Dr. Jay Prakash Narayan

M.Sc (Tech.), Ph.D.
Assistant Professor

AREA OF INTEREST

Two & Half Dimensional and Three Dimensional Numerical Simulation of Seismic Wave Propagation, Site-Specific Strong Ground Motion Prediction, Local Site effects, Seismic Microzonation and Macroseismic Field Observations.

ACADEMIC QUALIFICATIONS

- Ph.D., Geophysics, 1994, Banaras Hindu University, Varanasi -221005.
- M.Sc. (Tech), Geophysics, 1990, Banaras Hindu University, Varanasi.
- B.Sc. (Hons), 1986, Banaras Hindu University, Varanasi.

PRESENT OFFICE ADDRESS

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HONOURS & AWARDS

1. Anil Kumar Bose Memorial Award-2003, Indian National Science Academy, New Delhi.
2. Khosla Annual Research Award-2001 (*The Second Khosla Research Prize and a Medal*), Indian Institute of Technology, Roorkee.
3. *INSA Young Scientist Medal Award-1998*, Indian National Science Academy, New Delhi.
4. Senior Research Fellowship (SRF), DRS-UGC Scheme.
5. Junior Research Fellowship (JRF), DRS-UGC Scheme.
6. Endowment Fund
7. UGC Studentship during M.Sc (Tech.) 3rd -Year

Dr. J. P. Narayan
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PROFESSIONAL MEMBERSHIPS

- Member "*Indian Society of Earthquake Technology" (ISET).*
- Member "*Indian Association of Exploration Geophysicists"(AEG).*

PROFESSIONAL SERVICES

Co-Editor, ISET Journal of Earthquake Technology, IIT, Roorkee, May 2001-05.

List of Publications: (Sixty six)

A. Papers in Refereed Journals (Thirty six)

(i) International Journals: (Twenty five)

1. M.L. Sharma, **J.P. Narayan** and B.K. Maheshwari (2005) 26th December, 2004 Indian Ocean tsunami: a report on damage survey along the coast of Tamilnadu (India), (Communicated)

2. **J.P. Narayan** and S.P. Singh (2005) Effects of soil layering on the characteristics of basin-edge induced surface waves and differential ground motion, (under revision).

3. **J.P. Narayan** and A. Ram (2005) Study of effects of underground ridge on the ground motion characteristics, Geophysical Journal International (in press).

4. **J.P. Narayan**, M.L. Sharma, and B.K. Maheshwari (2005) Tsunami intensity mapping along the coast of Tamilnadu (India) during the deadliest Indian Ocean tsunami of December 26, 2004, Pure and Applied Geophys (in press)

5. **J.P. Narayan** (2005) Numerical study of island effects on the Rayleigh wave characteristics, Geofizika (in press)

6. **J.P. Narayan**, M.L. Sharma, and B.K. Maheshwari (2005) Run-up and inundation pattern developed during the Indian Ocean tsunami of December 26, 2004 along the coast of Tamilnadu (india), *Gonwana Research*, 8(4) 611-616.

7. **J.P. Narayan,** M.L. Sharma, and B.K. Maheshwari (2005) Effects of Medu and coastal topography on the damage pattern during the recent Indian Ocean tsunami along the coast of Tamilnadu, Science of Tsunami Hazards, 23, 9-18.

8. **J.P. Narayan** (2005) Study basin-edge effects on the ground motion characteristics using 2.5D modeling, Pure and Applied Geophys, 162, 273-289.

9. **J.P. Narayan** (2003) 2.5D simulation of ridge-weathering effects on the ground motion characteristics, Jr. of Earthquake Engineering, 7, 447-461.

10. **J.P. Narayan** and P.V. Prasad Rao (2003) Two and half dimensional simulation of ridge effects on the ground motion characteristics, Pure and Applied Geophys, 160, 1557-1571.

11. **J. P. Narayan** (2002) H/V ratio and amplification factor: A numerical experiment using 2.5D modelling, Geofizika, 18-19, 1-16.

12. **J.P. Narayan**, M.L. Sharma and A. Kumar (2002) A seismological report on the January 26, 2001 earthquake at Bhuj, India, Seismological Research Letter, 73, 343-355.

13. **J.P. Narayan** (2001) Site-specific strong ground motion prediction using 2.5-D modelling, Geophysical Journal International, 146, 269-281.

