Agenda Papers

for

31st

Project Approval Board Meeting

3rd December, 2015

at

Conference Room,
Shastri Bhawan,
Ministry of Human Resource Development, New Delhi- 110 001

F. No. 16-34/2015-TEL
Government of India
Ministry of Human Resource Development
Department of Higher Education
TEL Division
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216-D, Shastri Bhawan,
New Delhi, dated 02.12.2015

OFFICE MEMORANDUM

Subject: Agenda for 31st Meeting of the Project Approval Board (PAB) of National Mission on Education through Information and Communication Technology (NMEICT)

The undersigned is directed to forward herewith agenda for the 31st meeting of the Project Approval Board (PAB) of National Mission on Education through Information and Communication Technology scheduled to be held on **03rd December, 2015 at 11:00 A.M.** under the chairmanship of Secretary (HE) in Conference Room No.-112, C Wing, Ministry of Human Resource Development, Shastri Bhawan, New Delhi.

2. Kindly make it convenient to attend the meeting and a line of confirmation may kindly be sent on email: kdverma.edu@nic.in

2/12/15

(K.D. Verma)
Under Secretary (TEL)
Tel 011-23073582

To,

1. Secretary, Department of Higher Education
2. Additional Secretary (TE), Department of HE, Ministry of Human Resource Development
3. Representative of Department of Expenditure
4. Representative of NITI Aayog
5. Representative of Department of Telecommunication
6. Representative of Department of Space
7. Representative of Department of Science & Technology
8. Representative of Department of Bio-Technology
9. Representative of the Ministry of Agriculture & Cooperation
10. Representative of the Ministry of Health & Family Welfare
11. Two representatives of Department of Electronics & Information Technology (DeitY)
12. Director, Indian Institute of Technology Bhubaneshwar
13. Director, Indian Institute of Technology Mandi
14. Director, Indian Institute of Information Technology, Design & Manufacturing (IIIT) Kancheepuram
15. Director, Indian Institute of Information Technology and Management (IIIT) Gwalior
16. Director, National Institute of Technology (NIT) Jaipur
17. Director, National Institute of Technology (NIT) Agartala
18. One Representative from National Association of Software and Services Companies (NASSCOM)
19. One Representative from Federation of Indian Chambers of Commerce and Industry (FICCI) / Confederation of Indian Industry (CII) / Associated Chambers of Commerce and Industry of India (ASSOCHAM)
20. One Representative from Manufacturers' Association for Information Technology (MAIT)
21. Three experts in the area of e-education nominated by the Chairperson:-
    (i) Shri. Gautam Shroff, Vice President & Chief Scientist, TCS Innovation Labs Delhi
    (ii) Prof. Pankaj Jalote, Director, IIIT Delhi
    (iii) Shri. F. C. Kohli, Chairman, CoE, Pune and Founder, TCS
22. JS & FA, Department of HE, Ministry of Human Resource Development

Copy to:-

1. Sr. PPS to Secretary (HE), M/o HRD
2. Sr. PPS to AS (TE), M/o HRD
3. PS to JS & FA, M/o HRD
4. Director (TE), M/o HRD
5. DS (ICT), M/o HRD

Copy for information & necessary action to:-

1. Project Manager (NMEICT)
2. Prof. Uma Kanjilal, Project Coordinator, SAKSHAT Portal, IGNOU – for uploading it on Sakshat Portal

Ministry of Human Resource Development
Department of Higher Education
NMEICT

31st Meeting of Project Approval Board, NMEICT

Date: **3rd December 2015 at 11:00 a.m.**
Venue: **Conference Room No.112, C-Wing, Shastri Bhawan, New Delhi.**

AGENDA ITEMS

Agenda Item No. 1

Confirmation of the "Minutes of the 30th Meeting of the Project Approval Board" held on 28th October, 2015.

National Mission on Education through
Information and Communication Technology (NME-ICT),
Ministry of Human Resource Development (MHRD)

Agenda Item No.1

Confirmation of the minutes of the 30th PAB meeting held on 28th October 2015 & Approval of minutes of the meeting.

The " Minutes of the 30th Meeting of the Project Approval Board " held on 28th October 2015 is placed for perusal and confirmation please (Annexure-1).

Agenda Item No. 2

" Action Taken Report " on the Minutes of the 29th PAB meeting held on 20th May 2015 (Page: 3 to 24) & 30th PAB meeting held on & 28th October 2015 (Page: 25 to 28).

Agenda Item No. 2

The " Action Taken Report " on the Minutes of the 29th PAB meeting held on 20th May 2015 (Page: 3 to 24) & 30th PAB meeting held on & 28th October 2015 (Page: 25 to 28).

The "Action Taken Report" on the Minutes of **29th Meeting** of Project Approval Board (PAB) of National Mission on Education through Information and Communication Technology (NMEICT) held on **20th May 2015** is placed below :

Agenda Item No	Action taken
Agenda Item No. 4 & Agenda Item No. 8 of the 28th Meeting of the PAB	
Regarding "Empanelment of Government Undertakings and State IT Organizations for Installing LANs at Universities" and "Providing 1+1 Redundancy to all Centrally Funded Institutions in North-Eastern States, J & K and hilly areas", the Members were of the view that the TEL Bureau may convene a Meeting of Secretary, Higher Education, Secretary, Telecom; Chairman, Domain Expert Committee, NMEICT on Connectivity; and Education Secretaries of the States, to review of the status of connectivity provided under NMEICT & NKN to Universities and Colleges in various States. The Members reviewed the issue of addressing the redundancy to Optical Fiber Connectivity already provided to the Institutions in the North-Eastern States, J&K and hilly areas. The Members felt that providing another Optical Fiber link at these places, as a redundancy link, may not be that fruitful. Prof. SV Raghavan, Chairman, Domain Expert Committee, NMEICT on Connectivity reminded the Chairman, PAB that he has already suggested that a letter, the draft of which has already been submitted by him, may be sent to Secretary, Department of Space (DoS) requesting him to allocate ten Transponders on INSAT-15 (to be launched around September, 2015) for establishing the redundancy link in the North-Eastern States, J&K and hilly areas.	**Action is under process.**
The PAB while noting the above developments agreed to them. The PAB also approved that the NMEICT should monitor the functioning and availability of appropriate level of connectivity through BSNL and MTNL as a case may be. The	**A meeting was held on 16th June, 2015 by Secretary (HE) with representatives of AICTE and UGC. Further, another meeting was held on 22nd**

PAB further approved that:- – **redundancy links be established in the North-Eastern States, J&K and hilly areas using ten Satellite Transponders, subject to the availability of funds with NMEICT.** – **a request letter as suggested by Prof. SV Raghavan on this be sent to Secretary, DOS as soon as possible.**	**September, 2015 by Secretary (HE) with the representatives of UGC. UGC and AICTE have to respond on the issues raised in the meetings.**
Agenda Item No.14 of the previous PAB "Consulting work for review and amendment of applicable UGC/AICTE Regulations for incorporating Technology Enabled Learning in Higher Education". The Members were informed that the Project could not be awarded. However, the Members recommended that the Committee constituted to redraft the DECI Bill may be approached by the MHRD to consider the recognition of award of certificates & degrees through the ICT mode by NMEICT such as MOOCs, NPTEL, e-content etc. expeditiously. The Members were informed that the Committee constituted to redraft the DECI Bill has already submitted its report and it would be appropriate to approach the UGC and the AICTE and the Regulator of Distance Education to have appropriate Regulations regarding the recognition of award of certificates & degrees through the ICT mode by NMEICT such as MOOCs, NPTEL, e-content etc. so that the students do not face any problem or uncertainty.	**A letter was sent by the Mission Director to Chairman, AICTE. However, AICTE has declined to provide office space in the immediate future because of settling their own offices in the new premises.**
Agenda Item No. 16 of the previous PAB The issue regarding Office Space for Mission Secretariat, NMEICT was discussed. After consideration of various options, it was decided that the required space for NMEICT may be made available by the All India Council of Technical Education (AICTE) in their new building now ready at Nelson Mandela Road. The TEL Bureau was authorised to approach the AICTE for this.	

Agenda Item No III: **Items for Ratification** The issues concerning NMEICT, wherein Secretary, Higher Education in his capacity as Chairman, PAB has taken the following decisions, were put before the Members for ratification. The issues listed were discussed and the Members ratified the decisions taken by Secretary, Higher Education as under:-	
a) Constitution of DTH Operations & Monitoring Group (OMG). The Members were informed that the MHRD vide Order F. No. 01-01/2014-TEL, dated 16th January, 2015, has reconstituted the 20 Member Domain Expert Committee called "DTH Operations & Monitoring Group (DTH-OMG)" under the Chairmanship of Prof. SV Raghavan, Scientific Secretary, Office of the Principal Scientific Advisor, Government of India, and the Terms of Reference of the Group are also spelt out in this Order. The 'DTH-OMG' as one of the three Domain Expert Committees now replaces the 15 Member 'DTH Committee' approved by the 'National Apex Committee', NMEICT in the 16th PAB Meeting, held on 1st September, 2010. **The PAB ratified the Constitution of the DTH Operations & Monitoring Group (OMG) with the amendment that the Member-Secretary of this Committee will be notified as the 'Consultant looking after the work of DTH in NMEICT' and not by name as appearing now in the Order. The PAB further authorized the Mission Director to issue a revised order to this effect.**	**The three Domain Expert Committees, including the DTH-OMG, are being reconstituted.**
b) List of 213 Institutions and copy of a Standard MOU. The Members were briefed that the "DTH Committee" has recommended the setting up of 213 Teaching Ends (TEs) for transmission of live content for the proposed 50 DTH Channels and creation of requisite content. A list of Institutions where the TEs are being established	**The standard MoU has been approved by the Department of Legal Affairs, Ministry of Law & Justice and the Nodal Officer had discussions with experts in IIT, Bombay regarding the future course of action.**

include Institutions like the Central Universities (CUs), Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), National Institutes of Technical Teachers' Training and Research (NITTTRs), Indian Institutes of Management (IIMs), Consortium for Educational Communication (CEC) & EMMRCs, Indira Gandhi National Open University (IGNOU) & State Open Universities, Institutions of National Importance, State & other Universities, Agricultural Universities, Medical Institutions etc., was circulated and it was informed that this list was approved by former Secretary, Higher Education & Chairman, PAB along with a standard MoU. **The PAB approved the decision taken in selection of the 213 TEs and in-principle approved the MoU re-visited by the TEL Bureau and authorized the Nodal Officer/Director (ICT), Department of Higher Education to sign the MoU after the above mentioned vetting and completion of other necessary formalities.**	
Agenda Item No. III. 3 **This Agenda Item was relisted under the heading 'Miscellaneous Items' (Agenda – IV D).**	
Agenda IV A, Administrative issues: **Agenda IV A (1)** **Engaging additional Technical & Secretarial Support Staff for NMEICT** The Members were informed that presently, only 3 Senior Consultants are engaged in the Mission, who are assigned more than 100 sanctioned Projects to mentor, guide, monitor, review and report as the representatives of MHRD/NMEICT through attending PRSG Meetings, attend work related to the three Domain Expert Committees and the PAB Meetings etc., and are assisted by a Computer Operator each. Further new initiatives have been taken by the NMEICT such as Wi-Fi in all Universities, National Digital Library, CHEERS, MOOCs etc. and as such additional manpower is urgently required.	**The process of the selection of Additional Staff is in progress and the interviews for the post of three Junior Consultants were already been held on 15th and 16th October, 2015.** **The interviews for the post of Consultant were held on 6th November, 2015 and 9th November, 2015 three Consultants selected out of which two have joined.** **The interviews for the post of Senior Consultant were held**

The Members were informed that at present the NMEICT has 30 Vacant positions, approved by the PAB and there is a proposal to fill 13 of these vacant positions. **The PAB approved the proposal to engage: 2 Senior Consultants; 1 Consultant; 3 Junior Consultants; 2 Secretarial Support Staff; 2 Office Assistants and 3 MTS/Messengers for NMEICT as per norms.**	**on 24th November, 2015 and action is being taken to finalize the candidates for the post of Senior Consultant.**
Agenda IV A (2). **Enhancement of Consultancy Fee of Senior Consultants and the Salary of other Contractual Supporting Staff working in TSG-EdCIL and re-designation of Senior Consultants.** The Members were informed that the consultancy fee of 2 Senior Consultants (recruited by EdCIL through regular selection process), was fixed at Rs. 90,000/- consolidated w.e.f. 1st April, 2012 consequent to the decision of the 24th PAB Meeting held on 4th October, 2012. It continues to be Rs. 90,000/- even now and has been frozen since 1st April, 2012. In addition, other supporting staff at various levels has also not been given any raise since September, 2013. The Members were informed that the personnel working in the Mission have been demanding appropriate and regular annual raise commensurate with inflation as well as their performance. **a) The PAB approved the introduction of annual raise in consulting fee/salaries of Senior Consultants/Supporting Staff engaged in NMEICT, commensurate with inflation as well as their performance as per the table given in the Agenda Note. However, the PAB felt that for all personnel including Senior Consultants, an appropriate upper limit of consolidated fee/salary has to be specified by EdCIL, to provide such relief to all the personnel recruited by EdCIL for NMEICT. The PAB further recommended that within the new ceiling so specified by EdCIL, they may follow the rules concerning performance rating for annual increase to all personnel engaged for NMEICT.**	**Appropriate action shall be taken as and when required.**

b) The PAB also approved to re-designate the incumbent 'Senior Consultants' recruited by EdCIL through regular selection process in NMEICT, as "Chief Consultants" without any additional financial outgo because of this re-designation. This would not add to the presently sanctioned strength of Consultants for NMEICT.	
Agenda IV A (3) **Delegation of financial powers for TSG-EdCIL expenditure to Nodal Officer (NMEICT).** The Members were briefed regarding the proposal for delegation of financial powers to the Nodal Officer (NMEICT) for expenditure up to Rs.5.00 Lakh. **The PAB deliberated and felt that the Apex Committee has delegated Financial Powers of NMEICT to 'Joint Secretary (TEL) & the Mission Director' and such powers cannot be further delegated by the JS (TEL) & Mission Director to Nodal Officer (NMEICT). However, financial powers up to** Rs.**5.00 Lakh for routine and administrative activities and small purchases may be delegated to Nodal Officer (NMEICT) with prior approval of Chairman, Apex Committee i.e. the Hon'ble Minister for Human Resource Development.**	**The proposal for implementing the decision under process.**
Agenda IV A (4). **Extension for continuing NMEICT Projects pending proposed review/evaluation by an Independent Agency for large Projects and by respective PRSGs for smaller Projects.** The Members were informed that all NMEICT Projects were given last extension for completion up to 30th September, 2014 and they were advised to complete the Projects and send Completion Reports to the Mission Secretariat. It is now proposed that before certifying as satisfactory, the completion of the Projects, particularly the large Projects with a sanction amount exceeding Rs.1.00 Crore, an independent agency may be asked to evaluate and review the Project outcomes.	**The TSG-EdCIL has been requested to identify independent agency for evaluation and review as directed by the PAB.**

The PAB approved the evaluation and review of Project outcomes of all Projects above Rs.1.00 Crore by an Independent Agency and evaluation and review by the respective PRSGs for remaining Projects. The PAB also approved the extension for all continuing Projects till 31st December, 2015, with effect from the expiry of last approval, without sanction of any additional amount, so that the review of the Projects can be completed. The PAB also authorized the Chairman, PAB to approve the selection of an independent agency for reviewing these Projects.	
Agenda IV A (5). **Budget Estimate for TSG-EdCIL & Mission Secretariat NMEICT for the Financial Year 2015-16** The Members were briefed that EdCIL as TSG maintains and supports the Mission Secretariat of NMEICT & the salary of staff etc. The disbursement to EdCIL is presently linked with 1% of NMEICT Budget Outlay as per Para-7(f) of the note approved by the CCEA. The Budget estimated towards recurring administrative expenses at present ranges between Rs.250.00 - Rs.275.00 Lakh. **The PAB approved the Budget Estimate of Rs.200.00 Lakh for TSG-EdCIL and Mission Secretariat, NMEICT; as the budget outlay for NMEICT in 2015-16 is Rs.200.00 Crore. It was also approved that the TSG-EdCIL may be entrusted with the additional support work related to new Schemes CHEERS and SWAYAM.**	**Compliance has been done and decision of the PAB is being followed.**
Agenda IV A (6). **Reconstitution of Selection Committee for Interview of Senior Consultants & Consultants of NMEICT.** The Members were informed that the PAB in its 6th Meeting held on 29th May, 2009 has approved Selection Committee for interview of 'Consultants', which is around 6 years old and outdated and were therefore requested to reconstitute the Selection Committee.	**Compliance has been done and decision of the PAB is being followed.**

The PAB therefore considered reconstituting the Selection Committee for interviewing Senior Consultants, Consultants & Junior Consultants for NMEICT as under:- – **Mission Director (NMEICT)** – **Representative of EdCIL** – **Domain Experts to be nominated by EdCIL in consultation with Mission Director (NMEICT).**	
Agenda-IV C **Items recommended by Standing Committee, NMEICT, as under, were taken up for deliberation and decision by the PAB.**	
Agenda-IV C (1) **Creating Digital Learning Environment for design in India (e-Kalpa) Phase-II.** **Project Investigator (PI): Prof. Ravi Poovaiah, IIT Bombay.** The Members were briefed that this is a continuing Project, wherein Phase-I has been completed and Phase-II of the Project has been recommended by the Standing Committee (SC) in its Meeting held on 25th August, 2014 with the budget outlay of Rs.8.40 Crore & the SC has also offered some observations. **The PAB approved e-Kalpa Phase-II at a total cost of Rs.8.40 Crore with the stipulation that the e-content developed under the Project may be assessed by an independent body to take into consideration the opinions of learners. It was also recommended that the name of the Project website be changed to a new familiar name which directly relates with this Project.**	**An amount of Rs. 2.5 crore has been released to project on 15th June, 2015.**
Agenda-IV C (2). **Entrepreneurship Development for the Educated Youth in India.** **PI: Prof. Prem Chander, Visiting Professor, IIM Ahmadabad**	**The PI has been asked to resubmit the proposal.**

