

Annexure-I

Academic Staff: 21

Student Admitted:UG/INT.M.Tech/M.Sc, P.G. 59

Ph.D. : 10

Publications in : Journals : 38, conferences : 52,

Books/Books Chapters: 1(i. Dr. Manish Shrikhande published a book on "Finite Element Method and Computational Structural Dynamics" published by PHI Learning Pvt. Ltd., New Delhi.)

Projects: Research (Rs. In Lacs) : 142.42 , Consultancy (Rs. In Lacs) : 269.6149

Format for Preparation of Information by Academic Department/Centres

1. Salient Features

Department of Earthquake Engineering at the Indian Institute of Technology Roorkee (erstwhile University of Roorkee) was established in 1960 as School of Research and Training in Earthquake Engineering. Four major areas of earthquake engineering viz., Structural Dynamics, Soil Dynamics, Engineering Seismology and Seismotectonics, and Instrumentation have been nurtured for the last fifty years. The department provides Master's degree in three specializations namely, Structural Dynamics, Soil Dynamics, and Seismic Vulnerability and Risk Assessment. The major functions of the Department include teaching and research, and rendering expert advice to various organizations in the area of earthquake resistant design of structures and systems, such as dams, bridges, power plants, etc. The Department has played a key role at the national level in the formulation of Indian Standard Codes of Practice for earthquake resistant design of Structures.

Several major facilities have been developed in the Department to conduct experiments related to earthquake engineering. Some of the major facilities include: a low cost railway wagon shock table for dynamic testing of structural models, a computer controlled shake table to stimulate strong ground motion, a quasi static testing laboratory having servo-controlled dynamic actuator systems and servo-controlled compression testing machine, a soil dynamics laboratory equipped with liquefaction table and cyclic triaxial testing system, a seismological observatory having state of the art broadband seismograph to record earthquake ground motion, a strong motion network of 300 digital accelerographs deployed in the Himalayan region to measure strong ground motion due to moderate and major earthquakes and a state-of-the-art 12-station telemetered network to monitor local seismicity in the environs of Tehri Dam.

2. Faculty List

a. Professors

Sharma M. L., Ph. D. (IITR)

Head

Engineering Seismology & Seismotectonics

Sinvhal Amita (Ms.), Ph. D. (IITR)

Engineering Seismology & Seismotectonics

Kumar Ashok, Ph. D. (IITR)

Instrumentation

Singh Yogendra, Ph. D. (IITD)

Structural Earthquake Engineering, Performance Based Design, Seismic Risk Assessment

Pal Kirat , Ph. D. (IITR)

Instrumentation

Maheshwari B. K. , Ph. D. (Japan)

Soil Dynamics

Agarwal Pankaj, Ph. D. (IITR)

Structural Dynamics

Narayan J. P., Ph. D. (BHU)

Engineering Seismology & Seismotectonics

Shrikhande M., Ph. D. (IIT K)

Structural Dynamics

b. Associate Professors

Das, Josodhir, Ph.D. (IITR)

Seismotectonics and Remote Sensing

c. Assistant Professors

Jakka, Ravi Shankar, Ph.D. (IITD)

Soil Dynamics

Pandey, A.D., ME(IITR)

Structural Dynamics

Shankar, Daya, Ph.D.(BHU)

Seismology

Dubey, Ramanand, Ph.D.(IIR)
Structural Dynamics

d. Scientific Officer Grade-II

Gupta, S.C., Ph.D. (IITR)
Seismology and Seismotectonics

IV. Emeritus Professor

Prof. A. S. Arya, Ph.D. (Illinois)
Structural Dynamics

V. Emeritus Fellow

Paul D. K., Ph. D. (Swansea)
Soil Dynamics, Earthquake Risk Mitigation, Structural Earthquake Engineering

Kumar Ashwani, Ph.D. (IITR)
Engineering Seismology & Seismotectonics

Wason H. R., Ph. D. (KU)
Engineering Seismology & Seismotectonics

V. Visiting Faculty

Mukerjee, Shyamal, Ph.D.(IITR)
Soil Dynamics

Gupta, I. D., Ph.D. (Pune)
Seismic Hazard Assessment, Engineering Seismology

3. Honours and Awards to Faculty Members (earned during the year under report).

Sharma, M.L.

- i. Dr. M.L. Sharma, Professor was elected as Fellow of Indian Geophysical Union during 51st Annual Convention held at Kurukshetra University during Nov. 19-21, 2014 and also chaired a session on Seismic Hazard in the Convention.
- ii. Dr. M. L. Sharma is appointed Convener of BIS Sub Committee of CED-39 for “Guidelines for seismic microzonation”.

Maheshwari, B.K.

- i. **Prof. B.K. Maheshwari** was presented **IACMAG** Award of "**Excellent Regional Contributions**" during 14th Int. Conference of the International Association for Computer Methods & Advances in Geomechanics, Kyoto, Japan, Sept. 2014
- ii. **Prof. B.K. Maheshwari** was invited to deliver a talk entitled "Recent Advances in Seismic Soil-Structure Interaction" in a **Preliminary Session** during Indian Geotechnical Conference, Kakinada, Andhra Pradesh, December 18, 2014.

- iii. Dr. B.K. Maheshwari is appointed convener of the BIS Sub-committee of CED-39 for "Liquefaction Potential of Soils during Earthquakes".

Jakka, R. S.

- i. Dr. Ravi Sankar Jakka, Asst. Professor, Deptt. of Earthquake Engg. has been conferred upon 'Young Geotechnical Engineer Best Paper Award' on 18th December, 2014 from Indian Geotechnical Society.

Shrikhande, Manish

- i. Dr. Manish Shrikhande published a book on "Finite Element Method and Computational Structural Dynamics" published by PHI Learning Pvt. Ltd., New Delhi.
- ii. Dr. Manish Shrikhande is appointed Convener of the BIS Sub-committee of CED-39 for Dams.

Paul, D. K.