14. **J.P. Narayan** (2001) Prediction of strong ground motion characteristics, Acta Geophysica Polonica, 50, 167-177.
15. **J.P. Narayan** (2000) Strong ground motion simulation using shear dislocation sources, Geofizika, 16-17, 73-86.
16. **J.P. Narayan** (1999) 2.5-D cross-hole acoustic response: A variable density approach, Geophysical Journal International, 139, 879-887.
17. **J.P. Narayan** (1999) Modelling of multi-layered dissipative media, Acta Geophysica Polonica, XLVIII, 347-358.
18. **J.P. Narayan** (1998) 2.5-D acoustic wave simulation of geological structures, Pure and Applied Geophys, 151, 47-61.
19. **J.P. Narayan** and Avadh Ram, (1998) Numerical simulation of geological structure using SH-wave solution, Acta Geophysica Polonica, XLVI(1), 115-126.
20. A. Ram and **J.P. Narayan**, (1997) Synthetic seismograms for a layered earth geological model using the absorption and dispersion phenomena, Pure and Applied Geophys, 149, 541-551.
21. A. Ram and **J.P. Narayan**, (1995) Simulation of hydrocarbon structures using the P-SV wave solution, Pure and Applied Geophys., 144, 59-77.
22. **J.P. Narayan** and Avadh Ram, (1995) Application of flexural modelling to the formation of Ganga basin of northern India, Bollettino di Geofisica Teorica ed Applicata, XXXVII, 245-255.
23. A. Ram, R. Juneja and **J. P. Narayan**, (1995) Analysis of the local events and inferred P* velocity near the Koyna dam, Maharashtra, India, Acta Geodetica and Geophysica, 30, 63-173.
24. A. Ram and **J.P. Narayan**, (1995) Optimum filtering of seismic signatures, Acta Geophysica Polonica, XLIII(4), 325-335.
25. **J.P. Narayan** and Avadh Ram, (1994) Application of acoustic wave solution for analysis of reverberation, Geofizika, 11, 1-13.

(ii) National Journals: (Eleven)

1. B.K. Maheshwari, M.L. Sharma and **J.P. Narayan** (2005) Structural damages on the coast of Tamilnadu due to tsunami caused by December 26, 2004 Sumatra earthquake ISET Jr. of Earthquake Technology (in press)
2. K. Sambasivarao, **J.P. Narayan** and M.L. Sharma (2004) Scenario of ground motion amplification in Delhi, Jr. Geol. Soc. India (in press).
3. **J.P. Narayan** (2003) 2.5-D Simulation of basin edge effects on the ground motion characteristics, Proceedings of Indian Academy of Sciences (Earth and Planatary Sciences), 112, 463-469.
4. **J.P. Narayan** (2001) Site specific ground motion prediction using 3-D modelling, ISET Jr. of Earthquake Technology, 38, 17-29.
5. **J.P. Narayan** (1999) Finite difference simulation of 2.5-D acoustic wave propagation in random media, Jr. of Geophysics, XX, 123-127.
6. **J.P. Narayan** and Avadh Ram (1998) Numerical modelling of the off-shore regions for hydrocarbons, In 'Recent researches in sedimentary basins (ed. Tiwari, R.N.), Indian Petroleum Publisher, 104-109.

7. A. Ram, **J.P. Narayan** and K.N.S. Yadav, (1996) Effect of attenuation and dispersion on the seismic signatures, Geoscience Journal, XVII(1), 41-45.
8. **J.P. Narayan** and Avadh Ram, (1996) Direct detection of hydrocarbon and lithology discremination using finite difference method, Indian Jr. of Petro. Geo., 5(1), 65-78.
9. A. Ram and **J.P. Narayan**, (1995) A spectral estimates using three different models, Geoscience Jr. XVI(2), 121-125.
10. **J.P. Narayan** and Avadh Ram, (1995) Acoustic modelling of reservoirs, Geoscience Jr., XVI (I), 65-71.
11. **J.P. Narayan** and Avadh Ram, (1993) Application of finite difference technique for computation of seismic responses as obtained from the parts of Cambay basin, Jr. Assoc. Expl. Geophys., XIV, 173-180.