The Members were informed that the SC has recommended in-principle the development of 10 Courses by the PI in two years' time at the rate recently approved by the PAB, i.e., Rs.29,000/- for one hour of e-content development (each course of 40 Hours) and Rs.2,000/- for Transcription. However, in the first instance, development of 5 Courses in MOOCs format with a budget of Rs.62.00 Lakh in the first year is proposed. **The PAB decided that now onwards all content development Projects to be put up for approval before the PAB should be MOOCs compliant only. The PI should therefore be asked to re-submit the proposal for development & running of these courses on MOOCs format to the DEC, once the recommendations of the Costing Committee on MOOCs are considered, finalized and notified.**	
Agenda-IV C (3) **National Consultation for Educational Technology for Establishment of Indian Association of Educational Technology (IAET)** **PI: Dr. Jayashree Shinde, SNDT Women's University, Mumbai.** The SC has recommended a proposal to establish "Indian Association of Educational Technology (IAET)" as a common platform for pooling together of expertise in the field of Educational Technology. On the recommendation of the SC the PI has revised the DPR for a 'National Consultation Conference' with NMEICT's funding for grant of Rs.18.50 Lakh for the Conference. **The PAB observed that formation of Associations is not in the mandate of NMEICT; accordingly, the proposal was not approved.**	**No Action required.**
Agenda-IV C (4) **e-Training Environment for Training Technical (Polytechnic) Teachers & Students** **PI: Dr. S. Mohan, Director NITTTR Chennai.** This is a proposal to develop 80 courses for Polytechnics by 4 NITTTRs with NITTTR Chennai as the Anchor Institution. The SC on 25th August, 2014	**No Action required.**

has recommended a budget of Rs.13.40 Crore, as first instalment to initiate the program. The SC also advised that PRSG for this program is to be constituted. **The PAB observed that the PI has since left the NITTTR and no further interest has been shown by any of the NITTTRs after that. The proposal was therefore not approved.**	
Agenda-IV C (5) **E-content creation in the area of Economics, Mathematics, Commerce, History, Zoology & Botany.** **PI: Prof. Ramesh Kumar Gautam, Director, ILLL.** The Members were briefed that this is a continuing Project and the PI has requested for release of the second instalment. The SC in the Meeting held on 8th September, 2014, recommended the release of Rs.50.00 Lakh as next installment out of 2 Crore budget already approved by the PAB. **The PAB approved the release of the next instalment as recommended by the SC.**	**In this project CCA MHRD had conducted a special audit. Director ILLL was asked to submit his comments on the Special Audit Report. The response received from Director ILLL have been sent to CCA for his comments. On issue of financial irregularity as mentioned in the report, ICT Division has sought comments of Director ILLL.**
Agenda-IV C (6) **Creation of Social Work Education Network** **PI: Dr S. Parasuraman, Director, TISS, Mumbai.** The SC has forwarded a Project recommending Creation of Social Work Education Network with a budget to implement setting up of six subject hubs in six regions including North, South, East, West, North-East and Central India. There would be 30 Colleges affiliated to the six hubs based on the accessibility, resources and student strength. Courses Offered – 2000 teaching learning hours will be created contributing to 4 complete courses and part content for 3 courses. Teachers Training - Two batches of Teachers Training shall be organized for 100 trainers. **The PAB feels that the Project does not cover the objectives of NMEICT. Further the Indian Council of Social Sciences Research (ICSSR), which has mandate for Social Sciences, can be approached for seeking funding of this Project. The proposal was therefore not approved.**	**No Action required.**

Agenda-IV C (7) **Institutional Network and Virtual Knowledge Repository for Arts and Humanities Education in India-Sahapedia.** **PI: Prof. Navjyoti Singh, IIIT Hyderabad.** The proposal is to build an Institutional Network and Virtual Knowledge Repository for Arts and Humanities Education in India, engaging nine partner Institutions, both Universities and Cultural Organizations. 11 content modules + 3 proofs of concept/Detailed Project Proposals (DPPs)will be produced. **The PAB decided that now onwards all content development Projects to be put up for approval before the PAB should be MOOCs compliant only. The PI should therefore be asked to re-submit the proposal for development & running of these courses on MOOCs format to the DEC, once the recommendations of the Costing Committee on MOOCs are considered, finalized and notified.**	**The PI has been asked to resubmit the proposal.**
Agenda-IV C (8) **Seamless Integrated e-Learning Knowledge Management System for Commerce Education at National Level COMMTEL.** **PI: Prof. Bhanu Murthy, Khalsa College, Delhi University.** The Project proposal is to build courses in commerce subjects. The SC has recommended the PI to concentrate on the development of lectures only to establish proof of concepts and recommended 156 Video Lectures, 300 e-LORs, Transcription, Question Bank & Workshop and after due-diligence a budget of Rs.69.36 Lakh is recommended. **The PAB decided that now onwards all content development Projects to be put up for approval before the PAB should be MOOCs compliant only. The PI should therefore be asked to re-submit the proposal for development & running of these**	**The PI has been asked to resubmit the proposal.**

courses on MOOCs format to the DEC, once the recommendations of the Costing Committee on MOOCs are considered, finalized and notified.	
Agenda-IV C (9) **Intelligent Tutoring Systems for Primary & Secondary school Subjects.** **PI: Prof. Amey Karkare, IIT Kanpur.** The Project proposal is to develop automated intelligent tutoring systems for various domains, including Physics, Chemistry and Mathematics topics for Primary and Secondary Schools and for Engineering Courses. It was observed that the PI intends to develop tutoring systems for Primary and Secondary Schools and the Mission is mandated for funding Projects concerning Higher education only. **The PAB did not approve the proposal 'Intelligent Tutoring Systems for Primary & Secondary School Subjects', as they do not fall in the mandate of NMEICT.**	**No Action required.**
Agenda-IV C (10) **National Programme on Technology Enhanced Medical Education** **PI: Prof. M. Manivannan, IIT Madras.** The proposal is to develop prototypes of *basic medical education ICT tools,* comprising haptic feedback devices, sensors and actuators and computer/network/multimedia equipment. There are very few proposals received by Mission, concerning Medical discipline. The Project is a pilot Project to focus at present only on two deliverables, instead of 10 deliverables as proposed in the original proposal. The timeline has been reduced to six months, instead of three years. **The PAB felt that Project proposals on Medical Education do not fall under the purview of MHRD; therefore, the proposal was not approved.**	**No Action required.**

Agenda-IV C (11) **"Running Online Courses for Polytechnics and Skill Development" by NITTTR, Kolkata as Nodal Agency as extended arm of MHRD.** **PI: Prof Phalguni Gupta, NITTTR, Kolkata.** The Project proposal is to set up the Massive Open Online Courses (MOOCs) platform and to be named as Institute of Future Learning (IFL), as and when the SWAYAM platform is launched. The PI and the Institutes may be involved in the preparation of content in the form of MOOCs. The SWAYAM platform can be provided to NITTTR, Kolkata instead of a separate platform proposed to be created by NITTTR, Kolkata. **The PAB decided that now onwards all content development Projects to be put up for approval before the PAB should be MOOCs compliant only. The PI should therefore be asked to re-submit the proposal for development & running of these courses on MOOCs format to the DEC, once the recommendations of the Costing Committee on MOOCs are considered, finalized and notified.**	**The PI has been asked to resubmit the proposal.**
Agenda-IV C (12) **Establishing a Centre of Excellence (CoE) for Research into Indian Knowledge Systems (RIKS).** **PI: Dr. P. Ramanujan, C-DAC, Bangalore.** The PI proposes to create online, ICT-enabled, PG-level, Sanskrit academic e-Content for seven disciplines in 4-quadrant approach to enhance and upgrade Central Sanskrit University curricular courses of UGC recognition. **The PAB did not approve the proposal 'Establishing a Centre of Excellence (CoE) for Research into Indian Knowledge Systems (RIKS)' and was of the view that:-** **(a) It would be better if e-Content, as proposed, are MOOCS compliant.**	**No Action required.**

(b) It would be further better if the PI collaborates with an Academic Institution in the domain of Sanskrit language.	
Agenda-IV C (13) **Learning by Doing (LBD) based course Content Development.** **PI: Prof. Sandhya Kode, IIIT Hyderabad** The proposal is an ongoing Project and on the recommendations of the SC, the PAB had approved this Project at an estimated amount of Rs.119.00 Lakh for development of 17 courses, out of which Rs.35.70 Lakh have already been sanctioned. The PRSG in its Meeting has found the progress satisfactory. The SC in-principle has recommended for enhancement of the budget of the Project as per rate approved by the PAB for the CEC. **The PAB approved the release of the next instalment as recommended by the SC, if not already released so far.**	**For release of the funds to the project, a copy of the minutes of the PRSG meeting held on 13th August, 2015 is required. The PI has been asked to submit the minutes of the PRSG.**
Agenda-IV C (14) **Design and Development of Neuro-Endo Trainer for Neurosurgery Psychomotor Skills Training.** **PI: Prof. Ashish Suri, AIIMS in collaboration with IIT Delhi** The proposal before the PAB is to develop prototypes of basic medical education ICT tools, comprising haptic feedback device, sensors and actuators and computer/network/multimedia equipment. **The PAB felt that Project Proposals on Medical Education do not fall under the purview of MHRD; therefore, the proposal was not approved.**	**No Action required.**
Agenda-IV C (15) **Production of e-content courseware development in Bachelor of Commerce, Bachelor of Business Management.** **PI: Prof. H. Rajashekar, University of Mysore.**	**The PI has been asked to resubmit the proposal.**

The proposal before the PAB is to develop e-content Courseware for 26 subjects under Phase-I & under Phase II production of additional 22 subjects shall be undertaken. Each subject consists of two Courses of 40 hours each and the subjects include development in Bachelor of Commerce, Bachelor of Business Management & Translation. **The PAB decided that now onwards all content development Projects to be put up for approval before the PAB should be MOOCs compliant only. The PI should therefore be asked to re-submit the proposal for development & running of these courses on MOOCs format to the DEC, once the recommendations of the Costing Committee on MOOCs are considered, finalized and notified.**	
Agenda-IV C (16) **Dissemination of NMEICT products through Google.** **PI: Mr. Rachit Jain, Google India Private Ltd.** The proposal is to launch massive publicity campaign to make the student and teacher communities aware of the major products of the NMEICT and to use a phased approach for the online promotions by Google India using the Google Platform. **The PAB did not approve the proposal, 'Dissemination of NMEICT products through Google' as it felt that it would be better to use an indigenous platform for the purpose.**	**No Action required**
Agenda-IV C (17) **Policy Decision on Wi-Fi Campus Connect in University Campuses connected through NMEICT.** The PAB was informed that the BSNL out of 403 universities having provided with 1 Gbps connectivity has further provided 400 node LAN in 50 Universities only and is now in the process of establishment of Wi Fi connectivity in 48 Universities. There are lots of	**The issue was also discussed in 30th meeting of PAB held on 28th October, 2015. Based on the decision in the meeting item is likely to be discussed in the 31st meeting of PAB which is scheduled to be held on 3rd December, 2015.**

complaints received from various users on non-satisfactory performance of BSNL. Further, once the migration of NMEICT networks to NKN is done, the charges for connectivity by BSNL should not be paid. **The PAB approved that a Fact-Finding Committee be constituted to look into the matters related to complaints on connectivity and provision of LAN by BSNL & MTNL under NMEICT to Universities and Colleges.**	
Agenda-IV C (18) **e-Exam** **PI: Prof. R.K. Shevgaonkar, IIT Delhi** The Project is to develop electronic examination system wherein the basic principles in defining the problem and finding its solution, etc. are based on outcome based education, instead of traditional system. The proposal has two components, viz., Paper setting Platform and Creation of e-Exam Question Bank for five courses. A separate platform may not be required to be set up, since this shall be supported under SWAYAM platform. Accordingly, the Project cost after such consideration stands at Rs. 135.00 lakhs**.** **PAB did not approve the Project as neither the PI nor any of his team members were present to explain the Project.**	**No action required**
Agenda-IV C (19) **Campus Connect Provision of Wi-Fi in 350 Universities** **PI: Prof. Jaspal S. Sandhu, Secretary, UGC** The proposal is to provide Wi-Fi services in 305 Universities at a cost of Rs.40.00 lakhs per university. This Department is working hard for implementation of the decision taken in the Meeting chaired by the Principal Secretary to PM on 17th December, 2014 regarding Digital Initiative in HRD. One of the components of the decision was provision of Wi Fi in Universities.	**An amount of Rs. 6.8 crore was released to UGC on 30th March, 2015. UGC had requested MHRD to allow them utilise the fund during the F.Y. 2015-16. MHRD has conveyed the concurrence to UGC for utilising the amount during F.Y. 2015-16.**

The PAB took note of it and ratified the release of funds to the UGC for Wi-Fi Campus Connect in Universities.	
Agenda-IV C (20) **Distributed Digitized Answer Book Evaluation Software for a Computer Aided System.** **PI: Dr. P. Sunthar, IIT Bombay** The proposal is to develop a software system, associated answer book design, printing and post-exam booklet handling standards and protocols, making statistics and MIS for an unbiased, secured error free on screen evaluation of digitized answer booklets. After the SC recommendation & Financial Due Diligence a budget of Rs.35.40 Lakh is proposed. **The PAB did not approve the proposal "Distributed Digitized Answer Book Evaluation Software for a Computer Aided System" as the PI did not agree for the revised cost recommended after Financial Due Diligence.**	**No action required**
Agenda-IV C (21) **Award of 'Consulting Work' for ERP Project Completion and Integrated Implementation.** **PI: Prof. Y.N. Singh, IIT Kanpur.** The proposal put up by the SC is that the PI has informed that he and his group have completed 9 out of 15 EduERP components of the sanctioned Project. It has been observed that, most of the components of the EduERP Project are working fine but such components are working in silos and are lacking seamless integration of EduERP modules within the Institution as well as across the Institutions. The SC has recommended awarding the missing work to a consulting agency for preparation of an assessment report after carrying out "Gap Analysis" etc. to be completed in three-month period at a cost of Rs.15.00 Lakh. **The PAB approved the proposal to release Rs.15.00 Lakh as recommended by the SC.**	**The matter has been processed and a further clarification is being sought from Prof. Y N Singh.**

Agenda-IV C (22) **The Village Community Network** **PI: Dr. K. S. Daya, Dayalbagh Educational Institute, Agra** The proposal put up by the SC is that the PI was assigned to develop low cost network synchronization oscillators for voice data networks to bring down cost of network installation, operation and services dramatically and to rollout technology for ubiquitous connectivity in two remote villages. An amount of Rs.3.00 Crore out of Rs.6.00 Crore, approved by the PAB has been released. The PI has spent Rs.3.22 Crore on the Project. The SC has now appreciated the efforts of the PI; however, it is felt that the Project can no longer be funded under the Mission. The SC has recommended the release of excess amount Rs.22.00 Lakh spent by the PI. The UC has been received from PI, which states an excess expenditure of Rs.23,05,235/-. **The PAB approved the proposal to release Rs.23,05,235/- to the PI subject to Receipt of the Report by the PI and Acceptance of it by the DEC and observed that the DEC should ensure that the Phase-I deliverables of the Project are put to proper use.**	**PI has been asked to submit a report on the progress of the project, which is awaited.**
AGENDA-IV C(b) **Proposals forwarded by Domain Experts Committee, Direct to Home-Operations Management Group.**	
AGENDA-IV C(b) (1) **Projects recommended by the "DTH OMG" are put before PAB for kind consideration & approval** The DTH-OMG vide its 1st Meeting held on 4th February 2015, recommended a-g Projects as under:-	**No action required**

(Rs. in Lakhs)

Item No	Proposal Regarding	Institution	Amount approved
(1) a	Development of Pedagogy & Scheduling	SNDT Women's University	135.00
(1) b	Design & develop Logo's & its animate	IIT BOMBAY	25.00
(1) c	Develop & design Template for e-Content development	INFLIBNET	35.00
(1) d	Conduct trainings & workshops for Subject Co-ordinators, SME's, TE Co-ordinators etc.	CEC	1000.00
(1) e	Design and implement Advertisement, promo & Awareness programme	INFLIBNET	505.00
(1) f	Strengthening activities, management, office, manpower etc., for running DTH Programme.	IIT Delhi	75.00
(1) g	To study & design a number of Set Top Boxes, for reception of MHRD DTH programme.	Only conduct of Meetings	-NIL-

The Chairman, PAB questioned the recommendation of awarding the above mentioned Projects on nomination basis; it was felt by the PAB that there is no justification for awarding these Projects on nomination basis.

AGENDA-IV C(b) (2)

Engaging Director, IIT Delhi for Setting up MHRD DTH Earth Station at JNU and seeking Technical Assistance of Prasar Bharti

The DEC DTH-OMG has forwarded a proposal as above, stating that the PAB in its 23rd Meeting had approved for obtaining services of M/s TCIL at one-time payment of Rs.24.00 Lakh for locating an agency for hiring a Teleport for MHRD 50 DTH Channels. A sum of Rs.7.2 Lakh has already been released to TCIL for tendering to hire teleport facilities and the TCIL has also gone ahead with the tender on this.

Noted & efforts are on to request Chairman, ISRO to assist utilizing ISRO's satellite uplinking facility for use in MHRD DTH programme.

