

**DEPARTMENT OF EARTHQUAKE ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : **XXX M.Tech. (Seismic Vulnerability and Risk Assessment)**  
 Department : **Department of Earthquake Engineering**  
 Year : **I**  
 Model : **2**

| Teaching Scheme             |              |  |              |              | Contact Hours/Week |   |   | Exam Duration |           |
|-----------------------------|--------------|--|--------------|--------------|--------------------|---|---|---------------|-----------|
| S.No.                       | Subject Code | Course Title                                     | Subject Area | Credits      | L                  | T | P | Theory        | Practical |
| <b>Semester-I (Autumn)</b>  |              |  |              |              |                    |   |   |               |           |
| 1.                          | EQC-511      | Structural Dynamics                              | PCC          | 4            | 3                  | 0 | 2 | 3             | 0         |
| 2.                          | EQC-521      | Seismological Modelling and Simulation           | PCC          | 4            | 3                  | 0 | 2 | 3             | 0         |
| 3.                          | EQC-523      | Seismic Vulnerability and Risk Analysis          | PCC          | 4            | 3                  | 0 | 2 | 3             | 0         |
| 4.                          | EQC-525      | Seismic Hazard Assessment                        | PCC          | 3            | 2                  | 1 | 0 | 3             | 0         |
| 5.                          |              | Program Elective-I                               | PEC          | 3/4          | -                  | - | - | -             | -         |
| 6.                          |              | Social Science Course                            | SSC          | 2            | -                  | - | - | -             | -         |
|                             |              | <b>Total</b>                                     |              | <b>20/21</b> |                    |   |   |               |           |
| <b>Semester-II (Spring)</b> |              |  |              |              |                    |   |   |               |           |
| 1.                          |              | Program Elective-II                              | PEC          | 4            | -                  | - | - | -             | -         |
| 2.                          |              | Program Elective-III                             | PEC          | 4            | -                  | - | - | -             | -         |
| 3.                          |              | Program Elective-IV                              | PEC          | 4            | -                  | - | - | -             | -         |
| 4.                          |              | Science, Technology, and Advanced Research-tools | STAR         | 3            | -                  | - | - | -             | -         |
| 5.                          | EQC-700      | Seminar  | SEM          | 2            | -                  | - | - | -             | -         |
|                             |              | <b>Total</b>                                     |              | <b>17</b>    |                    |   |   |               |           |

**DEPARTMENT OF EARTHQUAKE ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : **XXX M.Tech. (Seismic Vulnerability and Risk Assessment)**  
 Department : **Department of Earthquake Engineering**  
 Year : **II**  
 Model : **2**

| Teaching Scheme             |              |                            |              |           | Contact Hours/Week |   |   | Exam Duration |           |
|-----------------------------|--------------|----------------------------|--------------|-----------|--------------------|---|---|---------------|-----------|
| S.No.                       | Subject Code | Course Title               | Subject Area | Credits   | L                  | T | P | Theory        | Practical |
| <b>Semester-I (Autumn)</b>  |              |                            |              |           |                    |   |   |               |           |
| 1.                          | EQC-691      | Internship Social Activity | ISA          | 3         | -                  | - | - | -             | -         |
| 2.                          | EQC-701A     | Thesis Stage-I             | THESIS       | 10        | -                  | - | - | -             | -         |
|                             |              | <b>Total</b>               |              | <b>13</b> |                    |   |   |               |           |
| <b>Semester-II (Spring)</b> |              |                            |              |           |                    |   |   |               |           |
| 1.                          | EQC-701B     | Thesis Stage-II            | THESIS       | 14        | -                  | - | - | -             | -         |
|                             |              | <b>Total</b>               |              | <b>14</b> |                    |   |   |               |           |

| <b>Summary</b>                     |              |    |    |    |
|------------------------------------|--------------|----|----|----|
| Semester                           | 1            | 2  | 3  | 4  |
| <b>Semester-wise Total Credits</b> | 20/21        | 17 | 13 | 14 |
| <b>Total Credits</b>               | <b>64/65</b> |    |    |    |