- i. Chairman, Working Group on Seismic Microzonation of Delhi Region constituted by DST, N Delhi.
- ii. Member of STEERING COMMITTEE for Involvement of Science and Technology Commu in DM work constituted bt National Disaster Management Authority, Government of India
- iii. Member of Group Monitoring Committee (GMC) for the National Coordinated Programme Seismicity constituted by Ministry of Earth Sciences
- iv. Member of the Governing Council (GC) of Central Soil and Material Research Station, N Delhi constituted by Ministry of Water Resources, Government of India, (August 2008 – Aug 2011).
- v. Member Program Advisory Committee (PAC) for Intrnational Cooperation in the area of Ea Atmospheric and Environmental Sciences constituted by DST for three years w.e.f Feb2, 2012
- vi. Member Sub-Committee of Advisory and Monitoring Committee on Seismic Microzonat study of NCT Delhi on 1:10000 scaleconstituted by Director General of Meteorology, IMD
- vii. Chairman, BIS Committee on Earthquake Engineering Sectional Committee - CED reappointed for another term of three years 2014-2017.
- viii. Member of re-constituted National Steering Committee (NSC) for National Earthquake F Mitigation Project (NERMP) consttuted by NDMA datd July 21, 2014
- ix. Member of Expert Committee to discuss beyond design basis earthquake constituted by Ato: Energy Regulatory Board, Government of India

4. Participation of Faculty in Conferences/Seminar/Symposia/Workshop/Guest Lectures

Name of Faculty	Detials of Conf./Semi./Symp./Workshop/Guest Lecture	Venue	Date
M. L. Sharma	Visited NCREE in Taiwan under sponsored research project funded by DST.	Taiwan	Jan 24- Feb 01, 2015
M.L. Sharma	Dharamshala Workshop, Presented paper, chaired session invited talk		Nov 6-9, 2014

M.L. Sharma	Natural Hazards in Himachal Pradesh, CUHP	Himachal Pradesh	Nov. 6-8, 2014
M.L. Sharma	51st Convention of IGU, KUK Univ, Chaired session		Nov 19-21, 2014
M. L. Sharma	MOES PAC meeting	Prithevi Bhawan, New Delhi	Nov. 26-28, 2014
M. L. Sharma	NCSDP meeting	New Delhi	May 19, 2015
Yogendra Singh	Tenth U.S. National Conference on Earthquake Engineering, Frontiers of Earthquake Engineering	Anchorage, Alaska	July 21-25, 2014
B.K. Maheshwari	14 th Int. Conf. of the International Association for Computer Methods & Advances in Geomechanics	Kyoto, Japan	Sept. 22-25, 2014
B.K. Maheshwari	Visited Norwegian Geotechnical Institute (NGI) for Research Project	Oslo, Norway	Oct. 3-12, 2014
Ravi Shankar Jakka	Indian Geotechnical Conference – 2014 (IGC)	Kakinada, Andhra Pradesh	18 to 20 December, 2014
Ravi Shankar Jakka	Invited talk at UK-India Workshop(UKIERI)	IIT Guwahati, Guwahati	7-9th January 2015
D.K. Paul	Annual Conversion on Advances in Earthquake Science	Institute of Seismological Research and Gujarat Institute of Disaster Management, Ahmedabad	Jan. 4-5, 2014
D.K. Paul	Attended Workshop on "Earthquake Resistant Construction of RC Buildings in Patna	BSDMA, Patna	Jan.16-17, 14
D.K. Paul	Participated in the Discussion Meet on Engineering of Foundations for NPP Structures in Alluvial Soils	AERB, Mumbai	Jan.24, 2014
D.K. Paul	ANSI-CII-BIS Workshop on Building and Construction Standards, New Delhi	American National Standards Institute, CII and BIS	Feb 12, 2014
D.K. Paul	National Conference on "Revisiting Development Paradigms for Utrakhand", Roorkee	Dept. of HSS, IIT Roorkee	Feb 15, 2014

D.K. Paul	Training Program on "Construction of Buildings in Hill Areas of Uttrakhand", Dehradun	BMTPC and RES	March 1, 2014
D.K. Paul	Training Program on "Construction of Buildings in Hill Areas of Uttrakhand", Dehradun	BMTPC and RES	March 1, 2014
D.K. Paul	Brain storming for Civil Engineering at IIT Mandi, Mandi	IIT Mandi	April 19, 2014
D.K. Paul	Int. Workshop on Emerging Trends in Earthquake Engg. and Structural Dynamics	IIT Delhi	Dec. 20, 2014
D.K. Paul	Structural Engineering Convention, 2014	IIT Delhi	Dec. 22, 2014
D.K. Paul	Int. Symp. on Reducing Earthquake Losses	Institute of Seismological Research	Jan.5-7, 2015

5. Participation of faculty in short term courses

Name of the faculty	Name of the courses	Venue	Dates
M.L. Sharma	Estimation of site specific seismic design parameters	Continuing Education Centre	Oct. 16-18, 2014
M.L. Sharma	Geotechnical Earthquake Engineering	Continuing Education Centre	Nov.26-28,2014
M.L. Sharma	Earthquake Resistant Structural Design/Drawings	Continuing Education Centre	Dec 01-06
B.K. Maheshwari	Geotechnical-Earthquake Engineering	QIP Centre	June 2-6, 2014
Ravi Shankar Jakka	AICTE Sponsored STC on "Geotechnical Earthquake Engineering"	IIT Roorkee	June 2-6, 2014
Ravi Shankar Jakka	NHPC Sponsored STC on "Geotechnical Earthquake Engg."	IIT Roorkee	November 24-26, 2014
Ravi Shankar Jakka	NHPC Sponsored STC on "Earthquake Resistant Structural Design /Drawings"	IIT Roorkee	December 1-6, 2014.
D.K. Paul	Indo-Norwegian Training Programme on Seismic Design of Multi-Storey Buildings: IS 1893 Vs. EUROCODE 8	IHC, New Delhi; BMTPC, NORSAR and IITR	May 26-27, 2014
D.K. Paul	AICTE Sponsored STC on Geotechnical	AICTE	June 2-6,

	Earthquake Engineering	sponsored QIP course	2014
D.K. Paul	Earthquake Resistant Design and Construction training course	BIPART, Patna and BMTPC, New Delhi	Nov.11-12, 2014
D.K. Paul	NHPC sponsored Short Term Course on Geotechnical Earthquake Engineering; For NHPC Engineers	CEC, IITR	1/6 -11, 2014
D.K. Paul	NHPC sponsored Short Term Course on Geotechnical Earthquake Engineering; For NHPC Engineers	CEC, IITR	24/26-11, 2014
D.K. Paul	Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8	VNIT, Nagpur	Dec.7-8, 2014
D.K. Paul	Indo-Norwegian Training Programme on Nonlinear Modelling and Seismic Response Evaluation of Structures	CED, IIT Roorkee	Dec.14-16, 2014