The PAB did not approve the above Projects and it was decided that it may be explored whether renting the infrastructure rather than owning it would be better or not as the Mission has no expertise regarding maintaining such infrastructure.	
AGENDA-IV C(b) (3) **Revised Budget (Recurring + Non-recurring) on DTH Programme and defining the Source of Budget for DTH activities.** The PAB was briefed that the PAB in its 25th Meeting approved a budget of Rs.572.73 Crore (Non-Recurring Rs.197.77 Crore & Recurring Rs.374.96 Crore). The MHRD vide letter dated 2nd January, 2015 to Director IIT, Madras, has communicated to go ahead & explore the possibility to reduce the cost of TEs. Based on revision exercise, the IIT Madras has submitted tentative revised budget proposal, Non-Recurring budget of Rs.244.41 Crore, Recurring budget of Rs.103.58 Crore/annum and budget on Content Development etc. Rs.102.34 Crore/annum. It was pointed that the Mission document has earmarked Rs.401.00 Crore on hardware activities related to satellite dissemination, now being undertaken under the DTH Programme. **The PAB decided that the Detailed Budget Proposal may be put up on file for consideration and scrutiny by the IFD of MHRD before being put up to the Chairperson, PAB who was authorized to take a final decision.**	**The budget proposal shall be put before the IFD for kind consideration and scrutiny.**
Agenda-IV D, Miscellaneous Items **Process for Preparing Agenda Notes for New Proposals.** The Guidelines/procedures for processing NMEICT Project proposals issued on 12th December, 2014, state that the recommendations of the Domain Experts Committee (DEC), be placed before the PAB. This is in view of the fact that since the Members of the DECs	**The recommendation is being followed up.**

are mostly academicians, the insights provided in DECs' recommendations do not cover relevant aspects like the provisions for compliance with GFRs, the cost estimates etc. in the proposals considered by them. **The PAB approved the process that the TEL Bureau should offer its recommendations to the PAB on Agenda Notes on Administrative and Financial issues.**	
Agenda-V: Items for information. **Request Department of Space for Re-allocation of Satellite Transponders to MHRD for DTH Programme** The PAB was informed that on the request from Chairman, DTH-OMG, the Chairman, PAB approached the Chairman, ISRO & Secretary, DoS on 19th February, 2015 requesting him to swap the two Transponders allotted to MHRD (at GSAT-8 Satellite, location at 55º degree East), to a location close to a Satellite presently being used by the Doordarshan (INSAT-4B Satellite, location at 93.5º East). In this way it shall enable viewers of Doordarshan & that of Dish TV, approx. 20 and 15 millions respectively in numbers to watch the proposed 50 Channels of MHRD DTH programmes without having loaded such Channels on their network & uplinking such Channels. The PAB was further informed that in response to the letter, the Chairman, ISRO and Secretary, DoS has vide his letter dated 12th March, 2015 replied favourably to Secretary, Higher Education that the proposal shall soon be put before the INSAT Co-ordination Committee. **The PAB noted the above.**	**---**

TABLE Agenda-VI (1) **Extension of NPTEL Project till 31st March 2015.** The PAB was briefed that Projects sanctioned under NMEICT were extended by MHRD till 30th September, 2014. The Co-ordinator, NPTEL, (a Project assigned to IIT Madras) approached the TEL Bureau informing that they are taking the initiative of MHRD and is interested to launch 11 MOOCs from early 2015. In order to develop the MOOCs & launch them, the NPTEL has some unspent funds and requires extension to continue the NPTEL Project till 31st March, 2015. Noting urgency in the matter, the Secretary, Higher Education in his capacity, as Chairman, PAB had on 15th December, 2014 extended NPTEL Project till 31st March, 2015, without any additional financial burden to MHRD. **The PAB ratified the extension of NPTEL Project till 31st March 2015.**	**PAB has already approved extension of project till 31st December, 2015. The project has been further extended up to 31st December, 2016, subject to approval of PAB.**
TABLE Agenda-VI (2) **Ratification and Approval for Relaxation in Qualification of Ms. Shilpi Tiwari for Temporary Appointment as Consultant under NMEICT.** A note dated 11th March, 2015 was received from the Office of Hon'ble HRM regarding appointment of Ms. Shilpi Tiwari as Consultant under NMEICT to work on website, social media and other communication related activities including but not limited to design and content development for MHRD. EdCIL India Limited, as TSG for NMEICT, has examined the proposal. Thereafter, the Secretary, Higher Education has approved the appointment of Ms. Shilpi Tiwari. It was proposed that initially she may be appointed for the period of 3 months at a fee of Rs. 35,000/- per month and relaxation in qualifications of Ms. Shilpi Tiwari may be approved. **The PAB ratified the approval accorded by Secretary, Higher Education to appoint Ms. Shilpi Tiwari and relaxation in qualifications prescribed for appointment of Consultants in respect of Ms. Tiwari.** **The Members thanked the Chairman, PAB for having spent extended hours on discussion of agenda items and having conducted a fruitful deliberation.**	**No action required. It is for information of the Board that Ms. Shipli Tiwari has not joined the NMEICT.**

The "Action Taken Report" on the Minutes of 30th Meeting of Project Approval Board (PAB) of National Mission on Education through Information and Communication Technology (NMEICT) held on 28th October 2015 is placed below:

Agenda Item No	Action taken
Agenda Item No. 1 Confirmation of Minutes of the 29th Meeting of the Project Approval Board held on 20th May, 2015. Member Secretary, PAB, informed the Members that the "Action Taken Report" on the Minutes of the 29th Meeting of the Project Approval Board" held on 20th May, 2015 shall be placed during next PAB meeting.	Action Taken Report for the 29th PAB Meeting is placed in the meeting.
Agenda Item No. 2 Seeking Approval of Minutes of the Meeting Domain Expert Committee (DEC) on Connectivity, Networking, Communication & Bulk Storage Servers (CNC&S) held on 26th September, 2015. The PAB approved the "Minutes of the Meeting Domain Expert Committee (DEC) on Connectivity, Networking, Communication & Bulk Storage Servers (CNC&S) held on 26th September, 2015.	Follow up action is being taken.
Agenda Item No. 2(b) A presentation by Dr. Neena Pahuja, DG ERNET, Campus Connect & Wi-Fi' received from CUs & vetted by the ERNET. Dr. Neena Pahuja, DG & Mr. Meherban Singh, Sr. Director both from ERNET, made a presentation on 'Campus Connect & Wi-Fi' proposals received from CUs & vetted by the ERNET. The Members raised certain questions, to which Dr. Neena Pahuja, replied.	No Action is required.

Agenda Item No. 2(c) **Establishment of Hotspot / Wi-Fi Campus Connect at Central Universities.** The Members were briefed based on the recommendations of Principal Secretary to the Prime Minister and the Panel of Secretaries; comprising of Secretary, MHRD; Secretary, Department of Information Technology (DeitY); Secretary, Department of Tele-Communication (DOT) represented by Joint Secretary (DOT) and Director General, Unique Identification Authority of India (UIDAI) the MHRD has decided that in the first instance, all Central Universities (CU) shall be established with Hotspot/Wi-Fi connected at their respective campuses. The PAB in principal approved the proposal of establishing Hotspot Wi-Fi in the first instance at CUs. DG ERNET informed that based on the proposals by the VCs of CUs, the ERNET vetted the proposals by deploying their technical experts to almost all CUs. They stated that based on the recommendations of DEC the total cost for setting up Hotspot/Wi-Fi Campus Connect at 32 CUs has been arrived at as Rs. 281.73 Crores. Apart from these, they have also recommended projects for 4 more CUs amounting to Rs. 32.24 Crores, and also proposed that for CUs of Haryana & Jharkhand, rough projection @ Rs. 8.72 Crores per university has been made. Further adding @Rs.1/- Crore for Server etc., as recommended by the DEC (Rs. 38.00 Crores for 38 CUs), the project cost for setting up Hotspot/Wi-Fi 'Campus Connect' at 38 CUs has been projected at Rs. 369.41 Crores. The PAB, while considering the proposal of ERNET noted that the full details for the Wi-Fi campus connect project as under were not furnished to the Members, and as such, no decision can therefore be taken on the proposal. PAB decided to call for the following details: a) Mapping: Plotting of the proposed project on the campus map: (i) The proposed server location, (ii) The pathway of the cabling proposed, (the total length of the cable) (iii) The buildings, which are to be provided with Wi-Fi (clearly showing the number of WAPs in each building). b) Adequacy: The total number of students and staff; and the total number of WAPs proposed, the average number of connections per WAP. c) Alternatives: Whether any alternative mode of	Revised proposal is being submitted for consideration of 31st PAB Meeting.

providing the Wi-Fi would work out cheaper and easier (like repeater towers). d) Permanency: Whether the facility being created is in permanent campus or temporary campus. Projects prepared on temporary campuses shall be rejected unless there is a possibility of the CU continuing in the temporary campus for atleast 5 years. e) Economy: Whether it is for a new set up or replacement of the old set-up. In case of replacement, it must be examined when the old facility was established and if there is adequate justification for the replacement. The proposal shall be brought before the PAB again after doing a further due diligence.	
Agenda No.2 (d) **'Modalities for execution of the Wi-Fi Project'.** The PAB approved that the ERNET be asked to prepare RFP in consultation with NMEICT, which can be used for tendering and further ERNET may be asked to submit list of four or more venders on their panel, who could be asked to take up the job of executing the programme of Campus Wi-Fi **in CUs. Remaining issues under this agenda shall be discussed during the next PAB meeting.**	Follow up action is being taken.

Agenda Item No. 3 (a) **Appointment of Consultants for Development of SWAYAM Platform.** In order to develop the IT platform for the SWAYAM project, in consultation with NICSI, a 'Consultant' to draft RFP for selection of 'System Integrator' (who in turn could develop the SWAYAM platform) has been engaged after following the process laid down under the GFR and the process laid down by DEITY. DeitY/NICSI after following due-diligence has accordingly awarded the work to M/s Price Waterhouse Coopers Pvt. Ltd (PwC). M/s PWC have quoted a total Cost of Rs. 24,50,000/- for the execution of the project, with service taxes extra. NICSI has raised a Performa Invoice of Rs. 29,88,510/- (including service tax & NICSI for Operating Margin) for making payment, as per rules, to M/s PWC for execution of above project. The PAB approved the engagement of a Consulting firm for drafting RFP to select a System Integrator and the Consultant shall monitor development of SWAYAM platform, to be completed in 4 months at a cost of Rs. 29,88,510/-.	Action has already been taken.
Agenda No. 3 (b) **To engage a 'System Integrator' for development of SWAYAM Platform.** It has been proposed that the IT platform for the hosting the MOOCs courses under SWAYAM may be developed under the NME-ICT project meeting the cost from the Head "Development of suitable pedagogical methods in eContent". This will help in immediately entrusting the work to the System Integrator to be identified through competitive bidding process. The PAB approved the above proposal 'in principle' to meet the cost of IT Platform, SWAYAM from NME-ICT funds.	Action is being taken.

Agenda Item No. 3

Resubmission of proposal on "Establishment of Hotspot / Wi-Fi Campus Connect at Central Universities" after Due Diligence.

Agenda Item No. 3

Re-submission of proposal on 'Establishment of Hotspot / Wi-Fi Campus Connect at Central Universities' after Due Diligence.

- The Agenda paper will be circulated during the course of the meeting -

Agenda Item No. 4

Considering “ Modalities for Execution of the Wi-Fi Project ”.

Agenda Item No. 4.

Considering " Modalities for execution of the Wi-Fi Project ".

The 30th PAB approved that the ERNET be asked to prepare RFP in consultation with NMEICT, which can be used for tendering and further ERNET may be asked to submit list of four or more venders on their panel, who could be asked to take up the job of executing the programme of Campus Wi-Fi in CUs.

This may be confirmed and time limit may be fixed for the activities.

Agenda Item No. 5

Extension for all continuing Projects, from 1st January, 2016 till 31st March, 2016, without sanction of any additional amount.

Agenda Item No. 5.

Extension for all continuing Projects, from 1st January 2016 till 31st March 2016, without sanction of any additional amount.

The 29th PAB, NMEICT held on 20th May 2015, under Agenda No. IV A (4), discussed the Extension for continuing NMEICT Projects pending proposed review / evaluation by an Independent Agency for large Projects and by respective PRSGs for smaller Projects.

The Members were informed that all NMEICT Projects were given last extension for completion upto 30th September 2014 and they were advised to complete the Projects and send Completion Reports to the Mission Secretariat. It is now proposed that before certifying as satisfactory, the completion of the Projects, particularly the large Projects with a sanction amount exceeding Rs.1.00 Crore, an independent agency may be asked to evaluate and review the Project outcomes.

The PAB approved the evaluation and review of Project outcomes of all Projects above Rs.1.00 Crore by an Independent Agency and evaluation and review by the respective PRSGs for remaining Projects. The PAB also approved the extension for all continuing Projects till 31st December 2015, with effect from the expiry of last approval, without sanction of any additional amount, so that the review of the Projects can be completed. The PAB also authorized the Chairman, PAB to approve the selection of an independent agency for reviewing these Projects.

The TEL Bureau is initiating the evaluation and review of Project outcomes of all Projects above Rs.1.00 Crore by an Independent Agency and evaluation and review by the respective PRSGs for remaining Projects.

PAB is requested the extension of all continuing Projects, from 1st January, 2016 till 31st March, 2016, without sanction of any additional amount.

Agenda Item No. - 6

Ratification of Extension offered to NPTEL, CEC and UGC e-content Development Projects from 1st January 2016 till 31st December, 2016.

Agenda Item No. 6.

Ratification of Extension offered to NPTEL, CEC and UGC e-content Development Projects from 1st January, 2016 till 31st December, 2016.

The 29th PAB, NMEICT held on 20th May 2015, decided that now onwards all content Development Projects to be put up for approval before the PAB should be MOOCs compliant only.

In order to ensure major projects assigned to NPTEL, CEC and UGC, for development of e-content disciplines in Engineering, UG non-Engineering and PG in NET subjects respectively, Additional Secretary, (TE) & Mission Director discussed with the three organizations and all agreed that they shall now onwards be making the remaining assigned e-content's into MOOCs compliant only.

The MHRD has initiated programme to develop SWAYAM platform, engage DeitY & NKN on connectivity & Cloud networking. In order to ensure the three major organizations are allowed to continue development of MOOCs compliant e-content, out of the funds already sanctioned to each by the PAB, it is felt necessary to convey in advance approval of extension of the project deadline (to retain the contractual manpower engaged by them for this) for a year to the last extension date approved on this by the PAB. Accordingly, Education Secretary (Higher Education) as Chairman, PAB was approached and has approved extension of NPTEL, CEC and UGC projects for development of e-content till 31st December 2016.

The PAB is requested to ratify extension offered to NPTEL, CEC and UGC e-Content Development Projects from 1st January, 2016 till 31st December, 2016 to complete their projects approved by the PAB.

Agenda Item No. - 7

Approval of report by "Costing Committee towards the Assessment of Costing for Re-appropriation, Design, Development and Operations of MOOCs ".

Agenda Item No. 7.

Approval of Report by " Costing Committee; towards the assessment of Costing for Re-appropriation, Design, Development and Operations of MOOCs ".

The MHRD vide Office Order F.No.8-1/2015-TEL dated 12th January, 2015, has constituted, nine member **"**Costing Committee towards the assessment of Costing for Re-appropriation, Design, Development and Operations of MOOCs " under the Chairmanship of Prof. K. Mangala Sunder, IIT, Madras as per Annexure - 2. The Committee had a number of meetings and deliberated in details on the issue.

The MOOCs Costing Committee noted that MOOCs consists of MOOCs compliant Content development and delivery, assessment & certification. Accordingly the Committee while arriving at the cost of development of fresh MOOCs content took cognizance of a recent PAB decision on rates approved for e-content development as under :

The 27th PAB in its meeting held on 19th March, 2014 under Agenda Item No.12, reviewed a proposal titled " Creation of Courseware e-content Development for remaining 58 UG Subjects at an enhanced rate of Rs.34,000/- per Module for Institute CEC & EMMRCs ".

The proposal was based on the request made by the Director, Consortium for Educational Communication (CEC) and the recommendations of the Standing Committee (DEC) in its meeting held on 6th December, 2013 and the Due Diligence conducted by the M/s KPMG, for development of e-content by CEC for left over 58 UG subjects (out of 87 Subjects allotted) with revised cost of Rs. 34,000/- per Module.

After discussions, ***PAB agreed for the unit cost of Rs. 31,000 per Module*** *(Rs 29,000/- +Rs 2,000 as the transcription charges).*

It may be seen from the Agenda put before 27th PAB that PAB has approved a Course is of 40 Modules and each Module of one-hour content. Wherein a Module contains ½ Hour Video and Text of 30 minutes and above duration. Thus, total Course duration is thus 20 Hours of Video and 20 hours or more of Text Material and the PAB has approved Rs.31,000/- per modules and Rs.12.4 Lakhs for one Course.

The MOOCs Costing Committee referred to the Agenda item on this that was put before 27th PAB in its meeting.

The MOOCs Costing Committee felt that development of content for e-Content under NMEICT scheme and content development proposed under MOOCs scheme has lot of similarities. The MOOCs Costing Committee has also defined a MOOCs Course to be of 20 Hour video and Text of 20 Hours and more of duration. The cost of each Module of MOOCs fresh content development cost defined is Rs. 22,500/- as under, or Rs.9.00 Lakhs for one Course.

The MOOCs Costing Committee has selected the relevant elements, as under, out of the rate details submitted in the Agenda copy, that has been approved by the 27th PAB as above, element that constitutes in the development of content for the MOOCs.

S.No.	Description of items for payment	Cost of Developing one Module of MOOCs
1	Transcript, subtitling and accuracy check for transcription.	Rs. 4,500/-
2.	For production of ETV Programme / Video Modules a) Hiring / purchase of Equipment, facilities. b) Hiring / engagement of Human resources on contract basis as permissible under project for timely and successful completion of the project.	 Rs. 5,000/- Rs. 5,000/-
3.	Freelance / hired Editors payment per e-Content / ETV Programme for 4 shifts @ Rs.1,000/- per shift.	Rs. 4,000/-
4.	Freelance / hired Graphics Artist / Animator / Module Integrator per e-Content for 4 shifts @ Rs.1,000/- per shift.	Rs. 4,000/-
	Total	**Rs. 22,500/-**

Due Diligence by an Independent Agency :

As recorded in the PAB minutes, the CEC proposal that has approval of costing on e-content, was placed for " Due Diligence " before an Independent Cost & Audit Agency, M/s " KPMG " and their observation on Cost per Module is as under:

" A dedicated committee in Dec 2013 after detailed review recommended as per module budget of INR 34,000/- for a 1 hour module including, video lecture, transcript, e-book, assignment, certification. Based on Committee Report's Review, Phase 1 vs. Phase 2 cost breakup comparison and the understanding that significant part of content development cost in Phase I was allocated to UGC funds, KPMG doesn't find the recommended cost of INR 34,000/- per module to be over-estimated ".

The “Costing Committee Report”, is at Annexure - 3. A summary of Costing Committee is as under the (i) cost for Content Development for a Fresh and Repurposed MOOCs Courses, (ii) Honorarium to the Coordinator for preparation of Content, (iii) Honorarium to Coordinator for active Subsequent running of course for three months, (iv) payment / Honorarium scheme to Teaching Assistants / Mentor, (v) Honorarium to Reviewer, (vi) recommended Course Examination fee, etc.

MOOCs Costing Committee Report, Summary.

(The costs are given as average per course or per bundle of courses wherever appropriate).

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S.No.	Activity	Repurposed Content	Fresh Content	Remarks
1	**Cost of a course** Cost includes videos recording & editing totaling 20 hours, quizzes, answer keys, subject additional links, additional notes and transcript of the text of all videos in English.	Rs. 6.0 lakhs	Rs. 9.0 lakhs	An existing NPTEL / UGC or other 40-hour course can be usually offered as two MOOC courses connected back-to-back for credit transfer with institutions.
2	**Coordinator Honorarium** for preparation (only for new course contents and new recording for the whole course with contents in video and text format, quizzes online and assignments, supplementary materials)	Rs. 2.0 lakhs	Rs. 2.0 lakhs	One-time payment
3	**Coordinator Honorarium:** For running the Course under the name of content creator with the faculty offering the course as additional faculty. One-time, or less depending on the extent of repurposing. Full payment for more than 40 percent restructuring.	Rs. 1.0 lakh	Rs. 1.0 lakh	Adhere to copyrights provisions (CC BY SA) if course contents of other faculty are used. Extent of revision must be approved by a committee constituted for subject revision assessment.
	OR to 2+3			

S.No.	Activity	Repurposed Content	Fresh Content	Remarks
3	**Coordinator Honorarium for active Subsequent running of course for three months** (**Recurring cost)**. Every MOOC offering by the same or other faculty members who use course contents already available.	Rs. 1.5 lakhs	Rs. 1.5 lakhs	Teacher presence and monitoring of active learning needed until exams are conducted and certificates issues. Three-month participation.
4 (a) Or (b)	**TA / Mentor Honorarium** (500 active registrants, one TA for two months), 5000-10,000 active registrants, 5 TAs. For a course having 10,000 to 20,000 registrants effective monitoring of website and discussion forums is the main job.	Rs. 0.3 lakhs Rs. 1.5 lakhs	Rs. 0.3 lakhs Rs. 1.5 lakhs	Assumption: less than 10 percent of active learners participate in discussion and raise questions, doubts, request additional learning material etc.
5	**Course Reviewer Honorarium.** Two reviewers, both of whom peers and academic faculty with reputation and with experience in the area	Rs. 15,000/- per course.	Rs. 15,000/- per course.	Reviewer panel will be nominated by the subject-specific committees constituted for MOOC.
6	**Course Examination fee.** Tendering possible for identification of centres where simultaneously more than one exam can be conducted.	Rs. 1000 per candidate per course unless tenders are floated.	Rs. 1000 per candidate per course unless tenders are floated.	GATE model is working model-tender for a limited period of time is used to award contract for online exam services and scanning and storing of answer sheets for evaluation by humans if necessary.
7	**Human Resource support for Course.** This is technically a different team which overlooks at the network and website management and is not to	Rs. 2.0 lakhs per institute offering 20 or more MOOC courses at a	Rs. 2.0 lakhs per institute offering 20 or more MOOC courses at a	It is an administrative expense and must be approved each time by the national committee recommending

S.No.	Activity	Repurposed Content	Fresh Content	Remarks
	be identified as the multimedia resource persons required for producing the course from faculty's inputs. Not more than 5 Technical Project Staff for supporting the course management	given time. (A period of three months would be considered the effective hiring period for the running of twenty courses)	given time. (A period of three months would be considered the effective hiring period for the running of twenty courses)	MOOC programmes.
8	**Workshops** About 5-10 workshops are immediately needed for updating faculty with tools and technologies for certification on-line. 60 to 75 participants, restricted to those who travel from within 200 -300 km radius of the site for workshop	Rs. 5 lakhs per workshop, or pro rata	Rs. 5 lakhs per workshop, or pro rata	Three days, including travel, honoraria for organizing team (Faculty, mission staff and mission consultants who are involved in the organization) and contingent expenses.