B. Papers in ISET News Letters (Six)

1. **J.P. Narayan**, M.L. Sharma, and B.K. Maheshwari (2005) Damage pattern along the coast of Tamilnadu during Indian Ocean tsunami of December 26, 2004, ISET, News Letter, Oct. 2004 –April, 2005, 8-11.
2. **J.P. Narayan** (2003) Relevance of seismic microzonation of Mumbai city, ISET, News Letter, July, 2003, 6-8.
3. **J.P. Narayan** (2003) Basin/soil effects on the ground motion characteristics, ISET, News Letter, April, 2003, 6-8.
4. **J.P. Narayan** (2003) Plate tectonics and Earthquakes, ISET, News Letter, Oct., 2002 - Jan., 2003, 26-30.
5. **J.P. Narayan** (2002) The Richter magnitude scale, ISET, News Letter, Jan.-June, 7-11.
6. **J. P. Narayan**, M. L. Sharma and Ashwani Kumar (2001) Bhuj earthquake of January 26, 2001, ISET, News Letter, April-Oct., 27-29.

C. Papers in Proceedings of Seminar/Reports: (Twenty four)

(i) Seminar/Symposium (Thirteen)

1. B.K. Maheshwari, M.L. Sharma and **J.P. Narayan** (2005) Damages on the Indian coast due to tsunamis caused by Sumatra earthquake: Geotechnical aspect. Proc. of Symposium on 'Seismic hazard analysis and microzonation', DEQ, IITR, Sept. 23-24.
2. **J. P. Narayan** (2004) 3D Simulation of basin-edge effects on the ground motion characteristics (Paper No. 3333), Proc. of 13th World Conference on Earthquake Engineering (13WCEE), Vancouver, B.C., Canada, August 1-6.
3. **J.P. Narayan** and M.L. Sharma (2004) Effects of local geology on damage severity during Bhuj, India earthquake (Paper No. 2042), Proc. of 13th World Conference on Earthquake Engineering (13WCEE), Vancouver, B.C., Canada, August 1-6.
4. M.L. Sharma, **J.P. Narayan** and K.S. Rao (2004) Seismic microzonation of Delhi region in India (Paper No. 2043), Proc. of 13th World Conference on Earthquake Engineering (13WCEE), Vancouver, B.C., Canada, August 1-6.

5. **J. P. Narayan**, M. L. Sharma and Ashwani Kumar (2003) Local site effects observed during Bhuj earthquake, Proc. of Workshop on Gujarat earthquake, IIT, Kanpur, January 27-29.
6. **J. P. Narayan** (2002) Study of effects of basin-edge geometry on the surface wave generation using 2.5-D modelling, Proc. of 12th 'Symposium on earthquake engineering' Department of Earthquake Engineering, IITR, Roorkee, Dec. 16-18.
7. **J. P. Narayan**, M. L. Sharma and Ashwani Kumar (2002) Damage survey report: Bhuj earthquake, January 26, 2001, Proc. of the 12th 'Symposium on earthquake engineering' Department of Earthquake Engineering, IITR, Roorkee, Dec. 16-18.
8. **J.P. Narayan** and D.C. Rai (2001) An observational study of local site effects in Chamoli earthquake, Proceedings of 'Workshop on recent earthquakes of Chamoli and Bhuj', Indian Society of Earthquake Technology, Roorkee, May 24-26, 273-280.
9. M. Shrikhande, D.C. Rai, **J.P. Narayan** and J.Das (2000) The March 29, 1999 earthquake at Chamoli, India, Proceedings of 12th World Conference on Earthquake Engineering, Auckland, New Zealand, Jan. 30-Feb 4.
10. **J.P. Narayan** (1998) Numerical strong ground motion simulation and study of local site effects, Proceedings of the 11th 'Symposium on earthquake engineering' Department of Earthquake Engineering, University of Roorkee, Dec. 17-19, 229-238.
11. **J.P. Narayan** and A. Ram (1998) Numerical simulation of scalar wave propagation using higher order accuracy, Proceedings of the 2nd Conference and exhibition on 'Petroleum Geophysics' SPG-98, Chennai, Jan. 19-21, 215-219.
12. **J.P. Narayan** and Ashwani Kumar (1997) Field observations and intensity distribution related to Jabalpur earthquake of May 22, 1997, Proceeding of workshop on 'Earthquake disaster preparedness' held at Department of Earthquake Engineering, University of Roorkee, Roorkee during October 13-14, 219-228.
13. **J.P. Narayan** (1996) Numerical simulation and analysis of reverberations, Proceeding of the conference on 'Mathematics and its Applications in Engineering and Industry', held at Department of Mathematics, UOR, during December 16-18, 377-383.