6. Distinguished Visitors to the Department (National/International):

Name	Designation and Affiliation	Purpose	Dates
Prof. William Powrie	Professor and University of Southampton UK		July 08, 2014
Prof. John Preston	Professor and University of Southampton UK		July 08, 2014
Prof. David Richards	Professor and University of Southampton UK		July 08, 2014
Prof. Louis Le Ben	Professor and University of Southampton UK		July 08, 2014
Dr. Mahendra P. Singh	Professor and USA		Jan 15, 2015

7. (a) Internship by IIT Roorkee Students

SI. No.	Name of Student	Name of the Internship Programme	Under Graduate	Post Graduate	Name of Institute	Period
1	Divya Varkey	DAAD		Post Graduate	German University	Oct 2014 to Mar 2015
2	Ritesh Kumar	DAAD		Post Graduate	German University	Oct 2014 to Mar 2015

7.(b) Internships to Other Students in IIT Roorkee

Name of Student	Name of Supervisor	Under Graduate	Post Graduate	Name of Institute	Period
Xavier Maurice	Yogendra Singh	Under Graduate		ESTP Paris	21-07-2014 to 05-09-2014

8. Academic Activities Organized by the Department

Name of Conf./Seminar/Symp./Workshop	Name of the Chairman	Sponsored by	Dates
15 Symposium on Earthquake Engineering	Dr. M.L. Sharma	Science and Engineering Research Board, NTPC Ltd, Atomic Energy Regulatory Board, and NHPC Ltd.,	11-13, Dec, 2014
1 Day workshop on 'Challenges in Seismic Site Characterization and Solutions through Recent Developments'	Dr. Ravi Sankar Jakka & Dr. S. Mukerjee	QIP Centre, IITR	10 th December, 2014

9. Short Term/ sponsored Courses Organized by the Department

Name of Coordinator	Name of Course	Source of funding	Nos. of Participants	Dates
M.L. Sharma	Estimation of site specific seismic design parameters	NHPC	15	Oct. 16-18, 2014
M.L. Sharma	Geotechnical Earthquake Engineering	NHPC	15	Nov.26-28,2014
M.L. Sharma	Earthquake Resistant Structural Design/Drawings	NHPC	20	Dec 01-06
B.K. Maheshwari and D.K. Paul	Geotechnical Earthquake Engineering	QIP Centre, AICTE, GoI	18	June 2-6, 2014
Yogendra Singh	Indo-Norwegian Training Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8	BMTPC & NORSAR Norway	93	May 26 - 28, 2014
Yogendra Singh	Indo-Norwegian Training	BMTPC &	100	October

	Programme on Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8	NORSAR Norway		13-15, 2014
Yogendra Singh	Indo-Norwegian Training Programme on Nonlinear Modelling and Seismic Response Evaluation of Structures	BMTPC & NORSAR Norway	69	December 14-16, 2014

10. Sponsored/Consultancy Projects

i. Completed Sponsored Research Projects

Principal Investigators	Title of the Projects	Sponsoring Agency	Outlay Amt. (Rs. In Lacs)
Ashwani Kumar	Seismological Network around THDC Region	THDC, India Ltd., Rishikesh	22.40
Yogendra Singh	Earthquake Hazard and Risk Reduction on the Indian Subcontinent	NORSAR Norway	113
D.K. Paul	Study of Seismic Base Isolation Techniques for Buildings and Development of Appropriate Seismic Base Isolation System	DST, New Delhi	23.1

ii. Continuing Sponsored Research Projects

Principal Investigators	Title of the Projects	Sponsoring Agency	Outlay Amt. (Rs. In Lacs)
Y. Singh, Co-PI: D.K. Paul, M.L. Sharma, B.K. Maheshwari	Seismic Risk and Loss Assessment in Hilly Areas	Royal Norwegian Embassy in India	Rs. 104 Lacs (total)

iii. New Sponsored Research Projects

Principal Investigators	Title of the Projects	Sponsoring Agency	Outlay Amt. (Rs. In Lacs)
B.K. Maheshwari	Dynamic Properties of Soils using Resonant Column Tests	Seismology Div. Min. of Earth Sciences, GoI	Rs. 16.6 Lacs (October 1, 2014)

**11. Summary of Major Sponsored Research Schemes and Consultancy Projects(>Rs. 10 lacs)
(A brief Write-up upto 100 words) (New Projects during the year 2013-14)**

S. No.	Title of Project	Funding Agency	Financial Outlay (lacs)	Year of start & total period	Name of P.I. and other Investigators	Status started or completed or in progress
1.	Seismic analysis of Bhakra dam stability analysis	Bhakra management Board	10.0	2008-09	D.K. Paul	Ongoing
2.	Rehabilitation & retrofitting of preindependence building of FRI, Dehradun	MoES	37.0	2008-09	D.K. Paul	Ongoing
3.	2D Stability Analysis of 215 m Roller Compacted Concrete Dam Sankosh HEP (2560 MW), Bhutan	THDC India Limited	13.236	2012	D.K. Paul	Started

- i. **Development of Seismic Base Isolation:** Seismic base isolation system is an seismic protection system against earthquake. Design and development of seismic isolation system for building has been developed and tested in collaboration with M/s Resistoflex Pvt. Ltd., Noida. The isolation system reduces the effects of an earthquake by essentially isolating the superstructure and its contents from potentially damaging ground motion. The most common isolation system used is Laminated Lead Rubber Bearings (LLRB). They combine the function of isolation and energy dissipation in a single compact unit, giving structural support, horizontal flexibility, damping, and a re-centering force in a single unit.
- ii. **Retrofitting of Forest Research Institute:** The FRI building is an architectural marvel and also a heritage building of historic importance. The building consists of several large halls, different kinds of arches, domed vaults and two huge towers. Seismic retrofitting of such a historical building is very demanding as all interventions are not allowed which may affect on the aesthetical appearance and heritage value. The FRI building has been sub-structured into five macro-elements whose independent behavior represents the global seismic behavior. Analyses of these macro-elements are used to locate the vulnerable locations in the building and accordingly suitable retrofitting strategy has been worked out.
- iii. **Research Project entitled "Dynamic Properties of Soils using Resonant Column Tests",** PI: Dr. B.K. Maheshwari, is awarded by Seismology Division, Ministry of Earth Sciences, Govt. of