Put up for kind consideration of PAB and Approval of " Costing Committee " Report, towards the assessment of costing for Re-Appropriation, Design, Development and Operations of MOOCs'

Agenda Item No. - 8

Approval "NPTEL Phase-IV Project", on the recommendations of DEC-Content Meeting held on 23rd November, 2015.

Agenda Item No. 8.

Approval " NPTEL Phase-IV Project ", on the recommendations of DEC-Content Meeting held on 23rd November 2015.

The Domain Expert Committee (e-Content, Pedagogy and Related Activities) in its meeting held on 23rd November, 2015 deliberated as under:

a) **Status & Review :** of NPTEL Phase-III e-Content development & transition plan to SWAYAM.

b) **Project Proposal :** NPTEL Phase IV and NPTEL Online Certification (NOC) for 2015-2017
Anchor Institute: Indian Institute of Technology Madras.
PI : Dr. Andrew Thangaraj, Associate Professor, Deptt. of Electrical Engineering, IIT M & others.
Control Number: AEC 3012201413260
Duration: January 2016 to 31st Dec 2018
Total Budget: Rs.93.00 Crores
NMEICT Co-ordinator: Pradeep Kaul, Senior Consultant, NMEICT

The PIs presented progress made so far on NPTEL Phase-I, Phase II-III - including the launch of certification courses, as under.

- Phase-I, had 263 (138 video & 125 web) and Phase II and III had 600 Projected Courses, which totaled to 863 Courses due completion by 2014. The number of Courses produced has exceeded this number, however the Courses are mostly in one quadrant format.
- Current count of courses in Phase-I to III is 933 (512 Video & 421 Web) with about 150 more in the pipeline by IIT Madras. The increase was also attributed to the increase of one year in the Project Deadline.
- Phase III ends on 31st December, 2015 but might get extended till 31st December, 2016 without any financial requirements.
- As on 31st March 2015 less than Rs.10.00 Crores are left with IIT's so would require more funds from start of 2016.
- Till date 93 MOOCs Courses have been delivered that include 47 new & 46 repurposed.

The PI discussed NPTEL-IV proposal at Annexure-4, with the DEC-Content in its meeting held on 23rd November 2015, proposing deliverable over three years 2016-18 as under:

i) Creation of open online courses is 300, spread equally over 3 years.
ii) No. of courses for Repurposing Courses for Online Delivery is 300 spread equally over 3 years.

iii) Rerun of open online courses is 200 spread as 30, 70 and 100 over 2016-18 respectively.
iv) Lecture Series on Special Topics is 100 spread as 25, 40 and 35 over 2016-18 respectively.
v) Workshops and research conferences to be conducted will total to 200 spread over 80,60 and 60 over 2016-18 respectively.
vi) Budget of Rs.93.00 Crores to be spread as Rs.36.00 Crores for creation of open online courses, Rs.18.00 Crores for repurposing, Rs.10.00 Crores for rerun, 6 Crores for lecture on special topics, 10 Crores on workshops. Rest Rs.10.00 Crores on travel of coordinators for 3 years and office expenditure amounting total to Rs.93.00 Crores.

The PI informed that the costing of development and delivery of MOOCs as above is based on the "MOOCs Costing Committee" recommendations, approved by the MHRD. After detailed deliberations, the DEC-Content recommends as under:

The 'DEC-Content' approved the development of 300 MOOCs compliant fresh courses, 300 repurpose courses, rerun of 200 courses, production of 100 lecture series on special topics, conduct of 200 workshops & conferences and travel, honorarium etc., under NPTEL-IV, in next three years, as per the DPR submitted.

The DEC further suggested the NPTEL-IV to look into all disciplines in Engineering so that it saturates a discipline, all courses in Engineering discipline are taken up for Development of MOOCs Compliant Courses and involve (other than the present 7 IIT's & IISc) more partners in NPTEL group i.e., other IIT's, NIT's etc., in the development of MOOCs Compliant Courses in other disciplines in engineering.

Put up for kind consideration of PAB and approval of the recommendation of the DEC-Content on NPTEL-IV as above and approval of a budget of Rs.93.00 Crores for project deliverables in next three years.

No. 9. : **Tabled Item , if any**

No. 10 : Items with the permission of Chair.

ANNEXURE

Annexure 1	**:**	**Minutes of the 30th Meeting of the Project Approval Board " held on 28th October 2015**
Annexure 2	**:**	**Constitution of Costing Committee towards the assessment of Costing for Re-appropriation, Design, Development and Operations of MOOCs**
Annexure 3	**:**	**Costing Committee Report**
Annexure 4	**:**	**Proposal NPTEL-IV**

F.No. NMEICT(MS)/PAB/29
Government of India
Ministry of Human Resource Development
Department of Higher Education

Minutes of the meeting of the PAB dated 28th October 2015

The 30th Meeting of "Project Approval Board" (PAB) of National Mission On Education Through Information And Communication Technology (NMEICT) was held on 28th October 2015, at 14:00 hrs, at Conference Room, Shastri Bhavan, New Delhi, under the Chairpersonship of Secretary, Department of Higher Education, Ministry of HRD. The list of Members and Invitees, who participated in the Meeting, is at Annexure-I.

Additional Secretary (TE) and Mission Director (NMEICT) & Member Secretary, PAB welcomed the newly constituted Members of the PAB and informed them about the Agenda in brief. Thereafter, with the permission of the Chair, the Agenda Items were discussed and the following decisions were taken:

Agenda Item No. 1

Confirmation of Minutes of the 29th Meeting of the Project Approval Board held on 20th May 2015.

Member Secretary, PAB, informed the Members that the "Action Taken Report" on the Minutes of the 29th Meeting of the Project Approval Board" held on 20th May 2015, shall be placed during next PAB meeting.

Agenda Item No. 2

Seeking Approval of Minutes of the Meeting Domain Expert Committee (DEC) on Connectivity, Networking, Communication & Bulk Storage Servers (CNC&S) held on 26th September 2015.

The PAB approved the "Minutes of the Meeting Domain Expert Committee (DEC) on Connectivity, Networking, Communication & Bulk Storage Servers (CNC&S) held on 26th September 2015.

Agenda Item No. 2(b)

A presentation by Dr. Neena Pahuja, DG ERNET, Campus Connect & Wi-Fi' received from CUs & vetted by the ERNET.Dr. Neena Pahuja, DG & Mr. Meherban Singh, Sen. Director both from ERNET, made a presentation on 'Campus Connect & Wi-Fi' proposals received from CUs & vetted by the ERNET. The Members raised certain questions, to which Dr. Neena Pahuja, replied.

Agenda Item No. 2(c)

Establishment of Hotspot *I* Wi-Fi Campus Connect at Central Universities.

The Members were briefed based on the recommendations of Principal Secretary to the Prime Minister and the Panel of Secretaries; comprising of Secretary, the MHRD; Secretary, Department of Information Technology (DeitY); Secretary, Department of Tele-Communication (DQT) represented by Joint Secretary (DOT) and Director General, Unique Identification Authority of India (UIDAI) the MHRD has decided that in the first instance, all Central Universities (CU) shall be established with Hotspot/Wi-Fi connected at their respective campuses. The PAB in principal approved the proposal of establishing Hotspot Wi-Fi in the first instance at CU's.

DG ERNET informed that based on the proposals by the VC's of CU's, the ERNET vetted the proposals by deploying their technical experts to almost all CUs. They stated that based on the recommendations of DEC the total cost for setting up Hotspot/Wi-Fi Campus Connect at 32 CU has been arrived at as Rs. 281.73 Crores. Apart from these, they have also recommended projects for 4 more CUs amounting to Rs. 32.24 Crores, and also proposed that for CUs of Haryana & Jharkhand rough projection @ Rs. 8.72 Crores per university has been made. Further adding @Rs.1/- Crore for Server etc., as recommended by the DEC (Rs. 38.00 Crores for 38 CUs), the project cost for setting up Hotspot/Wi-Fi 'Campus Connect' at 38 CUs has been projected at Rs.369.41Crores.

The PAB, while considering the proposal of ERNET noted that the full details for the Wi-Fi campus connect project as under were not furnished to the Members, and as such, no decision can therefore be taken on the proposal. PAB decided to call for the following details:

a) Mapping: Plotting of the proposed project on the campus map:
   (i). The proposed server location,
   (ii). The pathway of the cabling proposed, (the total length of the cable)
   (iii). The buildings, which are to be provided with Wi-Fi (clearly showing the number of WAPs in each building).

b) Adequacy: The total number of students and staff; and the total number of WAPs proposed, the average number of connections per WAP.

c) Alternatives; Whether any alternative mode of providing the

Wi-Fi would work out cheaper and easier (like repeater towers).

d) Permanency: Whether the facility being created is in permanent campus or temporary campus. Projects prepared on temporary campuses shall be rejected unless there is a possibility of the CU continuing in the temporary campus for atleast 5 years.

e) Economy: Whether it is for a new set up or replacement of the old set-up. In case of replacement, it must be examined when the old facility was established and if there is adequate justification for the replacement.

The proposal shall be brought before the PAB again after doing a further due diligence.

Agenda No.2 (d)

'Modalities for execution of the Wi-Fi Project'.

The PAB approved that the ERNET be asked to prepare RFP in consultation with NMEICT, which can be used for tendering and further ERNET may be asked to submit list of four or more venders on their panel, who could be asked to take up the job of executing the programme of Campus Wi-Fi in CUs. Remaining issues under this agenda shall be discussed during the next PAB meeting.

Agenda Item No. 3 (a)

Appointment of Consultants for Development of SWAYAM Platform.

In order to develop the IT platform for the SWAYAM project, in consultation with NICSI, a 'Consultant' to draft RFP for selection of 'System Integrator' (who in turn could develop the SWAYAM platform) has been engaged after following the process laid down under the GFR and the process laid down by DEITY. DeitY/NICSI after following due-diligence has accordingly awarded the work to M/s Price waterhouse Coopers Pvt. Ltd (PwC). M/s PWC have quoted a total Cost of Rs.24,50,000/- for the execution of the project, with service taxes extra.

NICSI has raised a Performa Invoice of Rs. 29,88,510/- (including service tax & NICSI for Operating Margin) for making payment, as per rules, to M/s PWC for execution of above project.

The PAB approved the engagement of a Consulting firm for drafting RFP to select a System Integrator and the Consult shall monitor

development of SWAYAM platform, to be completed in 4 months at a cost of Rs.29,88,510/-.

Agenda No. 3 (b)

To engage a 'System Integrator' for development of SWAYAM Platform.

It has been proposed that the IT platform for the hosting the MOOCs courses under SWAYAM may be developed under the NME-ICT project meeting the cost from the Head "Development of suitable pedagogical methods in eContent". This will help in immediately entrusting the work to the System Integrator to be identified through competitive bidding process.

The PAB has approved the above proposal 'in principle' to meet the cost of IT Platform, SWAYAM from NME-ICT funds.

The Members thanked the Chairman, PAB for having conducted a fruitful deliberation.

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F.No. 8-1/ 2015-TEL
Government of India
Ministry of Human Resource Development
Department of Higher Education
(TEL Division)
*****

D-Wing, Shastri Bhawan, New Delhi
Dated: 12th January 2015

Subject: Constitution of Costing Committee towards the assessment of costing for re-appropriation, design, development and operations of MOOCs

With the approval of the Competent Authority following "Costing Committee" is constituted to work out the costing towards re-purposing of existing digital courses, design and development of new courses in **MOOCs*** format, delivery of the courses online apart from online conduct of proctored examinations along with award of due credits and certification and also to ensure smooth operation and execution of courses in blended MOOCs format:

Sl. No.	Name	Designation, Organization	
1.	Prof. Mangal Sunder	IIT Madras	**Chairman**
2.	Prof. Manoj Singh	AIIMS, New Delhi	Member
3.	Prof. T.V. Prabhakar	IIT, Kanpur,	Member
5.	Prof. Kannan Moudgalya	IIT, Bombay	Member
6.	Prof. Rajbir Singh	Director, CEC	Member
7.	Shri Pradeep Kaul	Senior Consultant, NMEICT	Invitee
8.	Dr. C.S. Arora	Senior Consultant, NMEICT	Invitee
9.	Dr. V.V.S. Murty	Senior Consultant, NMEICT	**Convener**

***MOOCs ->Classroom for part of teaching and learning through Lectures, Media, Discussion & Hands-on to Accommodate learning styles, Maximize face-to-face time, Experiences not possible in the classroom, Instructor and learners maintain connections beyond official class time which requires Adjunct instructors, teacher aides and the course content is Replicable and repeatable.**

2. The Terms of Reference (ToR) of the Committee shall be as follows:

- This committee shall be responsible to work out the costs towards re-purposing of existing digital courses, design and development of new courses in MOOCs format, delivery of courses online apart from online conduct of proctored examinations along with award of due credits and certification and also to ensure smooth operation and execution of courses in MOOCs format

Broadly, scope of coverage for the committee to workout costing on the following components:

- Assessment of efforts of subject experts and teaching assistants to meet the scope indicated above and to engage them for the required duration.

- Hardware, system software & tools, LAN, networking, etc. for the local development/usage of existing studios for the design and delivery of the courses as per feasibility.
- Assessment and authentication of content.
- Hosting, operations and delivery of the courses online in MOOCs format.
- Conduct of proctored examinations across India & also peer level reviews, assessment of assignments, performance evaluation in group discussions, quizzes, peer level discussions, etc.
- Award of due credits and certification on successful completion of the course.
- Charges payable by learners towards, access of content from various internet access points and also towards proctored examination and certification.
- Any other items which are required for smooth operation of the courses.

3. The committee is required to submit its final report on the above costing by 22nd January 2015.

4. The secretarial assistance and the TA/ DA etc. for the members attending the meeting will be paid by the EdCIL through the funding for NMEICT Mission Secretariat.

(Devender Kumar)
Under Secretary to the Govt. of India
Tel. No. 011 23073582

To:

All Members of the Committee

Copy to:

4. Project Manager (NMEICT) for information and necessary action.

Ministry of Human Resource Development
Department of Higher Education

MOOCs Costing Committee, Report

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Draft Report of the Costing Committee towards assessment of costing form re-appropriation, design, development and operations of MOOCs.

Report by Prof. K. Mangala Sunder, IIT Madras, Chairman of the Committee.

The Committee was constituted by the Ministry of HRD vide Ref. F. No. 8-1/2015-TEL dated Jan 12, 2015 and the order was communicated to the members on Jan 22, 2015. Subsequently the Committee met on three days, Jan 2, 2015, Feb 5, 2015 and March 10, 2015. The summary of observations and recommendations of the Committee are given below.

The Terms of Reference of the committee have been stated in the MHRD communication. The Committee reviewed the processes and the cost for content that can be re-purposed out of the existing digital courses, design and development by some of the agencies. The Committee also proposed revised estimates for new MOOCs.

1. Prof. Rajbir Singh informed that CEC has developed more than 7000 e-content modules in 20 Subjects at the UG level, which would be converted into MOOC's. Other resources from CEC can also be used to supplement them as is necessary.

2. Prof. Mangala Sunder mentioned that while 890 science, engineering, technology and humanities course contents have been made available through the NPTEL website, thanks to support by MHRD through two phases of content development, about half of them have full, recorded videos for about 450 courses as 18000 plus 45 min-60 min videos and can be used within a short time for redesigning and repurposing learning using MOOC.

3. The Committee was briefed that a meeting was held on February 19, 2015, under chairpersonship of Dr. Satbir Bedi, JS (SE-II) at MHRD, to discuss preparation of Massive Open On-line Courses (MOOCs) for IX to XII Classes under Arts, Science, Commerce and Vocational Streams in School sector. It was agreed that the budget requirement can be made specific subject to the broad recommendations of this sub-Committee. The same was agreed upon by the NCERT Director.
4. Prof. Sadhana Parashar, CBSE informed that 800 videos have been prepared in Mathematics, Physics and Chemistry under UDAAN program meant exclusively for girls. CBSE has established around 60 virtual classrooms across the country for delivery of live lectures on Saturdays and Sundays. CBSE has released the list of all videos they have recorded so far and also have agreed to make them accessible by adding assessment and online quiz/examination under SWAYAM platform.

5. Prof. Rajaram Sharma, informed that NCERT has developed 3000 videos/modules of 15 to 45 minute duration in 12 subject areas for Class XI and XII meant for students and teachers in recent past spanning science, humanities and commerce. These are to be examined from the point of view of repurposing the content by the members towards effort-assessment and also looking into areas of overlapping of contents of CBSE and NCERT. For this purpose additional modules developed by NCERT and published already under NROER (National Repository of Open Educational Resources) would be used.

6. Prof. T. V. Prabhakar, IIT Kanpur explained the concepts and details of MOOCs programme. He identified the basic components of MOOCs as:
    a. Meta Component (course & learning objectives and the outcomes expected)
    b. Open Educational Resources (OERs) created for the courses or adopted from existing resources
    c. Discussion forums and active participation by learners during the course period (leading to partially synchronized learning process) and
    d. Assessment & certification either through proctored means (preferred) or honour code.

    Thus all MOOCs must strive to achieve a balanced learning process based on the above.