(ii) Chapters in Books/ Scientific Reports (Eleven)

1. M. L. Sharma, **J. P. Narayan** and B. K. Maheshwari (2005) Effects of tsunami on the Indian coastal region of Tamil Nadu, Chapter in report on 'Sumatra Earthquake of December 26, 2004', Department of Earthquake Engineering, IITR, Roorkee, (unpublished).
2. **J.P. Narayan** (2005) Tsunami, Chapter in report on 'Sumatra Earthquake of December 26, 2004', Department of Earthquake Engineering, IITR, Roorkee, (unpublished).
3. **J.P. Narayan** (2003) Engineering Seismology, DEIW (Distance, Electronic, Interactive, Workshop) Course Series on Earthquake Engineering, 1-43.
4. **J. P. Narayan**, M. L. Sharma and Ashwani Kumar (2002) Local site effects during Bhuj earthquake of Jan. 26, 2001, DST, New Delhi, report on Bhuj earthquake.
5. **J.P. Narayan**, A. Kumar and M.L. Sharma (2001) Seismological aspects of Bhuj earthquake of January 26, 2001 (unpublished).
6. J**.P. Narayan** (2000) Scientific issues and relief operations: Opinions and suggestions, Chapter 6 in report on 'Chamoli Earthquake of March 29, 1999', Department of Earthquake Engineering, University Of Roorkee, Roorkee, 81-86.

7. **J.P. Narayan** et al., (1999) Seismicity and strong ground motion, Chapter 2 in Report published on "Chamoli earthquake of March 29, 1999", National Society for Earthquake Technology (NSET), NEPAL, http://www.adpc.ait.ac.th/ audmp/project outputs/ report/report-chamoli-eq-1.pdf.
8. **J.P. Narayan** et al., (1999) Macroseismic survey and site effects, Chapter 3 in Report published on "Chamoli earthquake of March 29, 1999", National Society for Earthquake Technology (NSET), NEPAL, http://www.adpc.ait.ac.th/ audmp/project outputs/ report/report-chamoli-eq-1.pdf.
9. **J.P. Narayan** (1999) Numerical modelling of strong ground motion, Proceedings of the fourth SERC School on 'Seismology and Earthquake Processes' (SEP-IV), Department of Earthquake Engineering, University of Roorkee, April 12-30, 208-233.
10. **J.P. Narayan**, D.C. Rai and Ashwani Kumar (1997) Introduction, Chapter 1 in Report published on "Jabalpur earthquake of May 22, 1997", Department of Earthquake Engineering, University of Roorkee, Roorkee, 1-11.
11. **J.P. Narayan** and Ashwani Kumar (1997) Seismological aspects, Chapter 2 in Report published on "Jabalpur earthquake of May 22, 1997", Department of Earthquake Engineering, University of Roorkee, Roorkee, 13-39.

D. Books/Reports published (Two)

1. Jabalpur Earthquake of May 22, 1997: Reconnaissance Report, Published by Department of Earthquake Engineering, UOR, Roorkee, 1997, pp.1-101.
2. A Report on 'Chamoli Earthquake March 29, 1999, Published by Department of Earthquake Engineering, UOR, Roorkee, 2000, pp.1-89.

ME-THESIS SUPERVISED

1. 'Numerical simulation of Strong Ground Motion using shear dislocation sources' of Mr. Arvind Kumar, Department of Earthquake Engineering, University of Roorkee, 1999.
2. 'Numerical study of local site effects on the characteristics of Strong Ground Motion' of Mr. Sanjay Kumar Mittal, Department of Earthquake Engineering, University of Roorkee, 1999.
3. 'Effect of topography on strong ground motion characteristics: A numerical study' of Mr. P.V. Prasad Rao, Department of Earthquake Engineering, University of Roorkee, 2001.
4. 'Seismic stratigraphic modelling' of Mr. Bhuvaneshwar Singh, Department of Earth Sciences, University of Roorkee, 2001.
5. 'Seismic discrimination of sand shale ratio' of Mr. Sudesh Kumar, Department of Earth Sciences, University of Roorkee, 2001.
6. 'Seismic microzonation of Delhi' of Mr. K. Sambasivarao, Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee, 2003.
7. 'Numerical study of characteristics of basin-edge induced surface waves and associated differential ground motion' of Mr. Shailesh Pratap Singh, Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee, 2005.

- 'Study of local site effects on the ground motion characteristics using SH wave equation with fourth order accuracy and variable grid size' of Alka Ashokji Richharia,

Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee, (in progress).