- India. Outlay Rs. 16.6 Lacs, duration 3 years, Date of Start: October 1, 2014.
- iv. A sum of Rs.149.68 lakh has been allocated to IIT Roorkee, for Main phase of the MHRD sanctioned project entitled “Developing Suitable Pedagogical Methods for Various Classes, Intellectual Calibers and Research in e-learning”, for developing 26 courses in Engineering Mathematics, Mathematics-I, Catalysis In Refining And Petrochemicals, Chemical Process Calculations, Chemical Engineering Plant Design And Economics, Engineering Geology, Risk And Reliability Analyses Of Civil Infrastructure Structure, Environment Impact Assessment and Auditing, Structural Analysis-I, Discrete Structures, Process Equipment Design, Equipment Design, Structural Analysis 2, Foundation Engineering, Principles of Surveying, Geographical Information System, Geomatics Engineering, Engineering Electromagnetics, Semiconductor Devices and Technology, Fluid Mechanics, Principles of Industrial Engineering, Analysis of Metallurgical Failures, Corrosion and Protection, Materials Science and Engineering, Electrical and Electronic Properties of Materials, and Work System Design.

12. Scientific and Technical Reports

Title of the Projects	Participants	Authors	Remarks

(a) Scientific/technical reports prepared under Sponsored Research Projects

1. Kumar. A., A.D. Pandey, M.L. Sharma, J.P. Narayan and S.C. Gupta, EQ: 2015-01 (2014), “Seismological Network Around Tehri Region, (from July 2014 to Sep 2014), Department of Earthquake Engineering, IIT Roorkee
2. Kumar. A., A.D. Pandey, M.L. Sharma, J.P. Narayan and S.C. Gupta, EQ: 2014-38 (2014), “Seismological Network Around Tehri Region, (from April 2014 to June 2014), Department of Earthquake Engineering, IIT Roorkee
3. Kumar. A., A.D. Pandey, M.L. Sharma, J.P. Narayan and S.C. Gupta, EQ: 2014-28 (2014), “Seismological Network Around Tehri Region, (from Jan 2014 to Mar 2014), Department of Earthquake Engineering, IIT Roorkee
4. Kumar. A., A.D. Pandey, M.L. Sharma, J.P. Narayan and S.C. Gupta, EQ: 2014-17 (2014), “Seismological Network Around Tehri Region, (from Oct 2013 to Dec 2013), Department of Earthquake Engineering, IIT Roorkee

(b) Scientific/technical reports prepared under Consultancy Projects.

1. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2015-06 (2015), Site Specific Design Earthquake Parameters for Kholongchu HE Project, Bhutan, Department of Earthquake Engineering, IIT Roorkee
2. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2015-03 (2015), Site Specific Design Earthquake Parameters for Lakhwar HE Project, Uttarakhand, Department of Earthquake Engineering, IIT Roorkee
3. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2015-02 (2015), Site Specific Design Earthquake Parameters for Ramagundam, T.P.P. Aandhra Pradesh, Department of Earthquake Engineering, IIT Roorkee

4. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2014-46 (2014), Site Specific Design Earthquake Parameters for Jidu HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
5. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2014-45 (2014), Site Specific Design Earthquake Parameters for Dardu HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
6. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2014-44 (2014), Site Specific Design Earthquake Parameters for Turu HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
7. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, J. Das and R.S. Jakka, EQ: 2014-43 (2014), Site Specific Design Earthquake Parameters for Par HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
8. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, Kirat Pal, J. Das and S.C. Gupta, EQ: 2014-40 (2014), Site Specific Design Earthquake Parameters for HEO HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
9. Sharma. M.L., M. Shrikhande, J. P. Narayan, B. K. Maheshwari, Kirat Pal, J. Das and S.C. Gupta, EQ: 2014-39 (2014), Site Specific Design Earthquake Parameters for Pauk HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
10. Sharma. M.L., Ashok Kumar, M. Shrikhande, B. K. Maheshwari and J. Das, EQ: 2014-35 (2014), Site Specific Design Earthquake Parameters for Umngot HE Project, Meghalaya, Department of Earthquake Engineering, IIT Roorkee
11. Sharma. M.L., Kirat Pal, M. Shrikhande, B. K. Maheshwari and J. Das, EQ: 2014-34 (2014), Site Specific Design Earthquake Parameters for Naying HE Project (updated), Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
12. Sharma. M.L., Kirat Pal, J. P. Narayan, M. Shrikhande, B. K. Maheshwari and J. Das, EQ: 2014-33 (2014), Site Specific Design Earthquake Parameters for Ganol HE Project, Meghalaya, Department of Earthquake Engineering, IIT Roorkee
13. Sharma. M.L., J. P. Narayan, M. Shrikhande, B. K. Maheshwari, R. N. Dubey and J. Das, EQ: 2014-32 (2014), Site Specific Design Earthquake Parameters for Bilhaur HE Project, Uttar Pradesh, Department of Earthquake Engineering, IIT Roorkee
14. Sharma. M.L., J. P. Narayan, M. Shrikhande, B. K. Maheshwari, Y. Singh and J. Das, EQ: 2014-31 (2014), Site Specific Design Earthquake Parameters for Swalkot HE Project, J & K, Department of Earthquake Engineering, IIT Roorkee
15. Sharma. M.L., Ashwani Kumar, J. P. Narayan, M. Shrikhande, B. K. Maheshwari and J. Das, EQ: 2014-30 (2014), Site Specific Design Earthquake Parameters for Luhri HE Project, Himachal Pradesh, Department of Earthquake Engineering, IIT Roorkee
16. Sharma. M.L., Amita Sinvhal, J. P. Narayan, M. Shrikhande, B. K. Maheshwari, J. Das and S. C. Gupta, EQ: 2014-29 (2014), Site Specific Design Earthquake Parameters for Renukaji Dam Project, Department of Earthquake Engineering, IIT Roorkee
17. Sharma. M.L., H. R. Wason, M. Shrikhande, J. P. Narayan, A. D. Pandey, Kirat Pal and J. Das, EQ: 2014-26 (2014), Site Specific Design Earthquake Parameters for Subansiri Middle

