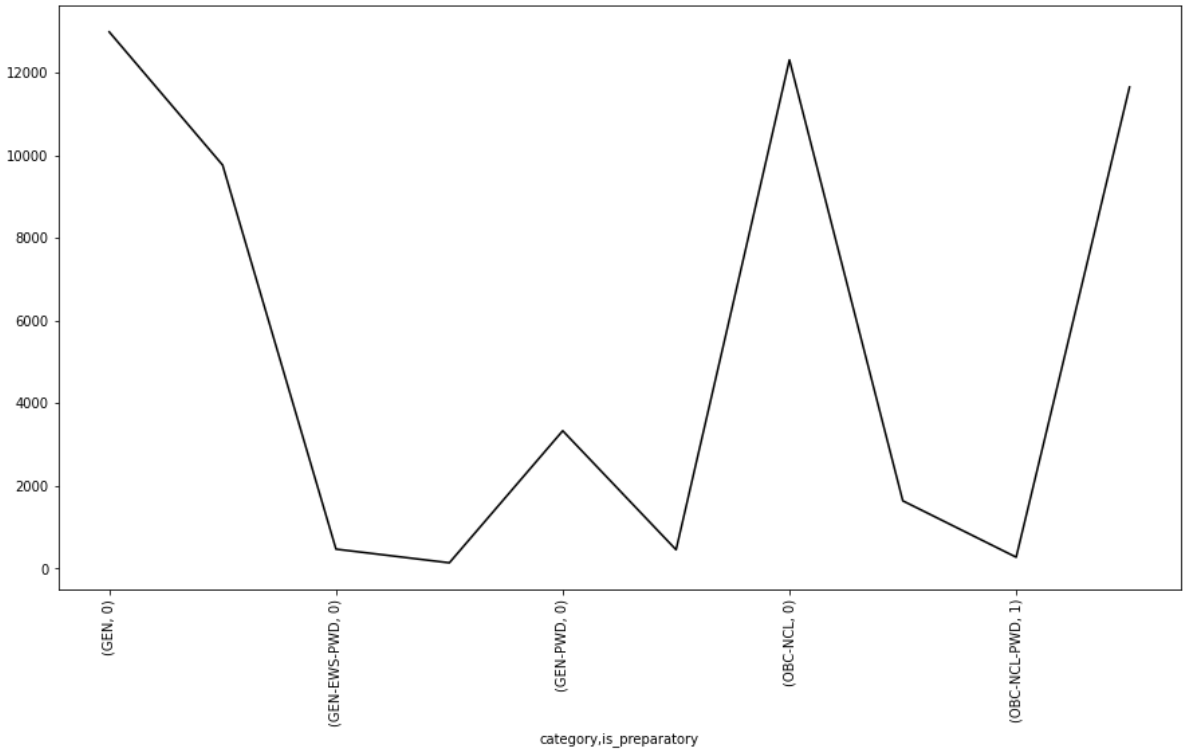
In [33]:

```
plt.figure(figsize=(15,8))
data_program_institute = data.groupby(['program_duration','institute_short']).insti
plt.xticks(rotation = 90)
plt.show()
```



In [34]:

```
plt.figure(figsize=(15,8))
data_category_preparatory = data.groupby(['category','is_preparatory']).is_preparat
plt.xticks(rotation = 90)
plt.show()
```



In [36]:

```
plt.figure(figsize=(15,8))
data_category_preparatory = data.groupby(['category','is_preparatory']).is_preparat
plt.xticks(rotation = 90)
plt.show()
```