- ‘Microzonation of soil parameters and resonance period in and around the Roorkee city’ of Ansul Kumar, Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee, (in progress).
- ‘AVO analysis using reflectivity method of ‘Ragvendra Singh’, Department of Earthsciences, Indian Institute of Technology Roorkee, Roorkee, (in progress).
- ‘Modelling of very thin soil layer saturated with hydrocarbons’ of ‘Sucheta Guleria’, Department of Earthsciences, IITR, Roorkee,, (in progress).
- ‘GIS based microzonation of IIT-Roorkee campus using Nakamura’s H/V technique & GPS generated digital map’, of I. Prabu, Subhadeep Banerjee and Ashes Maji, Department of Earthquake Engineering, IITR, Roorkee,, Roorkee, 2004.
- ‘Tsunami hazard analysis and vulnerability index map along the Indian coastal area’, of Alka Ashokji Richharia, Asiaf Ullah Khan and Ansul Kumar, Department of Earthquake Engineering, IITR, Roorkee, June, 2005.

➢ *Denotes Summer Projects*

SPONSORED PROJECTS

SN	Title	Funding Agency	Amount Rs.	Duration
1.	P.I., Site-specific strong ground motion prediction and study of local site effects using 2.5D and 3D simulation of seismic wave propagation.	DST,	12.14 Lakh	2003-2006
2.	Co-P.I., Broadband seismograph network for modelling of earthquake source and upper crust in the Garhwal Kumaun Himalaya region,	DST,	24.96 Lakh	2002-2005
3.	P.I., Numerical simulation of strong ground motion.	INSA,	4.43 Lakh	1999-2002
4.	P.I., Engineering perspective of strong ground motion simulation.	UGC,	0.15 Lakh	1998-2000

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CONSULTANCY PROJECTS

(Participation in 52 Departmental consultancy projects)

SN	Title	Funding Agency	Amount (Lakhs)	Report No.
1	INDO-NEPAL joint study of Chamoli earthquake effects	NSET-Nepal	0.40	---
2	Site specific earthquake parameters for Teesta H.E. project stage -V, East Sikkim	NHPC, Faridabad	4.00	EQ:2000-12
3	Site specific earthquake parameters for Parbati H.E. project stage -II, Kullu, H.P	NHPC, Faridabad	4.00	EQ:2000-13
4	Site specific earthquake parameters for Teesta low dam project, stage-III, West Bengal'	NHPC, Faridabad	2.00	EQ:2002-05
5	Site specific earthquake parameters for Teesta low dam project, stage-IV, West Bengal'	NHPC, Faridabad	2.00	EQ:2002-06
6	Site specific earthquake parameters for super thermal power plant site, Kahalgaon, Bihar'	NHPC, Faridabad	4.00	EQ:2002-14
7	Site specific earthquake parameters for Dhanikhari and Andaman and Nicobar	NHPC, Faridabad	4.00	EQ:2003-01
8	Site specific earthquake parameters for Sewa-II Hydro-electric project site	NHPC, Faridabad	4.00	EQ:2003-02
9	Earthquake parameter studies for Serlue 'B' Hydel project	NHPC, Faridabad	4.00	EQ:2003-05
10	Site-specific earthquake parameters for Nabi-nagar power plant project, Aurangabad, Bihar	NTPC	4.00	EQ:2003-13
11	Site-specific earthquake parameters for Bhilai power plant project, Durg, Chattisgarh	NTPC	4.00	EQ:2003-14
12	Site specific earthquake parameters for Chamera Hydro-electric project site, Stage-III, H.P.	NHPC, Faridabad	4.00	EQ:2003-15
13	Site-specific earthquake parameters for Kishangaga, HE project, J. & K.	NHPC	4.00	EQ:2003-16
14	Site-specific earthquake parameters for Ujjayanta Palace, Agartala	PWD, Tripura	4.00	Eq:2003-19
15	Site-specific earthquake parameters for Omkareshwar, HE project, M.P.	JP Industries	4.00	EQ:2003-20
16	Site-specific earthquake parameters for Uri-II HE project, J. & K.	NHPC	4.00	EQ:2004-01
17	Site-specific earthquake parameters for Nibu-Bazgo HE project, JK	NHPC	4.00	EQ:2004-02
18	Site-specific earthquake parameters for NCPP Dadary power plant project, Noida	NTPC	4.00	EQ:2004-03
19	Site-specific earthquake parameters for Ennore power plant project, Chennai, Tamilnadu	NTPC	4.00	EQ:2004-04
20	Site-specific earthquake parameters for Korba power plant project, Chattisgarh	NTPC	4.00	EQ:2004-08
21	Site-Specific Design Earthquake Parameter for Korba East Project.	BHEL	4.00	EQ:2004-09
22	Site-specific earthquake parameters for Anjikhand Railway Bridges, J.K.	Konkan Railway	3.00	EQ:2004-13