(Kamla) HE Project, Arunachal Pradesh, Department of Earthquake Engineering, IIT Roorkee

18. Sharma. M.L., Smt Amita Sinhval, J. P. Narayan, M. Shrikhande, B.K Maheshwari, and J. Das, EQ: 2014-25 (2014), Site Specific Design Earthquake Parameters for Gandarbal HE Project, Jammu and Kashmir, Department of Earthquake Engineering, IIT Roorkee
19. Sharma. M.L., H.R. Wason, Ashwani Kumar, Smt Amita Sinhval, M. Shrikhande, Pankaj Agarwal and J. Das, EQ: 2014-24 (2014), Site Specific Design Earthquake Parameters for Lower Kopili HE Project, Assam, Department of Earthquake Engineering, IIT Roorkee
20. Maheshwari, B.K., D.K. Paul and M.L. Sharma “Liquefaction Potential of NPP Site of Gorakhpur Haryana Anu Vidyut Pariyojana - 1 to 4, Fatehbad, Haryana”.
21. Paul, D.K. Seismic Analysis of Concrete Gravity Dam of Luhri HEP 775 MW, Luhri HEP.
22. Paul, D.K. 2D Stability Analysis of 215 m Roller Compacted Concrete Dam at Sankosh HEP (2560 MW), Bhutan, Sankosh HEP (2560 MW), Bhutan
23. Paul, D.K. Seismic Stability Analysis of Concrete Gravity Dam of Demwe Lower HE Project, Demwe Lower HE Project
24. Singh Yogendra and D. K. Paul. Seismic Retrofit of Ward and Corridor Blocks of GTB Hospital, GTB Hospital, New Delhi.
25. Paul, D.K. and Yogendra Singh. Seismic Assessment and Retrofitting of Kendriya Vidyalaya, Gangtok, Kendriya Vidyalaya, Gangtok.
26. Paul, D.K. and Pankaj Agarwal. Seismic Vulnerability Assessment, Repair, Rehabilitation and Retrofitting of FRI Masonry Building, Dehraun, FRI Masonry Building, Dehraun.
27. Paul, D.K. and Y. Singh. Study of Seismic Base Isolation Techniques for Buildings and Development of Appropriate Base Isolation, Research Report, MoES.

Title of the Projects	Participants	Authors	Remarks

13. Research Publications during the year under report (To be listed on the basis of first author only, as given below). Separate group for Conference/Symp./Papers and Books/Monographs be made.

Journals

1. Dadi, Surya Kumar, V. V. S. and Agarwal, Pankaj (2015) "Comparative Post-Yield Performance Evaluation of Flexural Members under Monotonic and Cyclic Loadings based on Experimental Tests" Structures (Elsevier), Vol. 2, pp. 72-80
2. Haldar, Putul, Yogendra Singh and D. K. Paul (2015). “Design Guidelines for URM Infills and Effect of Construction Sequence on Seismic Performance of Code Compliant RC Frame Buildings”, Advances in Structural Engineering. Springer India, ISBN:8132221923, DOI:10.1007/978-81-322-2193-7_83. December 12, 2014, pp. 1055-1069.
3. Jain, S. K., S. C. Gupta, A. Kumar (2015). Attenuation of coda waves in the Garhwal Lesser Himalaya, India, Journal of Seismology, Vol. 19, No. 2, pp. 355-369.

4. Jakka, R.S., Garg, S., (2015). Suitable triggering algorithms for detecting strong ground motions using MEMS accelerometers, *Earthquake Engineering and Engineering Vibrations*, 14A(2015),27-35.
5. Joshi, A., Chun-Hsiang Kuo, Piu Dhibar, ML Sharma, Kuo-Liang Wen, Che-Min Lin (2015). Simulation of the records of the 27 March 2013 Nantou Taiwan earthquake using modified semi-empirical approach, *Natural Hazards*, pp. 1-26
6. Kumar, Rohtash, S. C. Gupta, Arjun Kumar, Himanshu Mittal (2015). Source parameters and f_{max} in lower Siang region of Arunachal lesser Himalaya, *Arabian Journal of Geosciences*, Vol. 8, No. 1, pp. 255-265.
7. Nanda, Radhikesh P, Manish Shrikhande, Pankaj Agarwal (2015). Low-Cost Base-Isolation System for Seismic Protection of Rural Buildings, *Practice Periodical on Structural Design and Construction*.
8. Paidi, Vinod, Ashwani Kumar, S. C. Gupta, Arjun Kumar (2015). Estimation of source parameters of local earthquakes in the environs of Koldam site, *Arabian Journal of Geosciences*, Vol. 8, No. 1, pp. 227-238.
9. Siva, R., Chidambaram and Pankaj Agarwal, (2015) "Flexural and Shear Behavior of Geo-Grid Confined RC Beams With Steel Fiber Reinforced Concrete" *Construction and Building Materials* (Elsevier); Vol 78,pp-271-280.
10. Siva, R., Chidambaram and Pankaj Agarwal, (2015) "Inelastic Behavior of R.C Beams with Steel Fiber and Polymer Grid Confinement" *The Indian Concrete Journal*, Vol.89: pp-1-8.
11. Syed N.M. and Maheshwari B.K. (2015), "Improvement in the Computational Efficiency of the Coupled FEM-SBFEM approach for 3D Seismic SSI Analysis in the Time Domain", *Computers and Geotechnics*, Vol. 67, pp. 204-212.
12. Vandana, S. C. Gupta, Ashwani Kumar (2015). Coda wave attenuation characteristics for the Bilaspur region of Himachal Lesser Himalaya.
13. Adhikary, Shrabony, Yogendra Singh, and D.K.Paul (2014). "Effect of Soil Depth on Inelastic Seismic Response of Structures," *Soil Dynamics and Earthquake Engineering* 61-62 (2014) 13–28.
14. Agarwal, Pankaj, Ankit Gupta and Rachanna G. Angadi (2014), "Effect of FRP Wrapping on Axial Behavior of Concrete and Cyclic Behavior of External RC Beam Column Joints", *KSCE Journal of Civil Engineering* (Springer), 18(2):566-573.
15. Banerjee, Arnab, D. K. Paul and Arijit(2014). Optimization and safety evaluation of concrete gravity dam section, *KSCE Journal of Civil Engineering*, 10.1007/s12205-015-0139-0
16. Banerjee, Arnab, D. K. Paul and R.N. Dubey (2014). "Modeling Issues in Seismic Analysis of Concrete Gravity Dams, *J. of Dam Engineering*, Vol XXIV, Issue 2, pp. 87-11
17. Chaudhury, Deepshikha and Yogendra Singh, "Performance-based Design of RC Frame Buildings with Metallic and Friction Dampers," *J. Inst. Eng. India, Ser. A*, November (2014) DOI: 10.1007/s40030-014-0089-4
18. Herbindoo, A, Susheel Kumar and M. L. Sharma (2014) Earthquake ground motion predictive equations for Garhwal Himalaya, India, *Soil Dynamics and Earthquake Engineering*, *Soil Dynamics and Earthquake Engineering*, Vol. 66, pp.135-148.
19. Jayant N Tripathi, Priyamvada Singh, Mukat L Sharma (2014). Attenuation of high-frequency P and S waves in Garhwal Himalaya, India, *Tectonophysics*, Vol. 636, pp. 216-227.
20. Kadam, Sachin B., Yogendra Singh, and Bing Li, (2014). "Strengthening of Unreinforced Masonry