7. The Committee also agreed that these components must be required and integrated for every course submitted for public use under SWAYAM. The Committee therefore deliberated and recommended as under:

    a. The Project Advisory Board (PAB) under the National Mission on Education through Information and Communication Technology (NMEICT) has previously approved cost of e-content production (in four quadrants & with text transcription) of about one course of 40-hour duration at an approximate cost of Rs. 12.4 Lakhs. NPTEL team has been conducting 30 MOOCs courses so far, and has given a detailed budget for each course containing about twenty hours of video contents inclusive of additional and supplementary learning materials. The budget for NPTEL is Rs. 12 lakhs currently, requiring a slight revision, for each MOOC with an active student registration of 1000 students and participation in discussion forums by about 10 percent of them. The Committee felt that these figures are sustainable, cost effective and can be used as initial guidelines for institutions offering 100 or more courses within the next one or two years. If more students register, more teaching assistants and mentor faculties would be involved and the cost would go up due to payment of honoraria to them. Pro-rating is possible for increased enrollment at about Rs. 2 lakhs for every 1000 additional students with about 300-400 students associated with two TAs and one mentor. A marginally higher allocation can be considered per course for institutions offering fewer courses (up to about 25 percent more) upon justification by the PIs and recommended by the Domain Experts Committee (DEC).

    b. For rerunning MOOCs courses in subsequent semesters the cost would merely include TA and faculty support for three months each time the course is rerun. The cost for running the course shall be Rs. 3.5 lakhs; it includes an honorarium of Rs. 1.0 lakh for one faculty member and Rs. 1.5 lakhs for five TAs (Rs. 10,000 per TA per month). The other cost includes staff support for running the programme for a period of four months from registration to issue of certificates, and contingent expenses.

    c. The budget proposed for repurposing of existing content of for hours per course into MOOCs format of 20 hours for each course varies depending upon the efforts involved. However, in comparison with development of new MOOCs, repurposing of existing e-content to MOOCs could be between Rs. 5.0 – Rs. 7.0 lakhs per course Based on the costing details available, Rs. 6.0 lakhs per course in its first offering is recommended. Subsequent re-runs will be as per item b immediately above. Detailed budget estimates indicated by IIT Bombay, IIM Bangalore, IIT Delhi and IIT Kanpur, have been used in arriving at this number.

    d. Repurposing costs are estimated to be about half of that of one MOOC. Thus about Rs. 12 lakhs would be expected to be the maximum required for each NPTEL course of forty one

hour lectures being redesigned to create two MOOCs courses with additional assignments and TAs and Mentor participation. Similarly, CEC e-content courseware may be repurposed at the rate of Rs. 6 lakhs per MOOC as a maximum. (CEC courses have a video recording of thirty minutes each). The cost of hardware and software tools for development of MOOCs content has already been included in the budget of MOOC content development provided earlier and are within the purview of the overall MOOCs committee constituted by MHRD already.

e. Besides content repurposing, honorarium proposed for TAs at the rate of 300-400 registrants that requires work for a period of 2 to 3 months is recommended at Rs. 10,000/- per month per TA. This is included in the cost per course as above.

f. Honorarium for faculty towards a new MOOC course development and one-time delivery would be Rs. 3.5 lakhs. This is the PAB approved amount as in item 7. This includes Rs. 2.0 lakhs for content preparation nd final submission to MOOC platform. It was estimated that course assessment normally requires about three months of work by a faculty member per course. If faculty members run MOOC courses for which detailed contents were developed earlier and run earlier, the honorarium for running courses shall be Rs. 1.5 lakh per course. The faculty would be required to provide new assignments, tests and other support materials for their versions and also manage the discussion forum each time they run the MOOC.

g. Recently, MHRD has sanctioned and released the first installment of Rs. 50 crore as part of an approved budget to IIT Madras for setting up of 200+ Teaching Ends (that include multimedia studios) under DTH Program; these are likely to be ready in the next 6 to 8 months. The same infrastructure may then be used for development of MOOCs. Hence no additional investments on studio and other physical infrastructure need to be included in the present estimate.

h. Currently around 40 studios have been set up under NPTEL and CEC and the same may be used for MOOCs content preparation and delivery until the DTH approved studios are set up. Besides these studios there are also about 10 fully equipped studios under CBSE, NCERT and its State counterparts that may also be used for development of school and teacher MOOCs education content.

i. For peer reviewing of one MOOC course content completely, two reviewers would be assigned and it is suggested that their honoraria be fixed at Rs. 15,000/- for a full review of the course per reviewer.

j. Awareness through the conduct of a large number of workshops for coverage of courses and levels through SWAYAM and its potential through various media and web-enabled services is considered necessary. An estimate has been provided by NPTEL earlier and approved by the Ministry for three-day workshops for about 50 faculty members and the same figures may be adopted to start with. The budgetary requirement depends on the number of workshops that are required to be conducted. The average cost of the workshop for the proposed format is approximately Rs. 5 lakhs per workshop, including travel, boarding and lodging for 50 participants and is 25% upward from the cost proposed and approved in 2009.

8. The cost for final online, proctored examination varies from agency to agency and is also a function of the number of students taking the exam at any given time. **Online exams in centres supervised by faculty and technical staff of the centre are minimally needed for ensuring credibility of examinations. For a concurrent online enrollment in over 100 centres**

Manjula Sundar

throughout the country with a minimum of 200 examinees per centre, a student fee of Rs. 600 per candidate per MOOC exam is estimated based on market rates for CBSE JEE Main and GATE online. The centre cost is usually fixed at this rate. Any decrease in the number of students will not change the center cost.

The Committee recommends that the PAB consider the process of an open tender for empaneling online evaluation service providers for a fixed time and for a minimum number of MOOC registrants. A list of such providers contacted by IIT Madras earlier for running its exams is given in an annexure.

9. The Committee recommends that between three to five workshops be held immediately in different regions for faculty and content developers and that a suitable budget be provided by the NMEICT. (Approximate estimate in Para 7. j). Mission ICT Director and Mission Senior Consultants may be involved in the conduct of these workshops.

10. The honorarium for faculty in CBSE and NCERT initiated programme must follow the norms set by them; however, in the discussion it was learnt that a sum of Rs. 1500 and a TA/DA Rs. 1000 are paid to faculty teachers who prepare content videos for 15 minutes, edit and provide and final version. Thus for a MOOC with about 30 – 40 minutes for each lesson, a sum of Rs. 4000 and a TA of Rs. 1000 shall be paid as a single component to the faculty team that develops a 30 minute MOOC video and that the edited and final versions of videos with quizzes and online exam papers (2 per each course by the faculty team for the course) be obtained as the final deliverable. CBSE and NCERT will determine the length and duration of each such course.

What are required outside of the content creation efforts?

1. **A server with adequate capacity to handle large number of concurrent users** and scalable with the number of users and number of course. Bandwidth cost is excluded; it is assumed that NKN would support network bandwidth.

Example: 1. IIT Madras running the MOOC on a cloud. Technical staff members and admin provide official response to non-subject queries (runs into thousands of them in any short period of two weeks before the course starts and till the course ends). Registration period is one month before the start of the course. End of the course is one month after the examination for enabling transfer of certificates and student data and analytics to the project team.

2. IIT Bombay is running its own cloud and with technical staff to protect the hardware and software integrity of the cloud. Other expenses include project staff support for uploading the content, responding to e-mail queries, requirements of online assessment details from students.

3. IIT Kanpur running both its own software development for the MOOCs and hardware for online course delivery.

The activities will be formally transferred to the SWAYAM once the hardware / software components are installed and tested for scalability.

Estimates based on current experience:

1. IITM needs 5-6 technical and admin staff team for four months and a lab for a concurrent launch of 20 to 25 MOOC courses. The human resource assistance will be at the rate of Rs. 2 lakhs per month for four months in terms of salaries. The total number of registrants IIT had for these courses was 95000 and now active learners are around 8-10 percent per course. This works out to about 3000 active learners on an average per course with about 300 per course appearing in the proctored examination.

For a larger number of concurrent active learners for a given course, admin and support staff will have to be scaled proportionately.

3. IIT Kanpur has its own servers and its own platform. Their admin cost is similar to the 10 percent per course experienced by the other Institutes.

Cost of examination proctoring is not included.

Course coordinator for a specific course will have to be available throughout the duration of the course.

Studio recording, technical and other support services will remain at the same level (Rs. 23,000 per half hour video with integrated frames for text, quiz, supplementary and all animations) as that of CEC, New Delhi, which the NMEICT PAB has earlier approved. This has already been used in arriving at the cost of Rs. 12. 4 lakhs for a new course.

TA Honorarium examples are:

1. 30 courses, 3000 active learners per course (300 per course writing final exam) (2 TAs per course, Rs. 15000 per month per TA Rs. 9 lakhs per month, Rs. 18 lakh per offering of 30 MOOC Courses.
2. 30 courses, 30,000 active learners per course (3000 per course writing final exam) 5 TAs per course, Rs. 15000 per month per TA, Rs. 22.5 lakhs per month, Rs. 45 lakhs per offering of the courses;
3. TAs do not necessarily scale linearly with the number of registrants.

The Committee noted that the MOOCs programme comprises of generation, conduct, delivery, assessment etc., wherein the following elements are required:

a. Development of e-content in 4 quadrants by the course oordinators.
b. To conduct interaction, seek feedback and engage in discussion forums with the learners on regular basis to be performed by the teaching assistants and mentors.
c. Lab simulations
d. Engage learners with a number of assignments & its evaluation by the teaching assistants.
e. To examine and assess learning progress of registered leaners by conducting proctored examinations at various locations.
f. Award of certificates issued by recognized Institution(s).

In the first instance the Committee recommends to use & re-purpose e-content produced in 4 quadrants under NMEICT programme for MOOCs. However, in some cases new content may also be required to be developed. For development of fresh content for the MOOCs the Committee recommends to follow rate on content development approved by the 27th Project Advisory Board (PAB) under the National Mission on Education through Information and Communication Technology (NMEICT) in its meeting held on 19th March 2014, as recommended in Para 7a above.

Executive Summery of the recommendations:

The Committee observed that on an average, a MOOC comprises of 20 Hours, applying the PAB approved rate a new MOOCs content of 20 Hours may be sanctioned content development charges of Rs.12.4 Lakhs.

K. Mangalasundy

The Committee recommends for repurposing e-Content already developed under NMEICT, into 20 hours of MOOCs, a sum of Rs. 6.0 lakhs may be sanctioned to an institution.

A coordinator may be invited give no more than two MOOCs in any given academic year.

It is assumed that about 300-500 students will be associated with one TA and one Mentor during conduct of MOOCs. Honorarium proposed for TAs for interacting with 300-400 registrants that requires work for a period of 2 months is recommended Rs. 15,000/- per month per TA.

Mentor Honorarium (as per UGC NET qualified) shall be at half the rate of the fulltime NET fellowship (monthly salary, 3 months maximum per course for the duration of the course and not more than two courses per year, not exceeding Rs. 1.5 lakhs per course).

An institute launching 20 to 25 MOOC courses concurrently shall further need 5-6 technical and admin staff team for four months; for this, a sanction of Rs. 2 lakhs per month for four months is required as human resource cost in terms of their salaries.

Besides the above it is necessary to provide a MOOCs platform, server access and cloud network for effective handling of massive number of concurrent users likely to view content (that may comprising of Multimedia etc.). Viewers may like to benefit from such courses and the conduct of proctored examination for the registrants; the budget required for such services has not been included in the report, but needs to be kept in mind by the NMEICT Bureau.

The Chairman and the members thank the Secretarial staff of NMEICT for assisting and providing logistics and the Ministry for giving the opportunity to deliberate on online learning through MOOCs.

K. Mangala Sunder

Annexure 1

Tabular Summary of the Cost proposed**

Cost of a new course (with videos totaling 20 hours) + all quizzes, problem sets, solutions, text of the video in English	Rs 9.0 lakh	Cost includes video recording, editing, quizzes, answer keys, subject additional links, additional notes and transcript of the text of all videos.	
Coordinator honorarium for preparation	Rs. 2.0 lakh	One-time payment	
Cost for repurposing an existing course to provide a 20-hour summary for a MOOC offering	Rs. 6.0 lakhs	Cost covers re-recording, additional recording, aligning contents to chosen course deliverables and course outcomes, and adding quizzes and assignments	An existing NPTEL /UGC or other 40-hour course can be usually offered as two MOOC courses connected back-to-back for credit transfer with institutions.
Coordinator Honorarium	Rs. 1.0 lakh, one-time, or less depending on the extent of repurposing. (full payment for more than 40 percent restructuring)	Adhere to copyrights provisions (CC BY SA) if course contents of other faculty are used. Extent of revision must be approved by a committee constituted for subject revision assessment.	Course will be run under the name of content creator with the faculty offering the course as additional faculty.
Coordinator Honorarium for active running of course for three months	Rs. 1.5. lakh	Recurring cost. Every MOOC offering by the same or other faculty members who use course contents already available.	Teacher presence and monitoring of active learning needed until exams are conducted and certificates issues. Three-month participation.
TA / mentor hono-rarium (500 active registrants, one TA for two months), 5000-10,000 active registrants, 5 TAs	Rs. 0.3 lakh Rs. 1.5 lakh	TA numbers do not scale linearly. For a course having 10,000 to 20,000 registrants effective monitoring of website and discussion forums is the main job	Assumption: less than 10 percent of active learners participate in discussion and raise questions, doubts, request additional learning material etc.
Course Examination fee	Rs. 1000 per candidate per course unless tenders are floated.	Tendering possible for identification of centres where simultaneously more than one exam can be conducted.	GATE model is working model- tender for a limited period of time is used to award contract for online exam services and scanning and storing of answer sheets

			for evaluation by humans if necessary.
Course Reviewer Honorarium	Rs. 15000 per course.	Two reviewers, both of whom peers and academic faculty with reputation and with experience in the area	Reviewer panel will be nominated by the subject-specific committees constituted for MOOC.
Human Resource support for Course	Rs. 2.0 lakhs per institute offering 20 or more MOOC courses at a given time.	Not more than 5 technical project staff for supporting the course management	It is an administrative expense and must be approved each time by the national committee recommending MOOC programmes.
Workshops About 5-10 workshops are immediately needed for updating faculty with tools and technologies for certification on-line	Rs. 5 lakhs per workshop, or pro rata	60 to seventy five participants, restricted to those who travel from within 200 -300 km radius of the site for workshop	Three days, including travel, honoraria for organizing team (Faculty, mission staff and mission consultants who are involved in the organization) and contingent expenses.

** Subject to the provision./ceiling of Honorarium mentioned in Para 11 above.

Annexure 2

A preliminary list of proctored exam service providers contacted by NPTEL for its tender:

1) Tata Consultancy Services Ltd. iON
TCS House, Raveline Street
21 D. S. Marg, Fort
Mumbai 400 001
Tel: 1800 209 6030

2) Eduquity Career Technologies (P) Ltd
#433,1st CMain,7th Block Extension,
Koramangala,
Bangalore - 560095
Tel : +91-80-43436000

3) Pearson VUE
Ground Floor, S. B. Tower
1A/1, Sector 16A, Noida
Uttar Pradesh 201 301
Tel: +91-120-4001600

4) MeritTrac Services Pvt. Ltd.
Sy. No. 12/5, Kaikondarahalli, Varthur Hobli
Sarjapura Main Road
Bangalore- 560 011
Ph: +91 (80) 4013 0200

5) Aptech Assessment & Testing Solutions Ltd.
Aptech House
A-65, MIDC
Marol, Andheri (E)
Mumbai - 400093, Maharashtra, India
Tel (Direct): +91 22 28272308

Annexure 3

Members who attended the meetings:

1. Prof. Mangala Sunder, IIT Madras, Chairman
2. Prof. Rajbir Singh, Director, CEC, UGC, New Delhi
3. Prof. Manoj Singh, AIIMS, New Delhi, Member
4. Prof. T. V. Prabhakar, IIT Kanpur
5. Prof. Kannan Moudgalya, IIT Bombay
6. Mr. Pradeep Kaul, Sr. Consultant, NMEICT
7. Dr. C. S. Arora, Sr. Consultant, NMEICT
8. Dr. V. V. S. Murty, Sr. Consultant, NMEICT
9. Prof. Rajaram Sharma, Joint Director, CIET, NCERT
10. Prof. Sadhana Parashar, Director (ART & I), CBSE
11. Prof. A. P. Behera, CIET, NCERT, New Delhi
12. Dr. Yash Paul Sharma, CIET, NCERT, New Delhi
13. Shri Jaiprakash Chaturvedi, Assistant Secretary, CBSE
14. Dr. Kshipra Verma, Education Officer, CBSE
15. Shri Nageshwar Nath, CEC, New Delhi

NMEICT

National Mission on Education Through ICT MHRD, Govt. of India

Control Number: **AEC3012201413260**

Submission Date: **Nov 16, 2015**

PART I - Personal Details

	PI – 1	PI - 2	PI - 3	PI - 4
Name	Dr. Andrew Thangaraj	Dr. Prathap Haridoss	Dr. Kushal Sen	Dr.Satyaki Roy
Designation	Professor	Professor	Professor	Associate Professor
Organisation	IIT Madras	IIT Madras	IIT Delhi	IIT Kanpur
Postal Address	Web Studio, 3rd floor, ICSR building, IIT Madras, Chennai 600036	Web Studio, 3rd floor, ICSR building, IIT Madras, Chennai 600036	Educational Technology Services Centre, IIT Delhi, New Delhi 110016	Media Technology Centre, IIT Kanpur-208016
City	Chennai	Chennai	Delhi	Kanpur
State	Tamil Nadu	Tamil Nadu	Delhi	Uttar Pradesh
Fax	044-22570545	044-22570545	-	-
Email	andrew@iitm.ac.in	prathap@iitm.ac.in	kushal@textile.iitd.ac.in	satyaki@iitk.ac.in
Mobile	9940489032	9444468235	9810602231	9793000770
Project Category	Content Creation and Online Certification	-------	-------	--------

PART II - Information relating to Department/Institute

1. **Name of Institute with complete address:**

   Indian Institute of Technology Madras, Chennai 600036 (Coordinating Institute)

2. **Title of the Research Project**

   NPTEL Phase IV for the period 2016-2018

3. **Department/ Broad Area -** Not Applicable

4. **Major areas of research in the Department -**Not Applicable

5. **Names & Designation of Principal Researchers in the major areas and list of publications during last 5 years based on work done in the Department:**

Dr. Andrew Thangaraj (Professor, IIT Madras), Dr. Prathap Haridoss (Professor, IIT Madras), Dr. Kushal Sen (Professor, IIT Delhi) and Dr. Satyaki Roy (Associate Professor, IIT Kanpur);The CV of the Principal Investigators is attached at the end of this document.

6. **Is it Interdisciplinary Project?** Yes

7. **Is it Inter Institutional Project?** Yes

8. **Is any Industry/User agency participating?** No

9. **Brief of completed and or ongoing research projects supported by MHRD/ AICTE in the Department during last 5 years.**

Please refer Part IV- section 15(a) for details

PART III - Information relating to Department/Institute

10(a) **Principal Investigator Details:**

1. **Dr. Andrew Thangaraj** is a Professor in the Department of Electrical Engineering at the Indian Institute of Technology, Madras, where he has been since 2004. His areas of research interest are Coding Theory, Information-theoretic Security and Information Theory. For the past five years he has been interested in online and distance education pedagogies and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past three years. He has been heading the NPTEL Massive Open Online Courses (NPTEL MOOC) for the past one year. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.