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23	Microearthquake studies in the environs of Bichom and Tenga dam site, Kameng HE Project, Arunachal Pradesh	NE Electric Power Cop. Ltd.	57.5	EQ: 2004-10
24	Site-specific earthquake parameters for Chenab Railway Bridges, J.K.	Konkan Railway	3.00	EQ:2004-14
25	Site-specific earthquake parameters for Jhanor-Gandhar thermal power project, Bharuch, Gujarat	NTPC	4.00	EQ:2004-17
26	Site-specific earthquake parameters for Lakhwar HE project, Uttaranchal	NHPC	3.00	EQ:2004-21
27	Site-specific earthquake parameters for Vyasi HE project, Uttaranchal	NHPC	3.00	EQ:2004-22
28	Site-specific earthquake parameters for Pipavav thermal power project, Gujarat	NTPC	4.00	EQ:2005-04
29	Site-Specific Design Earthquake Parameter for Chutak HE Project, Kargil District, JK.	NHPC	4.00	EQ:2005-05
30	Site-Specific Design Earthquake Parameter for Allain Duhangan HE Project site, H.P.	AD Hydro Power Ltd	4.00	EQ:2005-06
31	Site-specific earthquake parameters for Loharinag Pala HE project, Uttarkashi,Uttaranchal	NTPC	4.00	EQ:2005-13
32	Site-specific earthquake parameters for Tapovan Vishnugad HE project, Chamoli,Uttaranchal	NTPC	4.00	EQ:2005-14
33	Site-Specific Design Earthquake Parameter for Karcham Wangtoo HE Project, H.P.	JAYPEE VENTURE LTD.	4.00	EQ:2005-17
34	Site-specific earthquake parameters for Koteshwar HE project, Uttaranchal	THDC	4.00	EQ:2005-18
35	Site-Specific Earthquake Parameters for Shahpur Kandi Dam Project, Punjab	Ranjit SD Const. Board	4.00	EQ:2005-20
36	Site-specific earthquake parameters for Vishnugad-Pipalkoti HE project, Uttaranchal	THDC	4.00	EQ:2005-25
37	Site-specific earthquake parameters for Debang Multipurpose Project, Guwahati	NHPC	4.00	EQ:2005-26
38	Site-specific earthquake parameters for Farakka thermal power project, W.B.	NTPC	4.00	EQ:2005-27
39	Site-Specific Design Earthquake Parameter for Pakal Dul H.E. Project, J. & K.	NHPC	3.00	Continue
40	Site-Specific Design Earthquake Parameter for Bursar H.E. Project, J. & K.	NHPC	3.00	Continue
41	Site-specific earthquake parameters for Munda thermal power project, Nagpur	NTPC	4.00	Continue
42	Site-Specific Design Earthquake Parameter for Road Bridge over River Brahmaputra on NH-31, Guwahati.	National Highway Authority of India	4.00	Continue
43	Site-Specific Design Earthquake Parameter for Dikrong HE Project, Arunachal Pradesh.	CES, Pvt. Ltd.	4.00	Continue
44	Site-Specific Design Earthquake Parameter for Kotlibhel HE Projects (Stage-IA), Uttaranchal.	NHPC	3.00	Continue
45	Site-Specific Design Earthquake Parameter for Kotlibhel HE Projects (Stage-IB), Uttaranchal.	NHPC	3.00	Continue

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46	Site-Specific Design Earthquake Parameter for Kotlibhel HE Projects (Stage-II), Uttaranchal.	NHPC	3.00	Continue
47	Site-Specific Design Earthquake Parameter for Bav HE Project, Maharashtra.	NHPC	4.00	Continue
48	Site-Specific Design Earthquake Parameter for Kawar HE Projects, Doda, J & K.	NHPC	3.00	Continue
49	Site-Specific Design Earthquake Parameter for Kiru HE Projects, Doda, J & K.	NHPC	3.00	Continue
50	Site-Specific Design Earthquake Parameter for Ratle HE Projects, Doda, J & K.	NHPC	3.00	Continue
51	Site-Specific Design Earthquake Parameter for Shamnot HE Projects, Doda, J & K.	NHPC	3.00	Continue
52	Site-specific Design Earthquake Parameters for Ban-sagar Canal Project, U.P.	Ban-sagar Canal, Proj. UP.	4.00	Continue
		TOTAL	**2,40.90**	