using Welded Wire Mesh and Micro-Concrete - Behaviour under In-Plane Action,” *Construction and Building Materials* 54 (2014) 247–257.

21. Kadam, Sachin B., Yogendra Singh & Bing Li, (2014). “Out-of-plane Behaviour of Unreinforced Masonry Strengthened using Ferrocement Overlay,” *Materials and Structures*, DOI 10.1617/s11527-014-0390-8.
22. Khose, Vijay Namdev, and Yogendra Singh (2014). “An Anomaly in Equivalent Linearization Approach for Estimation of Inelastic Response,” *Earthquake Spectra*, Volume 30, No. 2, pages 965–972.
23. Kulkarni, Rakhi, Shrabony Adhikary, Yogendra Singh, and Anirban Sengupta (2014). “Seismic Performance of a Bridge with Tall Piers” *ICE-Bridge Engineering*.
24. Kumar, Ashvini, A. Sinvhal, A. Joshi, D. Kumar Sandeep and Parveen Kumar (2014). Coda wave attenuation characteristics for Kumaon and Garhwal Himalaya, India, *Nat Hazards*.
25. Kumar, Ashwani, Arjun Kumar, S. C. Gupta, AK Jindal, Vandana Ghangas (2014). Seismicity and source parameters of local earthquakes in Bilaspur region of Himachal Lesser Himalaya, *Arabian Journal of Geosciences*, Vol. 7, No. 6, pp. 2257-2267.
26. Kumar, Rohtash, S. C. Gupta, Arjun Kumar (2014). Attenuation characteristics of seismic body waves for the crust of Lower Siang region of Arunachal Himalaya, *International Journal of Advanced Research*, Vol. 2, No. 6. pp. 742-755.
27. Kumar, Rohtash, S. C. Gupta, Arjun Kumar (2014). Determination and identification of focal mechanism solutions for Himalayan earthquakes from waveform inversion employing ISOLA software, *Natural Hazards*, pp. 1-19.
28. Kumar, Rohtash, S. C. Gupta, Arjun Kumar (2014). Effect of azimuthal coverage of an earthquake on moment tensor solutions estimated by waveform inversion, *Arabian Journal of Geosciences*, pp. 1-14.
29. Maheshwari, B.K. and Emani P.K. (2014). “Three Dimensional Nonlinear Seismic Analysis of Pile Groups using FE-CIFECM coupling in Hybrid Domain and HiSS Plasticity Model”, Published online *International Journal of Geomechanics*, ASCE, DOI: 10.1061/(ASCE)GM.1943-5622.0000335.
30. Mridula, A. Sinvhal and H. R. Wason (2014). Probabilistic seismic hazard assessment in the vicinity of MBT and MCT in western Himalaya” *Research Inventy: International Journal of Engineering and Science*, Vol.4, Issue 11, published online.
31. Naveen Pareek, Shilpa Pal, Amir M Kaynia, Mukat L Sharma (2014). Empirical-based seismically induced slope displacements in a geographic information system environment: a case study, *Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards*, Vol 8, No. 1, pp.258-268
32. Rani, Anusha and D.K. Paul (2014). Seismic Retrofitting of a Damaged School Building, *Int. Jr. of Research in Engineering and Technology*, Vol.3, Issue 6, June
33. Roy, N., Jakka, R.S., Wason, H.R., (2014). Reply to comment on ‘Effect of surface wave inversion non-uniqueness on 1D seismic ground response analysis’, *Natural Hazards Journal*, 75A, 983-989.
34. Sarkar R., Bhattacharya S. and Maheshwari B.K. (2014). “Seismic Requalification of Pile Foundations in Liquefiable Soils” *Indian Geotechnical Journal*, Vol. 44, No. 2, pp. 183-195.
35. Sen, Arup, A. Kumar, S. C. Gupta, A. Kumar (2014). Spectral Analysis of the Earthquake Sources around Roorkee (India) Region and its surrounding Indo-Gangetic Plains, *Disaster Advances*, Vol 7, No. 6, pp. 1-11.

36. Singh, J.P., Pankaj Agarwal, Ashok Kumar and S.K. Thakkar (2014). "Identification of Modal Parameters of a Multistoried RC Building using Ambient Vibration and Strong Vibration Records of Bhuj Earthquake, 2001" *Journal of Earthquake Engineering* (Taylor and Francis), 18:444–457
37. Siva, R., Chidambaram and Pankaj Agarwal, (2014). "The Confining Effect of Geo-grid on the Mechanical Properties of Concrete Specimens with Steel Fiber under Compression and Flexure" *Construction and Building Materials* (Elsevier); Vol.71: pp-628-637.
38. Syed N.M. and Maheshwari B.K. (2014). "Modeling using Coupled FEM-SBFEM for Three Dimensional Seismic SSI in Time Domain", *International Journal of Geomechanics*, ASCE, Vol. 14, No. 1, pp. 118-129.