2. **Dr. Prathap Haridoss** is a Professor in the Department of Metallurgical and Materials Engineering**,** Indian Institute of Technology Madras, where he has been since 2003. His areas of interests are Carbon Nanotubes, Fuel Cells, Semiconducting Nanomaterials and Recycling Printed Circuit Boards. For the past five years he has been developing online and distance education pedagogies and coursework and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past two years. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.

3. **Dr. Kushal Sen** is a Professor in the Department of Textile Engineering in IIT Delhi, where he has been since 1981. His areas of specialization are Dyeing, printing, finishing of natural and manufactured fibers, which come under the area of Textile Chemical Processing. He is a Founder and National Coordinator of Video Courses of the NPTEL Project from the first phase of NPTEL launched in 2003 and has been championing the programme of Eklavya, a Gyan Darshan TV Channel from 2004 and is well versed with all aspects of NPTEL for the past eleven years. In addition he is a contributor to NPTEL content.More details are in the CV attached.

4. **Dr. Satyaki Roy** is an Associate Professor jointly with the Department of Humanities and Social Sciences at Indian Institute of Technology, Kanpur and the Design Programme.He has been the IIT Kanpur NPTEL coordinator since the year 2005 and has been responsible for the promotion of NPTEL MOOCs in IIT Kanpur and for NPTEL's presence in all the Northern and Eastern States of India.His areas of interest include Graphics, Media and Design. More details are in the CV attached.

Detailed CVs of the PIs are in **Annexure I - CVs of Principal Investigators:**

10 (b) Co-Principal Investigator Details:

Not Applicable

11. In case it is a joint project with other Institution, research labs and industries, names(s) of Participating investigators:

NPTEL is a joint project of the 7 IITs (IIT Madras, IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Kanpur, IIT Roorkee, IIT Guwahati) and IISc Bangalore. NPTEL is administered through a national committee known as the NPTEL Programme Implementation Committee whose members are from each of the Institutes above. In addition there are other national and international experts who are invited from time to time to provide valuable inputs. The list of current NPTEL PIC Members is enclosed as Annexure III to this proposal.

12. In case industry/user agency is participating, whether a MOU has been signed or letter of intent given.

Several industries are partners to NPTEL and a number of MOUs have been signed with them. They are all non-exclusive to the partner industries. In addition NPTEL has signed MOUs and license agreements with national and international agencies to ensure promotion of the educational content and the NMEICT programme without compromising the fundamental integrity of the National effort. These details can be provided on request.

13 (a) Present commitments of the Principal Investigators:

No major commitments apart from regular departmental and institute duties.All the PIs are active TEL coordinators of NPTEL Phases II and III, which is about to be concluded.

13(b) Present commitments of the Co-Principal Investigators

Not Applicable

14. Other members of the Research Group to work on proposed Projects:

Not Applicable

PART IV - About Research Project

15 (a) Summary of the project (brief):

Over the past ten years, the National Programme on Technology Enabled Learning (NPTEL) has been successful in creating the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects and maintaining the popular online web portal http://nptel.ac.in. More than 16000 video hours have been uploaded in NPTEL and NPTEL's YouTube channel, and the portal constitutes the most accessed library of peer-reviewed educational content in the world. Cognizant of the rapid advances and changes in the area of online and distance education with tremendous transformations in efficacy, acceptance and quality of delivery, NPTEL has proposed new activities in the current proposal. Globally, popular online education portals have been witnessing rapid growth. In India, which has the largest growing population of youth in the world, the need for scalable, certifiable education for a large number of students is vital for the future growth of the country, and this need is addressed in this proposal as a key initiative. The main items in this proposal are the following:

- Creation of Open Online Courses
- Repurposing Courses for Online Delivery
- Courses in New Disciplines
- Lecture Series on Special Topics

(b) **Justification, importance of projects:**

Given its expertise, use and success in the Indian online education context, NPTEL is uniquely placed to be an important player in the country's effort towards affordable, high-quality, online education for all in every area of higher education. To work towards this larger objective, this document presents NPTEL's plans and proposals for the next three years 2016-18. All aspects of current and previous NPTEL proposals have been incorporated in the Mission Document that MHRD created and obtained approval from the Cabinet of Government of India in the year 2009 for launching the National Mission on Education through Information and Communication Technology (NMEICT). NPTEL has continued to create new vistas in online education and online certification with uniform policy for copyrights and distribution/access of materials throughout the world and provides full support for present and future NMEICT initiatives while creating a credible online programme and a model for the whole nation.

(c) Details of the work already done by Principal Investigator in this area

Introduction and Motivation (along with a summary of the past phases)

The National Programme on Technology Enhanced Learning (NPTEL) was initiated by five Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur and Madras) and four Indian Institutes of Management (Ahmedabad, Bangalore, Lucknow, and Calcutta (Kolkata now)) in the year 1999. In 1998 some of the Directors visited several Academic Institutions in the United States to explore active learning by students and teaching by faculty using the Internet and Technology Enhanced Learning (TEL). Professor Paul Goodman, Director, Center for Strategic Learning in Carnegie Mellon University (CMU) in Pittsburgh followed the visits with active support for TEL. He was the Director of the Center for Strategic Learning which had been helping CMU faculty create interactive and cognitive learning support using technology. He had also helped establish a highly successful Virtual University in Mexico earlier. Prof. Goodman arranged for a workshop in IIT Madras with funds from Ford Foundation (USA) in 1999. Industry, Government and academics from India and United States participated in the three day workshop conducted by IIT Madras in May 1999 and drafted a proposal a TEL framework for four activities, namely,

1. Creation of electronic and web based content for core engineering, management and basic science curriculum by the IITs and IIMs (about 100 courses)
2. Creation of digital library archives in India following CMU's pioneering effort in that direction,
3. Creation of online guidance for IIM Doctoral students by faculty who would be in other IIMs and
4. Creation of a Virtual Technical University (VTU) once the core content creation process had been standardized with about 500-600 complete one-semester courses.

IITs felt that a number of components such as core content creation and establishing a VTU (or a virtual IIT as the case may be with approval from IIT Council and with active partnership from all IITs and NITs) were vital to online science and engineering education in India as a whole and also the drivers for innovation in design and manufacturing to make the nation competitive in the twenty first century, and needed Government support. With a large number of private institutions in India created already due to liberalization of economy in the nineties and without adequate support of quality faculty the quality of students had started declining; the latter was already beginning to have its effects in the intake quality of M. Tech and M. S students to IITs. Large-scale teacher training and quality monitoring of engineering students were urgently needed before the situation got out of control. This prompted Prof. M. S. Ananth, Director of IIT Madras, who had earlier written a proposal based on the TEL workshop, to champion the TEL programme to the Government from 1999 onwards for providing high quality, peer-

reviewed educational contents freely, as a priority from those four activities listed above; he succeeded in convincing the Ministry and in 2003, funds to the tune of Rs. 15 Crores (Rs. 150 million, or equivalently, 3.5 million US Dollars then) were sanctioned for creating a National Programme on Technology Enhanced Learning (NPTEL) that would be coordinated by IIT Madras with six other IITs and IISc Bangalore. Five core disciplines were identified, namely, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering and mechanical engineering; in addition core science, language and management courses that all engineering students needed would be developed as the sixth discipline. Undergraduate courses covering the syllabi provided by the model curricula of All India Council of Technical Education would be the focus along with relevant components of three large affiliating engineering Universities in India at that time, Anna University (Tamil Nadu), Jawaharlal Nehru Technological University (Hyderabad) and Visvesvaraya Technological University (Karnataka). The courses would be modularized so that there is flexibility in their use by Universities and colleges. Between six to twelve modules containing three to four lectures each would be developed with sixty to eighty percent of the course covering core syllabus materials.

The Minister for the Human Resource Development, Dr. Murli Manohar Joshi, requested the project coordinators in 2003, soon after sanctioning funds, to restructure the proposal for 200 web based courses to about 100 full broadcast quality, video recorded courses and 100 online web based educational material. He argued that television had the last mile reach in India (which is a fact even today after eleven years of various interventions with Internet!) with more than forty percent of colleges in rural and semi-urban locations; internet had not penetrated even in the cities and reaching out to teachers and students had to be done fast with the steady increase in the opening up of new institutions and requirements for a large number of engineering students in the IT industry. The presence of a teacher, through the medium, could be quite influential to the students and other learners for the learning process. He created a new GyanDarshan T. V. Channel and named it as Ekalvya, which began hosting NPTEL content from 2005 until June of this year.

The first phase of the programme was completed in 2007 with about 130 video courses each containing approximately forty one-hour lectures recorded with high quality broadcast studios in seven IITs (including Roorkee and Guwahati which had been formed already) and the Indian Institute of Science. Another 130 courses were created as web based lecture materials with animations and other completely in-house contents. The requirement for adherence to copyrights was impressed upon faculty early-on and in return, the Government had agreed for a one-time honorarium to the faculty who

contributed to the teaching-learning process through their intellectual property. In order to facilitate content development in both the video and the web format, studios were created with state-of-the-art recording facility and computer-software-human technical support infrastructure in each of the eight institutes. An additional 5.5 crores of Indian Rupees was released towards the end the first phase to cover the costs of more than 60 courses that were added over and above the sanctioned number of 200 courses**. Recording from other books, scanned pictures and use of one's own text books in both web and video lectures were forbidden and this practice enabled NPTEL later to adopt Creative Commons copyright license to the NPTEL project**.

NPTEL activities summary for Phases II and III during 2009-2014

The video lectures from the first phase needed to be converted from the high-resolution broadcast format to low-resolution Internet streaming format in order to enable any-time, any-place access by any one. Google Inc. came forward with the option of providing a free Indian educational channel in YouTube similar to their offer to MIT, Stanford and University of California system in 2006. Dr. Ramanathan Guha, an Alumnus of IIT Madras and a senior Vice-President in Google spearheaded the effort inside his organization. The channels would be free of commercials and would be administered by the NPTEL academic team. In addition Google would provide data on analytics of usage. After considerable discussions among the Directors of IITs and IISc (who were the custodians of intellectual property created by their faculty) , approval was given to the NPTEL Project Implementation Committee to compress the videos and upload them in the YouTube. The programme was launched on Nov 5, 2007 and has registered more than 120 million channel views until Sep 2015. It is the single, largest, free academic channel in the world hosting more than 15000 curriculum based lectures videos (all in English) recorded by faculty in IITs and IISc and is growing everyday with uploads of new lectures. Every country in the world has viewers on that channel. Some of the videos have crossed the million-viewer mark. The largest number of YouTube users (75-80 percent) is from India. Corporates and academic institutions in India and abroad use the contents freely. In an Appendix to this document data on usage of some of the courses is provided.

The main goal of Phase II (2009-14) was to build on the engineering and core science courses launched previously in NPTEL Phase I by the Ministry for Human Resource Development, Government of India on September 03, 2006 and create online course contents and interactions between faculty members in science and engineering using the best academics in India. The main deliverables in Phase II were the following:

1. Conversion of NPTEL phase I video courses in streaming video lecture format and setting up eight distributed national video servers for delivering lectures on demand in each of the eight partner institutions.
2. Creation of additional 600 web and video courses in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level.
3. Integration of College curricula in engineering education with NPTEL contents through a large number of course specific workshops and interaction with Colleges in India for improving TEL infrastructure.
4. Creation of discussion forum for each course created under the NPTEL using a grid of computer servers and setting up FAQ's for each course.
5. Indexing of all video and web courses and setting up powerful search engines to enable content and keyword search on all topics in science and engineering developed under NPTEL.

Setting up internal infrastructure in each IIT for implementing virtual online certification programmes in science and engineering.

16 .Total amount requiredfor Phase IV (2016-18): Rs. 93 crores

S. No	Topic	Content	Unit Cost (in Lakhs)	Number	Total Cost (in lakhs)
1	Creation of Open Online Courses	Online course	12.0	300	3600
2	Repurposing Courses for Online Delivery	Course supplements	6.0	300	1800
3	Reruns of Open Online Courses	Course delivery	5.0	200	1000
4	Lecture Series on Special Topics	Lecture Series	6.0	100	600
5	Workshops and Conferences (National and International)	Training and research	5.0	200	1000
6	Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi	----------	----------	----------	1300
	Overall Total Cost				**9300**

17(a) Recurring budget of the proposal along with item-wise breakup (Manpower, Contingency, Consumable, Travel, Miscellaneous year wise breakup).

S. No.	Proposed item	Cost (in INR, lakhs) per course					Total cost (per course) in INR, lakhs	Number of courses	Total (INR in lakhs)
		Human resource support#	Web studio hardware/ software and infrastructure support	Honoraria to faculty	Student/ teacher assistant/ mentor online technical support	English text Transcription, indexing and assessment material for certification			
1	Creation of Open Online Courses	3.5	1.5	3.5	2	1.5	12	300	3600
2	Repurposing Courses for Online Delivery	2	0.5	1.5	1	1	6	300	1800
3	Reruns of Open Online Courses	2	0.5	1.5	1	-	5	200	1000
4	Lecture Series on Special Topics	2	1	2	-	1	6	100	600

#Human resource support includes 30% House Rent Allowance (HRA)

Item 6. Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi

	Years			
	2016	**2017**	**2018**	**In lakhs**
IIT Madras NPTEL Office	16.5	16.5	17	50
TEL coordinator Honoraria (IIT Madras: Rs. 40 lakhs, 7 other institutes: Rs. 30 lakhs each per Institute. This includes honoraria payment to support staff of the institute for providing all administrative and infrastructure support.) TEL coordinator honorarium will be fixed at Rs. 2.5 lakhs per coordinator per Institute per year				250
Travel expenses for meetings, publicity, coordinators and faculty deliberations on project related matters (Rs. 3.0 crores for coordinating Institute and Rs. 1.0 crore each for seven partner Institutes)				1000
Total				**1300**

18. SUMMARY SHEET:

1. Name of the Institution: IIT Madras (Coordinating Institute)

2. Title of the Project:

NPTEL Phase IV for the period 2016-2018

3. Name of the Department: Not Applicable

4. Cost of the Project: Rs. 93 crores

5. Amount released earlier if any: None

6. Utilization position in respect of grants released earlier (upto2001) for various projects (Details to have given project wise)

a. Fully spent: Not Applicable

b. Unspent, proposal to utilize it: Not Applicable

7. Reasons for unspent balance: Not Applicable

8. Name of the Principal Investigator responsible for implementation of the Project:

Dr. Andrew Thangaraj, IIT Madras (Coordinating Institute)

Dr. Prathap Haridoss, IIT Madras (Coordinating Institute)

Dr. Kushal Sen, IIT Delhi

Dr.Satyaki Roy, IIT Kanpur

PART V - Detailed Project Report (DPR)

1. Objective:

The main aspects of the proposal are the following:

1) Creation of Open Online Courses

Through an online portal, it is proposed to offer free 4-, 8- or 12- week or full-semester online courses typically on topics relevant to students, preferably in their final years of higher education along with basic core courses in sciences and humanities and relevant exposure to tools and technologies.The portal includes support for weekly submission of assignments by students and active interaction through a discussion forum. These courses are suitable for possible certification by any participating organization. As a pilot, since March 2014, online courses are being run by NPTEL. A total of 45 courses have already been newly created as open online courses. We propose to create 300 new courses in Phase IV.

2) Repurposing Courses for Online Delivery

Existing NPTEL courses were created without an explicit online course delivery model. In online delivery of courses, the videos have to be annotated and, if needed, broken up into smaller pieces. Also, weekly assignments have to be added, and the entire content needs to be moved to an online course delivery portal. In the pilot phase, since March 2014, a total of 9 courses have been repurposed for online delivery. We propose to repurpose 300 existing courses in Phase IV.

3) Reruns of Open Online Courses

An open online course, once created and run, can be offered again at a future time. However, during a rerun, the assignments are typically changed and questions in the discussion forum will have to be answered. If needed, new content is created based on feedback from previous course runs. In the pilot phase, since March 2014, 4 courses were rerun. We propose to rerun 200 courses in Phase IV.

4) Lecture Series on Special Topics

To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures. Four such lecture series have been created in 2013-14. They are in the areas of Ayurveda, siddha medicinal practices, Indian contribution to mathematics from First Century AD and Psychology. The science behind professional practices of ancient India and its arts and culture are some of the areas actively being promoted. It is proposed to create at least 100 such special topics lecture series during the period 2016-18 to bring the learning from our past to the present and the future generations using ICT.

5) NPTEL workshops and International Conferences

Workshops will be conducted throughout the country for fostering and promoting NPTEL and NMEICT. Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation or ICT tools in NPTEL and NMEICT and to create rigorous peer-review mechanisms for ICT in education. The conferences will also have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology enhanced learning known as T4E.

2. Methodology:

The exact methodologies to be followed for achieving the objectives are detailed in this section.

1) Creation of Open Online Courses

Online courses are to be offered along the lines of Massive Open Online Courses (MOOCs). A typical online course contains the following:

1. Clear assumptions about prerequisites for a learner
2. Clear learning outcomes
3. 8-12 weeks in duration or full semester courses
4. 2-4 hours of lecture every week
    - The lectures are broken up into short modules
    - Every module has a clear description of its contents and expected learning outcomes
5. Objective-type assessments every week (to be auto-graded)
6. Programming or other assignments every week (to be auto-graded or peer-graded)

Subject Matter Experts

Subject Matter Experts (SMEs) will be invited from all over India to create the video lectures and other content adhering to a curriculum. If the SMEs already have a course in NPTEL, that course may be modified to meet the requirements of an online course. However, all the important pedagogical aspects of the online course will be met – prerequisites, learning outcomes, splitting into weeks and short modules, weekly assessments and assignments will be provided.

The content of the online course will be peer-reviewed to see if it meets all the requirements. Even if the online course is created from an existing NPTEL course, a second round of peer review will be carried out to confirm that the newly created online course is suitable for open offering.

The effort of the SMEs for content creation and that of the reviewers will be funded adequately and according to norms approved by the Standing Committee and the PAB of NMEICT from time to time. The role of the SMEs will not end with content creation. The SME team (assuming there are more than one for a particular course; the team could have a single SME as well) will play a crucial role in the conduct of the course on the portal. The SME team will be assisted by a group of Teaching Assistants (TAs) provided by the SME team's department at their institute.

Course announcement

Once a course is ready, it will be announced on the portal for students to sign up for the course. The announcement will include the following:

- Date when sign-ups are opened
- Date when sign-ups will be closed
- Start date for the course
- End date for the course

Sign-up

Sign-up will be kept open typically for a month or two. Anyone who signs up will get a welcome email and get added to email lists for course announcements and course discussion. The welcome email for these lists will be drafted by the SME team. This will be done on the portal. The SME team and TAs will have course admin logins in the portal, and this will allow them to manage the content and the email lists.