**M.Tech. (Seismic Vulnerability and Risk Assessment)**

**Program Elective Courses**

| Teaching Scheme |              |   |              |         | Contact Hours/Week |   |   | Exam Duration |           |
|-----------------|--------------|---|--------------|---------|--------------------|---|---|---------------|-----------|
| S.No.           | Subject Code | Course Title  | Subject Area | Credits | L                  | T | P | Theory        | Practical |
| 1.              | EQL-501      | Dynamic Soil Structure Interaction                    | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 2.              | EQL-502      | Ground Improvement Techniques                         | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 3.              | EQL-503      | Machine Foundation                                    | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 4.              | EQL-504      | Seismic Slope Stability: Earth Dams & Retaining Walls | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 5.              | EQL-505      | Constitutive Modelling in Soil Dynamics               | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 6.              | EQL-506      | Offshore Geotechnical Engineering                     | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 7.              | EQL-507      | Numerical Methods for Dynamic Systems                 | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 8.              | EQL-508      | Advanced Earthquake Resistant Design of Structures    | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 9.              | EQL-509      | Earthquake Resistant Design of Masonry Structures     | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 10.             | EQL-510      | Seismic Evaluation and Retrofitting of Structures     | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 11.             | EQL-511      | Earthquake Resistant Design of Bridges                | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 12.             | EQL-512      | Earthquake Resistant Design of Steel Structures       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 13.             | EQL-513      | Structural Response Control for Seismic Protection    | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 14.             | EQL-514      | Random Vibration                                      | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 15.             | EQL-515      | Reliability Based Design                              | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 16.             | EQL-516      | Earthquake Resistant Design of Special Structures     | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 17.             | EQL-517      | Experimental Techniques in Earthquake Engineering     | PEC          | 4       | 3                  | 0 | 2 | 3             | 0         |
| 18.             | EQL-518      | Mechanics of Deformable Media                         | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 19.             | EQL-519      | Seismic Microzonation                                 | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 20.             | EQL-520      | Earthquake Precursors and Early Warning Systems       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 21.             | EQL-521      | Physics of Earthquakes                                | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 22.             | EQL-522      | Geoinformatics  | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |
| 23.             | EQL-523      | Risk Management and Insurance                         | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         |

**M.Tech. (Seismic Vulnerability and Risk Assessment)**

**Program Elective Courses**

| Teaching Scheme |              |  |              |         | Contact Hours/Week |   |   | Exam Duration |           |
|-----------------|--------------|--|--------------|---------|--------------------|---|---|---------------|-----------|
| S.No.           | Subject Code | Course Title                               | Subject Area | Credits | L                  | T | P | Theory        | Practical |
| 24.             | EQC-501      | Dynamics of Soil and Structures            | PEC          | 4       | 3                  | 0 | 2 | 3             | 0         |
| 25.             | EQC-503      | Finite Element Method                      | PEC          | 4       | 3                  | 0 | 2 | 3             | 0         |
| 26.             | EQC-505      | Geotechnical Earthquake Engineering        | PEC          | 4       | 3                  | 0 | 2 | 3             | 0         |
| 27.             | EQC-507      | Earthquake Resistant Design of Foundations | PEC          | 3       | 2                  | 1 | 0 | 3             | 0         |
| 28.             | EQC-513      | Earthquake Resistant Design of Structures  | PEC          | 4       | 3                  | 0 | 2 | 3             | 0         |
| 29.             | EQC-515      | Continuum Mechanics of Solids              | PEC          | 3       | 2                  | 1 | 0 | 3             | 0         |

**Science, Technology, and Advanced Research-tools Basket**

| Teaching Scheme |              |   |              |         | Contact Hours/Week |   |   | Exam Duration |           |
|-----------------|--------------|---|--------------|---------|--------------------|---|---|---------------|-----------|
| S.No.           | Subject Code | Course Title                            | Subject Area | Credits | L                  | T | P | Theory        | Practical |
| 1.              | EQT-502      | Dynamical Systems with Machine Learning | STAR         | 3       | 2                  | 1 | 0 | 3             | 0         |