Conferences

1. Adhikary, S., Y. Singh and D.K. Paul (2014). Effect of Soil Depth on Seismic Response of Three Typical Structures, 15th Sym. on Earthquake Engineering (15SEE-15), IIT Roorkee, Dec.11-13
2. Banerjee, A., D.K. Paul and R.N. Dubey (2014). "Estimation of Cumulative Damage in Concrete Gravity Dam Considering Foundation-Reservoir Interaction, Proc. 10th US National Conference on Earthquake Engineering, Anchorage, Alaska, July 21-25
3. Banerjee, Shubham, Sudipta Ghosh, Amit Shiuly and Ranjit Das (2014). Seismic hazard analysis and determination of site specific ground motion parameter of tollygunge region, Kolkata, 15th Symposium on Earthquake Engineering, IIT Roorkee
4. Baro, Olympa and Dr. Ashok Kumar (2014). A new attribute for earthquake early warning, 15th Symposium on Earthquake Engineering, IIT Roorkee
5. Bhina, Mohd Rizwan, Waseem Khan, and D.K.Paul (2014). Assessment of Different Aspects of R.C. Flat-Slab Building and Its Serviceability" and authored by International Conference on Architecture And Civil Engineering (ICAACE'14) during Dec. 25-26, Dubai (UAE).
6. Chidambaram, R. Siva and Pankaj Agarwal (2014). Cyclic behavior of column retrofitted using coupler with and without external CFRP confinement, 15th Symposium on Earthquake Engineering, IIT Roorkee
7. Chidambaram, R.Siva and Pankaj Agarwal (2014). Influence of high performance fiber reinforced cementitious composites on cyclic behavior of beam column joint, 15th Symposium on Earthquake Engineering, IIT Roorkee
8. Das, Ranjit , M.L.Sharma, and H.R.Wason (2014). Probabilistic seismic hazard assessment for northeast India, 15th Symposium on Earthquake Engineering, IIT Roorkee
9. Gupta, I.D. and Dr. B.K. Maheshwari (2014). Response of simple symmetric buildings to torsional excitation – rationalization of accidental eccentricity, 15th Symposium on Earthquake Engineering, IIT Roorkee
10. Haldar, P., Singh, Y. and Paul., D. K., (2014), "Design Guidelines for URM Infills and Effect of Construction Sequence on Seismic Performance of Code Complaint RC Frame Buildings" Proceedings of Structural Engineering Convention (SEC - 2014), Advances in Structural Engineering, Dynamics Vol-II, at Indian Institute of Technology, Delhi, India22–24th December 2014.
11. Jain, Ratish, Goverdhan and D.K. Paul (2014). Design & Development of an Optimised Base Isolation System for Seismic Protection of Buildings in India, Sestructural Engineering Convension SEC-14, IIT Delhi, Dec. 22-24, 2014
12. Kadam, Sachin B., Y. Singh, and Bing Li (2014). Behaviour of Masonry Strengthened Using Welded

Wire Mesh and Micro- Concrete, 15th Symposium on Earthquake Engineering, IIT Roorkee

13. Kamal and J.P. Narayan (2014). Effects of sediment damping and impedance contrast on the characteristics of basin generated surface waves in a 3d basin, 15th Symposium on Earthquake Engineering, IIT Roorkee
14. Kant, Lakshmi, S. Mukerjee and S .Saran (2014). Assessment of shear wave velocity from dynamic cone penetration test (DCPT) , 15th Symposium on Earthquake Engineering, IIT Roorkee
15. Kumar, Ashok, Himanshu Mittal , B.P. Chamoli , Ajay Gairola , R. S. Jakka , Amit Srivastava (2014). Earthquake early warning system for northern India, 15th Symposium on Earthquake Engineering, IIT Roorkee
16. Kumar, Prabhat, Ashwani Kumar, A.D. Pandey, Rakesh Sharma and Pawan Kumar Emani (2014). Seismic hazard map of Uttarakhand using NGA relationship, 15th Symposium on Earthquake Engineering, IIT Roorkee
17. Kumar, Prabhat, Nitin Bhosale and A.D Pandey (2014). Seismic influence of rooftop tower on host structure, 15th Symposium on Earthquake Engineering, IIT Roorkee
18. Kumar, R. and Maheshwari B.K. (2014). "Simplified Models for Dynamic Soil-Structure Interaction" Proc. of the Indian Geotechnical Conference, Kakinada, December 2014.
19. Kumar, Vinay, J.P. Narayan, and Luxman Kumar (2014). Numerical Study of Effect of Ridge-weathering thickness effect on the Ground Motion Amplification, 15th Symposium on Earthquake Engineering, IIT Roorkee
20. Kumari, Pushpa, A. Joshi and M. L. Sharma (2014). Simulation of strong ground motion due to Mw 6.9 Sikkim earthquake using semi-empirical forward modeling, 15th Symposium on Earthquake Engineering, IIT Roorkee
21. Kumawat, N.K. and Maheshwari B.K., "Liquefaction Potential of IITR Campus using CPT and Piezocones" Proc. of the Indian Geotechnical Conference, Kakinada, December 2014.
22. Lahiri, S. K., Pandey A. D., Bhattacharya K., Sinha A., Vishnu K. B, Ravichandra I. V. P . (2014). Dynamic response of a cable stayed bridge under blast loading, 15th Symposium on Earthquake Engineering, IIT Roorkee
23. Maheshwari, B.K., "Recent Advances in Seismic Soil-Structure Interaction" Plenary Lecture, Proc. of the Indian Geotechnical Conference, Kakinada, December 2014.
24. Marrapu, B.M. and Jakka, R.S., Application of artificial neural network for the assessment of slope stability, Proc. of Indian Geotechnical Conf. IGC-2014, Kakinada, India, December 18-20, 2014.
25. Mridula, A Sinvhal and H.R. Wason (2014). Seismic hazard zonation of Himachal Pradesh, Northwest Himalaya Abstract, National workshop on Status of natural hazards in Himachal Pradesh (NHHP-14), 6-8 November, 2014 conducted by Central University of Himachal Pradesh, Shahpur, Dharamsala
26. Mridula, Rashmi, A Sinvhal and H. R. Wason (2014), Probabilistic seismic hazard assessment of Himachal Pradesh and contiguous regions, Proceedings volume, 15SEE
27. Mukerjee, Dipanjan, Arnab Banerjee and D.K. Paul (2014). Necessity of Multimode Push Over Analysis in Concrete Gravity Dam, 15th Sym. on Earthquake Engineering (15SEE-15), IIT Roorkee, Dec.11-13
28. Paul, D. K. (2014). Damage to infrastructures caused by landslides, rockfalls and mudflows during Sikkim Earthquake of September 18, 2011, 15th Symposium on Earthquake Engineering, IIT Roorkee
29. Paul, D. K., Pradeep Kumar T.V & Pankaj Agarwal (2014). Response of integral bridges including

soil-structure interaction, 15th Symposium on Earthquake Engineering, IIT Roorkee