Uploading content

The course will open on the announced start date. Content will be released every week: Week 1 to Week 8 or 12, or the entire semester. Content includes video lectures, lecture slides, additional material, assessments and assignments. The SME team and TAs will be responsible for uploading the content on the portal, formatting it suitably, making it public and posting an announcement in the announcement email list about the content being available.

A suggested practice is to upload all content by Wednesday of the previous week, check the content for a couple of days and then make it public on Sunday night or Monday morning. The SME team and TAs will function as a well-knit group that would meet often and discuss the modalities of running the course.

Solutions for the assessments and assignments will be created and uploaded on the portal. Whenever possible, suitable videos will be created for explaining the solutions.

Forum

An important duty for the SME team and TAs during the running of the course is monitoring the forum. The discussion forum on the portal tends to be very active and numerous questions are posted in it on a daily basis. The SME team and TAs willrespond to the questions every day.

Multiple runs

The same course maybe run multiple times depending on the availability of the SMEs and the necessity as recognized by requests from institutions. The rerun may also be done by a different team of SMEs, who will create/manage the content and the running of the course on the portal. The efforts of the SME team and TAs in running the course on the portal will be remunerated at applicable and suggested rates provided in the budget details in a later section.

Pilot courses and portal (data ownership and integrity)

For the pilot courses, NPTEL has a partnership with Google for maintaining the portal. This is through a Google App Engine agreement, which many businesses use today. Through this, NPTEL and NMEICT will continue to own all the data on the portal and also access it. Developers and designers from Google have contributed significantly to the coding and the look-and-feel of the portal. They have extended full support for some time at least, through a personal oral and written assurance by the Google's software Head to the Secretary and the Mission Director. Google also released a white paper on how its processes and support will be made available to NPTEL without any cost for its involvement. All of this is

also due to a relationship that NPTEL has developed with the best search engine team in the world for helping with NPTEL analytics so far from 2007 when it launched the video channel with YouTube. The popularity of the YouTube IIT channel has belied everyone's expectations including Google. However, NPTEL will initiate efforts from the date of sanction of the project to migrate open source codes from Google cloud to a cloud identified by the NMEICT and integration effort will be carried out. The fully open coursebuilder codebase has been built on it significantly, and the entire codebase is in a git repository owned by NPTEL.

An important development effort from engineers in Google India is the support for programming assignments though an installation of a Mooshak instance and its connection to the portal. The Mooshak instance is being run on a Google Compute Engine instance, which, once again, through a suitable agreement, is owned by NPTEL. Google has donated all the development time and server space for the portal.

2) Repurposing Courses for Online Delivery

SMEs who already have an NPTEL course will work with the recorded video lectures and content from the other quadrant to repurpose their existing course into an open online course suitable for online delivery through the portal. The methodology involves porting the content to the online course portal in a suitable format. Typical tasks include adding annotations for video lectures to describe the content, uploading the content onto the portal and adding weekly assignments.

The running of the course is similar to that of a newly created course. The effort of the SME is lesser for repurposing because new video lectures are not being created. However, the effort of running the course – managing the content on the portal and responding to forum posts – are same as that of a newly created course.

3) Rerun of Open Online Courses

Once a course has been uploaded onto the portal and successfully run once, it can be offered again at a future time. At this time, either the same SME or a new SME, will be expected to alter the assignments suitably, manage the content of the portal, and respond to questions on the forum. Based on feedback from the previous run, new content may be created, if necessary.

A rerun involves little effort in lecture content creation, but the effort and methodology of running the course is same as before.

4) Lecture Series on Special Topics

To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures that will bring India's own traditional knowledge to the fore in a scientific and rigorous manner. Four such lecture series have been created in 2013-14 on a trial basis. It is proposed to create 100 such special topics lecture series during the period 2016-18.

NPTEL would launch, in addition to creating courses in more areas such as humanities, arts and sciences, performing arts such as music, motion picture, theatre and drama,special lecture programmes comprising of fewer but more focused lectures by experts in various fields in India. Strengthening the core humanities and social science programme online is envisaged as a fundamental need of the hour to engage students meaningfully and to bring out the best of culture and tradition as an embodiment of scientific knowledge. A large number of these lectures can be elective/special topics for students in higher education. Already, the following four programmes have been created:

a. Lectures on Ayurvedic Tradition of India by Padma Vibhushan Prof. M. S. Valiathan of Manipal University,
b. Lectures on Mathematics in Ancient and Modern India by Prof. M. D. Srinivas, Prof. Sriram (both from Madras University) and Prof. Ramasubramanian (IIT Bombay) who are international experts on the history and contribution of Indian Mathematicians to modern mathematical thought,
c. Lectures on Creativity in Indian Art and Culture and Temple inscriptions, in the Chola period of Tamil Kingdoms by the renowned archeologist Dr. Nagaswamy (Chennai), and
d. Lectures on Selected Topics in Psychology, by renowned people in the areas of Psychology and Psychiatry. The contributors are experts from IIM Bangalore, NIMHANS, Delhi University, Allahabad University, DRDO and ASSERT along with other experts in Neuro Radiology as well as R&D establishment. The series was coordinated by Prof.Braj Bhushan, Department of Humanities and Social Sciences, IIT Kanpur.

The objective is to recreate excellent contributions on learning native to India, to its younger citizens as formal education content. Hundreds of such topics are envisaged in the coming years and NPTEL will continue to bring the best exponents of every area in higher learning and India's own traditional knowledge to the fore. While humanities and social sciences subjects cannot be separated from the convictions and opinions of individual exponents, a scientific process of enumerating counter and

contrary thoughts processes of others by the same individual expert offering the course as a part of his or her lectures is being made a requirement to let the learner learn the topics more objectively.A total of 100 titles are proposed with 20 or fewer lectures in each title (not less than 10 per topic to ensure reasonable depth and to form a part of elective for students).

5) NPTEL workshops and International conferences

Workshops will be conducted throughout the country with the following objectives:

1. Inform teachers and students throughout the country as well as leaders of the industry and general public in the region about the availability and curriculum adoption of course contents developed by NPTEL. Encourage students to participate and obtain professional and competent certificates.
2. Invite faculty members to directly participate in NPTEL and NMEICT programmes as collaborators with adherence to the quality and content standards and procedures already in place and to evolve them with more participation by Universities, scientists in the national and private research labs and industry experts.
3. Evolve suitable mechanisms and support for educational institutions that offer NPTEL courses for their students and to establish online mentoring principles.

Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation or ICT tools in NPTEL and NMEICT and to create a rigorous peer-review mechanism for ICT in education. The Conferences will have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology Enhanced Learning known as T4E (Technology for Education). It is fully sponsored by the IEEE (USA) Society under the Computer Society's division on Learning Technologies. Its chairs have been Prof. Demetrio Sampson (University of Greece, Greece) and Prof. Kinshuk (Athabasca University, Canada). Prof. Mangala Sunder who was the National Coordinator of NPTEL Web Courses for the period 2003-2014 has also been the Chair of the Steering committee of T4E approved by the IEEE till December 20, 2014. Steering Committee on T4E is the Apex bodyfor selecting and approving proposals to hold research conferences in this area in India with the sponsorship of IEEE. Proceedings are published as peer-reviewed papers by IEEE fostering research and

tools in online education and pedagogy research, which are also listed as goals of the NMEICT Mission. Four fully sponsored T4E have been conducted in the past. They are

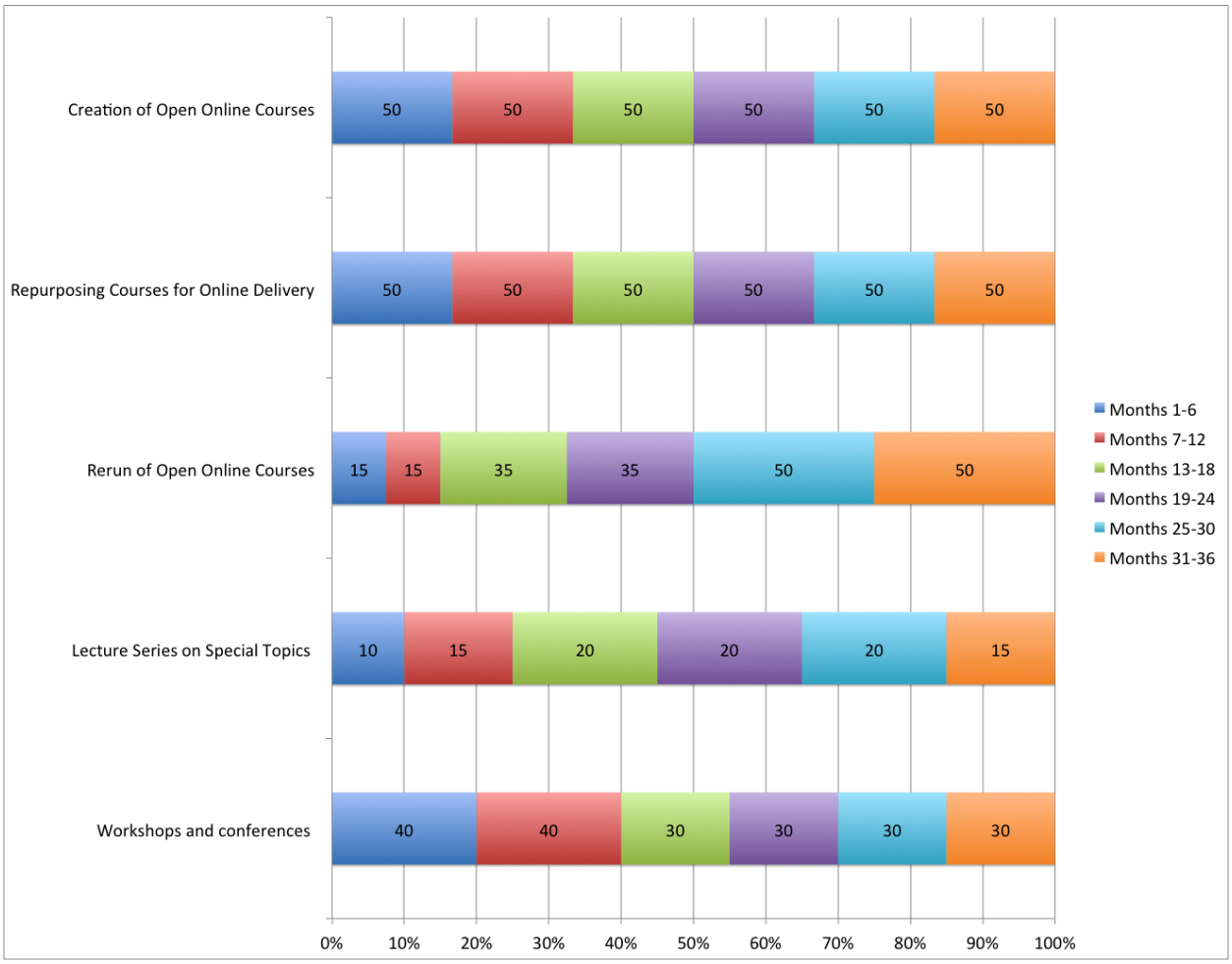
1. T4E 2011, IIT Madras
2. T4E 2012, IIIT Hyderabad
3. T4E 2013, IIT Kharagpur
4. T4E 2014, Amrita University, Kollam Campus
5. T4E 2015, NIT Warangal (Scheduled)

Two co-sponsored T4Es were held in the years 2009 (IIIT Bangalore) and 2010 (IIT Bombay) before IEEE upgraded the Conference to a fully sponsored event. Many International experts in educational technologies and pedagogies in online education have already participated and have been apprised of NMEICT and NPTEL. Panel discussions in these conferences devote adequate time to inform national and international educationists and researchers in the field of educational technology about Government of India's active role in promoting quality higher education and invite them to participate and contribute to the resource creation. The full proceedings have been published in several websites under T4E and will be archived for public access in the immediate future.

3. Deliverables year wise and its possible contribution to major objectives of mission.

S.No	**Proposed item**	**2016**	**2017**	**2018**	**Total (deliverables / Courses)**
1	Creation of Open Online Courses	100	100	100	300
2	Repurposing Courses for Online Delivery	100	100	100	300
3	Rerun of Open Online Courses	30	70	100	200
4	Lecture Series on Special Topics	25	40	35	100
5	Workshops and research conferences	80	60	60	200

4. *Time schedule (half yearly):*



The above graphic shows how the item-wise deliverables are spread out over the 3-year duration of the project.

5. *Details of permanent assets to be procured from the project with estimated cost.*

The total budget allocated forWebstudio hardware/ software and infrastructure supportis Rs. 8 crores.This total amount is to be split as follows into equipment and consumables.

Proposed:

Details	**Amount (in crores)**
Equipment	6
Consumables	2
Total	**8**

Equipment Details:

The total budget of Rs. 6 crores for equipment is to be split as follows. The split is based on similar expenditure in previous NPTEL phases.

Item Details	Amount in Crores
COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO	1.2
EQUIPMENT RELATED TO STUDIO	3.2
SERVER RELATED	0.6
SOFTWARE	0.8
MISC.	0.2
Total	**6**

More details about the exact equipment proposed to be purchased are presented in Annexure II of the proposal.

6. Details of financial outlay in year wise for recurring and nonrecurring fund

Item	Year 1	Year 2	Year 3	Total
Equipment	4	2	0	6
Consumables	1	0.5	0.5	2
Staff salary	7.5	7.5	7.5	22.5
Total	12.5	10	8	30.5

(*All costs are in Crores)

Consumables include filing cabinets/ stationery/ Labour/ furniture/ refreshment/ flooring/ repairs/ books/ fans / Video Tapes.

Annexure II provides sample expenditure of IIT Madras – NPTEL project for the previous phases.

7. Management of Deliverables & IPR etc.

All learning materials developed on this project will be released as Open Education Resource (OER)Creative Commons By Attribution ShareAlike (CC BY SA 4.0 India), which is consistent with NMEICT guidelines. All software developed will be licensed through an appropriate open source license.

8. Justification of the projection with clear cut statement about outcomes if the project contributing to mission objective.

The Mission objectives are fully met by this proposal in the area of content creation, pedagogical and instructional design, online ICT tools and development of platforms. The outcomes of the past NPTEL activities have been coherent and were released as unanimously approved by the partner institutions. At every stage NPTEL proposal has provided the Mission document and founders of the Mission with the necessary clarity on the proposed objectives of the Mission in 2009 with its experience preceding the Mission for six years (2003 – 2009).

PART VI:Uploaded CV and DPR

Uploaded CV: Yes

Uploaded DPR: Yes

Part VII - DPR Summary

1. Objective :

Thisprojectproposestodeploythepowerandadvantagesoftechnologyenhancedlearning(TEL)using ICT tobuildcapabilitiesofprofessionalsandstudents(UGlevelandabove)

2. Deliverables :

S.No	Proposed item	2016	2017	2018	Total (deliverables / Courses)
1	Creation of Open Online Courses	100	100	100	300
2	Repurposing Courses for Online Delivery	100	100	100	300
3	Rerun of Open Online Courses	30	70	100	200
4	Lecture Series on Special Topics	25	40	35	100
5	Workshops and research conferences	80	60	60	200

Milestones and Payments:

Timeline	Percentage of payment	Payment (crores)	Milestone
Start of project	26.88%	25	-
End of Year 1	26.88%	25	Progress towards deliverables for Year 1
End of Year 2	26.88%	25	Progress towards deliverables for Year 2
Mid of Year 3	19.35%	18	Progress towards deliverables for Year 3

The milestones will be assessed and monitored through regular meetings of the NPTEL Programme Implementation Committee.

Arrangements for quality control: Platform quality control is exercised through a review by a committee of users and technical experts. Content quality control is exercised through faculty selection and content review; process quality control is patterned after globally emerging practices for online certification with special reference to NPTEL.

Accuracy: Platform accuracy is verified through standard software engineering practices. Content accuracy will result from the quality control exercises.

Coverage: Nationally Open for participation in certification; content is science-based and contextually national; the portal is globally open for browsing and for certification in limited places.

Updating Mechanism: Platform will be continually updated throughout the project phase, with feedback from each course offering. Subsequently, the platform will be put in an appropriate Open Source license. Content will be updated as appropriate based on inputs and suggestions from peers and from online communities in the MOOCs. Further, content will be released under NPTEL content licensing scheme (Creative Commons CCBYSA 4.0 India). The idea of using Creative Commons for all NPTEL content was first initiated by the NPTEL coordinator Prof. K. Mangala Sunder in the year 2011 to the NMEICT and has now been adopted as the Universal model for all contents released under NMEICT. The document which enabled this change has been uploaded in the NPTEL website and is free for everyone to view.

Testing by Users: Both content and services are provided in a "permanently beta" mode, open to continuous evaluation and subject to continual improvement.

Testing by Peer Group: Please see above comment.

4. Scaling up

NPTEL online courses model is designed in a scalable manner to reach a large number of students and learners. Through online courses, we plan to offer certification to interested students spread across the country and even internationally.

All NPTEL content is hosted on web servers and on YouTube and a National server that is being mirrored at multiple locations. This enables scalable distribution of content across the globe.

5.Popularizing and extension activities and plans

NPTEL activities and efforts will be popularized through workshops conducted in colleges all over the country. A total of 700 plus workshops have been conducted in the past five years. It is proposed to

popularize NPTEL through similar workshops for the next three years. In addition, it is proposed to use online advertisement methods and popularization through facebook / twitter and other similar social network portals.

6.Review Mechanism

All NPTEL content is peer-reviewed. Reviewers from a list approved by the coordinator are contacted for comments. The comments are provided to the content creator for incorporation and editing. The content creation process is deemed to be complete only after the peer review is complete.

For project review, it is proposed to continue with the same committee chaired by Prof. Arun Nigavekar (Former UGC Chairman) and ten to twelve members who reviewed the NPTEL Phases II and III in September 2014. The list of committee members with their affiliations as of Sep 2014 is given below.

1) Prof. Arun Nigavekar, Former UGC Chairman, Pune

2) Prof. P. Rama Rao, Chairman Governing Council, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), Balapur PO, Hyderabad

3) Prof. Bandhopadhyay, former VC, Indraprastha University

4) Prof. Sunil Sarangi, Director, NIT Rourkela

5) Prof. Sandip Sancheti, Vice Chancellor, Manipal University, Jaipur

6) Prof. V. Ramachandran, Director, NIT Nagaland

7) Prof. M. K. Surappa, IIT Ropar

8) Shri. Kris Gopalakrishnan, Infosys

9) Prof. Ashok Mishra, Chairman, BOG, IIT Roorkee

10) Shri. Ravi Shankar, I. A.S. Additional Secretary, Dept. of Electronics and Communication Technology, New Delhi

11) Shri. N. K. Sinha, I. A. S. Principal Secretary, IT, Government of Bihar

12) Prof. S. Ramani, formerly Founder NCST and Director, HPLabs, Bengaluru

13) Prof. Ramakrishna Ramaswamy, Vice Chancellor, Central University of Hyderabad.