30. Paul, D.K. (2014). Seismic Safety of Large Dam: A Case Study of Tehri Dam, Int. Workshop on Emerging Trends in Earthquake Engineering and Structural Dynamics, IIT Delhi, Dec 20-2, 2014
31. Raja, M.A. and Maheshwari B.K. (2014). "Effect of Nonlinearity on Dynamic Response of Earthen Dam" Proc. of the Indian Geotechnical Conference, Kakinada, December 2014.
32. Rajput, SS, Mridula and Amita Sinvhal (2014). Vulnerability assessment of area and structures, Proceedings Volume, 15SEE.
33. Rangwala, H.M., S. Mukerjee and S. Saran (2014). Seismic bearing capacity of footing resting on partially submerged soil, 15th Symposium on Earthquake Engineering, IIT Roorkee
34. Rout, Madan Mohan, Josodhir Das, Kamal (2014). Probabilistic seismic hazard assessment of northwest and central Himalayas using moment slip rate, 15th Symposium on Earthquake Engineering, IIT Roorkee
35. Roy, K. and Jakka, R.S., Finite element modeling of liquefaction on layered soil, Proc. of Indian Geotechnical Conf. IGC-2014, Kakinada, India, December 18-20, 2014.
36. Sen, S. and Singh, Y., (2014), "Seismic Performance of Flat Slab Buildings" Proceedings of Structural Engineering Convention (SEC - 2014), Advances in Structural Engineering, Dynamics Vol-II, at Indian Institute of Technology, Delhi, India, pp. 897-90722–24th December 2014.
37. Sharma, M.L., Ashwani Kumar, S.C. Gupta, A.K. Jindal, Arup Sen, S.K. Jain, Neetu Goswami and Vandana (2014). Earthquake Source Parameters and Focal Mechanism of Local Earthquakes around Tehri Region, 15th Symposium on Earthquake Engineering, IIT Roorkee
38. Shukla, R.P. and Jakka, R.S. (2014). Bearing capacity of footings on slopes, Proc. of Indian Geotechnical Conf. IGC-2014, Kakinada, India, December 18-20, 2014.
39. Shukla, R.P. and Jakka, R.S. (2014). Critical review of pore pressure predictive models, Proc. of Indian Geotechnical Conf. IGC-2014, Kakinada, India, December 18-20, 2014.
40. Shukla, R.P., and Jakka, R.S. (2014). A critical review on bearing capacity of a strip footing on sloping ground, 5th Young Indian Geotechnical Engineers Conference 2014, Vadodara, India, March 14-15, 2015. Shukla, R.P., and Jakka, R.S., A critical review on seismic bearing capacity of a strip footing on sloping ground, International Symp. On Geohazards: Science, Engineering and Management, Kathmandu, Nepal, Nov. 20-21, 2014.
41. Singh, A. and Maheshwari B.K. (2014). "Geodynamic Tests for Landslide Studies" Proc. of the Indian Geotechnical Conference, Kakinada, December 2014.
42. Singh, Y., V.R. Yeluguri, and D.H. Lang (2014). "Seismic Response of Hill Buildings Subjected to Bi-Directional Excitation," Tenth U.S. National Conference on Earthquake Engineering, Frontiers of Earthquake Engineering, July 21-25, 2014, Anchorage, Alaska. 2014.
43. Singhal, A. and Singh, Y., (2014), "Seismic Performance of Eccentrically Braced Frame Buildings" Proceedings of Structural Engineering Convention (SEC - 2014), Advances in Structural Engineering, Dynamics Vol-II, at Indian Institute of Technology, Delhi, India, 22–24th December 2014.
44. Siva, R., Chidambaram and Pankaj Agarwal, (2014) "Cyclic Behavior of Column Retrofitted using Coupler with and without External CFRP Confinement" 15th Symposium on Earthquake Engineering, IIT Roorkee, India.
45. Siva, R., Chidambaram and Pankaj Agarwal, (2014) "Cyclic Evaluation of Beam Column Joint Using High Performance Fiber Reinforced Cementitious Composites" International Conference on Sustainable Civil Infrastructure 2014, Hyderabad, India.

46. Siva, R., Chidambaram and Pankaj Agarwal, (2014) "Hysteresis Behaviour of Exterior Beam Column Joint with High Performance Fiber Reinforced Cementitious Composites" "The 6th International Conference of Asian Concrete Federation, Seoul, Korea.
47. Siva, R., Chidambaram and Pankaj Agarwal, (2014) "Inelastic Behavior of R.C Beams with Steel Fiber and Polymer Grid Confinement" Structural Engineering Convention 2014, New Delhi, India.
48. Siva, R., Chidambaram and Pankaj Agarwal, (2014) "Influence of High Performance Fiber Reinforced Cementitious Composites on Cyclic Behavior of Beam Column Joint" 15th Symposium on Earthquake Engineering, IIT Roorkee.
49. Srivastava, A.K., M.L. Sharma, D.K. Paul, J. Das and R. Jakka (2014). Deep Soil Characteristics in the vicinity of Himalaya, 15th Sym. on Earthquake Engineering (15SEE-15), IIT Roorkee, Dec.11-13
50. Surana, M., Singh, Y. and Lang, D. H., (2014), "Seismic Performance of Shear-wall and Shear-wall core Buildings Designed for Indian Codes Buildings" Proceedings of Structural Engineering Convention (SEC - 2014), Advances in Structural Engineering, Dynamics Vol-II, at Indian Institute of Technology, Delhi, India, 22–24th December 2014.
51. Syed N.M. and Maheshwari B.K., "Verification of Numerical Modeling for Nonlinear Seismic Analysis of a Structure Considering Liquefaction", Proc. of 14th International Conference of the International Association for Computer Methods and Advances in Geomechanics, Kyoto, Japan, September 2014.
52. Vandana, S.C. Gupta, Ashwani Kumar, M. L. Sharma (2014). Attenuation characteristics of the Bilaspur region of Himachal Lesser Himalaya, 15th Symposium on Earthquake Engineering, IIT Roorkee