7. Budget

Overall Total Cost	Rs. 93 Crores

	Human Resource Support	Web Studio Hardware/ Software and Infrastructure Support	Honoraria to Faculty	Student/ Teacher Assistant/ Mentor online Technical Support	English text Transcription, Indexing and Assessment Material for Certification	Other Heads	Total
Creation of Open Online Courses	10.5	4.5	10.5	6	4.5	-	36
Repurposing Courses for Online Delivery	6	1.5	4.5	3	3	-	18
Rerun of Open Online Courses	4	1	3	2	-	-	10
Lecture Series on Special Topics	2	1	2	-	1	-	6
Travel / Honoraria / NPTEL Offices*			2.5			10.5	13
Workshops and research Conferences #			0.5			9.5	10
Total	22.5	8	23	11	8.5	20	93

(All costs are in crores)

*Travel expenses have been adjusted for inflation and increased fares and are otherwise based on the NPTEL proposal submitted to the Cabinet and to the NMEICT Mission in 2009. A copy of that will also be uploaded as support document for this proposal once a provision has been made.

#Workshop and research conferences will be supported in the same form as has been done till now. The budget for the NPTEL workshop for a typical 2-3 day workshop was approved earlier in 2009 by NMEICT for a sum of Rs. 4.0 lakhs and has been revised to Rs. 5 lakhs after adjusting for increased travel costs. Otherwise the unit cost is unaltered from the previous budget.

Focused comments on:

Total honorarium to be paid in the project:

Item No	Item Description	Honorarium per Unit (in Crores)	No. of Units	Rs. Total (in Crores)
1	Creation of Open Online Courses	0 .035	300	10.5
2	Repurposing Courses for Online Delivery	0.015	300	4.5
3	Rerun of Open Online Courses	0.015	200	3.0
5	Lecture Series	0.02	100	2.0
5	Workshops	0.0025	200	0.5
6	PI and Support staff	------	--------	2.5
	Total			23

Individual costs have all been identified under every category. Apart from technology tools, this is also a human intensive project in content creation of the best kind in the whole world and faculty, students and other contributors have been provided with honoraria at the rates approved by NMEICT earlier for many of its other projects as well. Therefore, the justification for this process has been amply given for the total amount of honorarium that includes all payments to all content generators and to the support groups involving teachers, students and other employees for three years.

8. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives:

The cost effectiveness of online course delivery and certification has been proven by our pilot courses run so far. The cost per student for certification is around Rs. 1000, which is affordable to most students. The cost of content creation is a one-time cost and the benefits accumulate over a long period of usage by students. Compared to other alternatives, the proposed NPTEL Online Courses model provides high quality content to all students in a scalable manner. Content creation through NPTEL is done predominantly using NPTEL studios maintained at all the institutions. So, the content creation process is cost-effective for those who certify through special MOOCs and NOCs.

The cost effectiveness is calculated with the total number of participatory learners to the whole programme and is arrived approximately as follows. From NPTEL Phases I, II and III the website has recorded more than 220 million visits till now and represent between forty to sixty percent of all viewers. More than 90 percent of these visits are due to NPTEL Phase II/III during the period 2009 – 2014. The scaling down to 40 percent is appropriate since more than 900 educational institutions and several university campuses have been provided local repository of the entire content and their students' views are not included in the Internet capture by Google. Thus assuming that more than 400 million views have been recorded altogether, and about ten percent of these is due to dedicated visits by the same learner we can assume that about 40 million dedicated viewers. With increasing richness and variety of contents in the coming years, and using this as a base figure, Rs. 93 crores divided by 4 crores of visitors at the current level (10 percent of total views) for the next three years amounts to Rs. 23.25 per viewer for the whole of three years, or Rs. 2.4 per visit to the web site! With more numbers visiting in the coming years, this is likely to be a lot less. The cost-benefit ratio to a learner by a Government funded academic initiative to provide the highest quality learning educational materials freely and with no prejudice to anyone, is yet to be loweredby any country in the world and is a record low among all OER contributors, including the UNESCO.

9. Social Impact:

Significant increases in human capability and skills to harness technology in fused methods to enhance national skill levels. The MOOC, as a social good, for developing and enhancing skill sets in the various domains of technology, engineering and sciences to empower students and professionals. The courses and the special topics foster a whole new generation of young learners to a value system developed in this country over centuries and Millennia. The impact is likely to be phenomenal and can result in the transformation of education in the country.

10. Outcome Extent to which the project will realize the objectives of the Mission may be given explicitly:

NPTEL is a major initiative and continues to act as the source for the whole content programme under NMEICT. Certification is the logical next step and an important new initiative for the mission. The final goal of creating a virtual IIT is in line with the mission and with the original goal of the workshop held in 1999 in IIT Madras.

Annexure I - CVs of Principal Investigators:

Curriculum Vitae – Andrew Thangaraj

Andrew Thangaraj

ESB212A, Electrical Engineering, IIT Madras, Chennai, Tamil Nadu 600036
Phone: 044 22576424 E-Mail: andrew@ee.iitm.ac.in

Professional Experience

Professor, Department of Electrical Engineering, IIT Madras — **Sep 2015-**

- **Research Area: Coding and Information Theory**

Associate Professor, Department of Electrical Engineering, IIT Madras — **Apr 2009-Sep 2015**

Assistant Professor, Department of Electrical Engineering, IIT Madras — **Jun 2004-Mar 2009**

Post-doctoral Researcher, Georgia Tech Lorraine, France — **Aug 2003-May 2004**

Education

Doctoral Student, Georgia Institute of Technology, Atlanta, USA — **Sep 1998-July 2003**

- Research in iterative error control codes and quantum codes.

Undergraduate Student, Department of Electrical Engineering, IIT Madras — **Aug 1994-May 1998**

Publications

Journal Papers

1) A. K. Pradhan, A. Thangaraj and A. Subramanian, “Construction of Near-Capacity Protograph LDPC Code Sequences with Block-Error Thresholds,” to appear in *IEEE Transactions on Communications*.
2) K. Thekumparampil, A. Thangaraj and R. Vaze, “Combinatorial Resource Allocation Using Sub-modularity of Waterfilling,” to appear in *IEEE Transactions on Wireless Communications*.
3) M. Bloch, M. Hayashi and A. Thangaraj, “Error-control Coding for Physical-layer Secrecy,” Proceedings of the IEEE, vol. 103, no. 10, pp. 1725-1746, September 2015.
4) K. Ravindran, A. Thangaraj and S. Bhashyam, “LDPC Codes for Network-coded Bidirectional Relaying with Higher Order Modulation,” IEEE Transactions on Communications, vol.63, no.6, pp.1975-1987, June 2015.
5) S. Vatedka, N. Kashyap and A. Thangaraj, “Secure Compute-and-Forward in a Bidirectional Relay,”IEEE Transactions on Information Theory, vol.61, no.5, pp.2531-2556, May 2015.

6) A. Thangaraj and R. Vaze, "Online Algorithms for Basestation Allocation," IEEE Transactions on Wireless Communications, vol. 13, no.5, pp. 2966-2975, May 2014.
7) R. Vaidyanathaswami and A. Thangaraj, "Robustness of Physical Layer Security Primitives Against Attacks on Pseudorandom Generators," IEEE Transactions on Communications, vol. 62, no. 3, pp. 1070-1079, March 2014.
8) N. Kashyap and A. Thangaraj, "The Treewidth of MDS and Reed-Muller Codes," IEEE Transactions on Information Theory, vol. 58, no. 7, pp. 4837-4847, July 2012.
9) A. Ayyar, Hari Ram B., A. Thangaraj, Vinoth N., K Giridhar, "Block Modulation for Interference Management in Heterogeneous Wireless Networks," IEEE Journal of Selected Topics in Signal Processing, vol. 6, no. 3, pp. 241-256, June 2012.
10) Srimathy S. and A. Thangaraj, "Codes on Planar Graphs," Advances in Mathematics of Communications, Vol. 6, No. 2, pp. 131-163, May 2012.
11) M. Bama, S. Bhashyam and A. Thangaraj, "A Decode and Forward Protocol for Two-stage Gaussian Relay Networks", IEEE Transactions on Communications, vol. 60, no. 1, pp. 68-73, January 2012.
12) Arunkumar Subramanian, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong Secrecy on the Binary Erasure Wiretap Channel Using Large-Girth LDPC Codes," IEEE Transactions on Information Forensics and Security, vol.6, no.3, pp.585-594, Sept. 2011.
13) Abhay Subramanian and A. Thangaraj, "Path Gain Algebraic Formulation for the Scalar Linear Network Coding Problem," IEEE Transactions on Information Theory, vol.56, no.9, pp.4520-4531, Sep 2010.
14) A. Thangaraj, S. Dihidar, A. R. Calderbank, S.W. McLaughlin, and J.-M. Merolla, "Applications of LDPC Codes to the Wiretap Channel," IEEE Transactions on Information Theory, Vol. 53, No. 8, Aug. 2007, pp. 2933-2945.
15) Sundeep B and A. Thangaraj, "Self-orthogonality of q-ary Images of q^m-ary Codes and Quantum Code Construction," IEEE Transactions on Information Theory, Vol. 52, No. 7, Jul 2007, pp. 2480-2489.
16) S. Donnet, A. Thangaraj, M. Bloch, J. Cussey, J.-M. Merolla and L. Larger, "Security of Y-00 under heterodyne measurement and fast correlation attack ", Physics Letters A, Vol. 356, No. 6, August 2006, pp. 406-410.
17) A. Thangaraj, “Rate Compatible LDPC Codes for Wireless Applications”, IETE Technical Review, Vol. 21, No. 5, Sep.-Oct. 2004, pp. 325-333.
18) A. Thangaraj and S. W. McLaughlin, "Quantum codes from cyclic codes over GF(4^m)," IEEE Transactions on Information Theory, Vol. 47, No. 3, Mar. 2001, pp. 1176 – 1178.
19) A. Thangaraj and S. W. McLaughlin, "Thresholds and scheduling for LDPC codes over partial response channels," IEEE Transactions on Magnetics, Vol. 38, No. 5, Sep. 2002, pp. 2307-2309.

International Conferences (peer-reviewed)

1) S. Harikumar, J. Ramesh, M. Srinivasan and A. Thangaraj, "Threshold Upper Bounds and Optimized Design of Protograph LDPC Codes for the Binary Erasure Channel", 7th International Workshop on Signal Design and its Applications in Communications (IWSDA), Bangalore, India, Sep 2015.

2) A. Thangaraj, G. Kramer and G. Boecherer, “Capacity Bounds For Amplitude-Constrained Additive White Gaussian Noise Channels," IEEE International Symposium on Information Theory 2015, Hong Kong, Jun 2015.
3) R. Ganti, A. Thangaraj and A. Mondal, “Approximation of Capacity for ISI Channels with One-bit Output Quantization,” IEEE International Symposium on Information Theory 2015, Hong Kong, Jun 2015.
4) A. Thangaraj, "Coding for wiretap channels: Channel resolvability and semantic security," 2014 IEEEInformation Theory Workshop (ITW), Nov. 2014.
5) A. Pradhan, A. Subramanian and A. Thangaraj, "Deterministic Constructions for Large Girth Protograph LDPC Codes," IEEE International Symposium on Information Theory 2013, Istanbul, Turkey, Jul 2013.
6) Vignesh G and A. Thangaraj, "Quasi-Cyclic Regenerating Codes for Distributed Storage: Existence and Near-MSR Examples, " IEEE International Symposium on Information Theory 2013, Istanbul, Turkey, Jul 2013.
7) N. Kashyap, V. Shashank and A. Thangaraj, "Secure Computation in a Bidirectional Relay," IEEE International Symposium on Information Theory 2012, Boston, USA, Jul 2012.
8) Rajaraman V and A. Thangaraj, "Known-plaintext Attack on the Binary Symmetric Wiretap Channel," IEEE Globecom Physical Layer Security (PLS) Workshop, Dec 9, 2011.
9) A. Thangaraj and C. Sankar, "Quasicyclic MDS Codes for Distributed Storage with Efficient Exact Repair", IEEE Information Theory Workshop 2011, Paraty, Brazil, Oct 16-20, 2011.
10) Navin Kashyap and Andrew Thangaraj, "On The Treewidth of MDS and Reed-Muller Codes," to be presented at the IEEE Symposium on Information Theory 2011, St. Petersburg, Russia, Aug 2011.

11) Arunkumar Subramanian, Ananda Theertha Suresh, Safitha Raj, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong and Weak Secrecy in Wiretap Channels", Invited paper at the Turbo Coding Conference (ISTC 2010), Brest, France, Sep 2010.
12) Ananda Theertha Suresh, Arunkumar Subramanian, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong Secrecy for Erasure Wiretap Channels", IEEE Information Theory Workshop Dublin, Ireland, Aug 2010.
13) Mukundan Madhavan, Y. Sankarasubramanian, K. Viswanathan and A. Thangaraj, "NLHB: A Non-linear Hopper Blum Protocol", IEEE ISIT 2010, Austin, USA, June 2010.
14) Shilpa Gadiraju, A. Thangaraj and S. Bhashyam, "Dirty Paper Coding Using Sign Bit Shaping and LDPC Codes," IEEE ISIT 2010, Austin, USA, June 2010.
15) Y. Sankarasubramanian, A. Thangaraj and K. Viswanathan, "Finite State Wiretap Channels: Secrecy Under Memory Constraints," IEEE ITW Taormina, Oct 2009.
16) M. Bama, S. Bhashyam, A. Thangaraj , "Receiver Selection Scheduling in Wireless Networks," Proceedings of the Wireless Personal Multimedia Communications (WPMC), Sendai, Japan, September 2009.
17) Dinesh Kumar K. R. and A. Thangaraj, “Algebraic Network Coding: A New Perspective,” to be presented in IEEE International Symposium on Information Theory 2009, Jun 28 – Jul 3 2009, Seoul.
18) S. Srimathy and A. Thangaraj, “Codes that have Tanner graphs with non-overlapping cycles,” 5th International Symposium on Turbo Codes and Related Topics, Sep. 2008, pp. 299 – 304.
19) A. Subramanian and A. Thangaraj, “A Simple Algebraic Formulation for the Scalar Linear Network Coding Problem,” Forty-Sixth Annual Allerton Conference on Communication, Control, and Computing, Sep. 2008, University of Illinois at Urbana-Champaign, IL, USA.

20) K. R. Gowtham and A. Thangaraj, “Computation of secrecy capacity for more-capable channel pairs,” IEEE International Symposium on Information Theory 2008, Jul. 2008, pp. 529 – 533.
21) G. Sridharan, A. Kumarasubramanian, A. Thangaraj, S. Bhashyam, “Optimizing burst erasure correction of LDPC codes by interleaving,” IEEE International Symposium on Information Theory 2008, Jul. 2008, pp. 1143 – 1147.
22) M. Bloch, A. Thangaraj, "Confidential Messages to a Cooperative Relay", IEEE Information Theory Workshop 2008, May 2008, pp. 154 – 158.
23) A. Iyengar, M. K. Dileep, A. Thangaraj, S. Bhashyam, “Thresholds for LDPC codes over OFDM,” 3rd International Conference on Communication Systems Software and Middleware and Workshops 2008, Jan. 2008, pp. 37 – 42.
24) Safitha J. Raj, A. Thangaraj, "Subcodes of Reed-Solomon Codes Suitable for Soft Decoding", Applicable Algebra and Error Control Codes – 17, Bangalore (Dec 2007), LNCS, vol. 4851/2007, pp. 217-226.
25) S. Kaimalettu, A. Thangaraj, M. Bloch, S. W. McLaughlin, "Constellation Shaping using LDPC Codes," IEEE International Symposium on Information Theory 2007, Jun. 2007, pp. 2366 – 2370.
26) Sundeep B and A. Thangaraj, "Self-orthogonality of Images and Traces of Codes with Applications to Quantum Codes", IEEE International Symposium on Information Theory 2007, Jun. 2007, pp. 266 – 270.
27) S. Planjery, T. A. Gulliver, A. Thangaraj, "Rate-Compatible Punctured Systematic Repeat - Accumulate Codes", IEEE Wireless Communications and Networking Conference 2007, March 2007, pp. 718 – 722.
28) M. Bloch, A. Thangaraj, S. McLaughlin, J.-M. Merolla, "LDPC-based secret key agreement over the Gaussian wiretap channel", IEEE International Symposium on Information Theory 2006, Jun. 2006, pp. 1179 – 1183.
29) A. Thangaraj, "Simple MAP decoding of binary cyclic codes", IEEE International Symposium on Information Theory 2006, Jun. 2006, pp. 464 – 468.
30) S. Donnet, A. Thangaraj, M. Bloch, J. Cussey, J.-M. Merolla, L. Larger, “Cryptanalysis of Y 00 under Heterodyne Measurement and Fast Correlation Attack,” European Conference on Optical Communication, Cannes, France, Sep. 2006.
31) M. Bloch, A. Thangaraj, S. W. McLaughlin and J.-M. Merolla, "LDPC-based Gaussian key reconciliation", EEE Information Theory Workshop, Punta del Este, Uruguay, March 2006, pp. 116-120.
32) H. Tiwari and A. Thangaraj, "Run-length Limited Codes with Free Distance Properties: Construction and Soft-Decision Decoding," IEEE International Magnetics Conference 2006, May 2006, pp. 789.
33) S. Dihidar, A. Thangaraj, S. McLaughlin and R. Calderbank, "Linear-time Decodable Secrecy Codes for Binary Erasure Wiretap Channels", 43rd Annual Allerton Conference on Communication, Control, and Computing, Sep. 2005, University of Illinois at Urbana-Champaign, IL, USA.
34) A. Thangaraj, S. Dihidar, R. Calderbank and S. McLaughlin, "Coding for Reliability and Security over Wire Tap Channel Systems", 26th Symposium on Information Theory in the Benelux 2005, Brussels, May 2005.

35) A. Thangaraj, S. Dihidar, A. R. Calderbank, S.W. McLaughlin, and J.-M. Merolla , "On Achieving Capacity on the Wire Tap channel using LDPC Codes", IEEE International Symposium on Information Theory 2005, Sep. 2005, pp. 1498 – 1502.
36) Fijo Therattil and A. Thangaraj, "A Low-complexity Soft-decision Decoder for Extended BCH and RS-like codes," IEEE International Symposium on Information Theory 2005, Sep. 2005, pp. 1320 – 1324.
37) A. Prabhakar, A. Thangaraj, M. Manickam, and E. Louis, "Effects of reader distortion on nonlinear transition shift measurements", IEEE International Magnetics Conference 2005, Apr. 2005, pp. 1343 – 1344.
38) A. Thangaraj and S. W. McLaughlin, "Threshold for regular LDPC codes over PR channels," IEEE International Symposium on Information Theory 2001, June 2001, pp. 70.
39) A. Thangaraj, A. R. Calderbank, S. McLaughlin and J.-M. Merolla, "Codes on graphs over the wire tap channel, " IEEE International Symposium on Information Theory and Applications, Parma, October 2004.
40) J.-M. Merolla, O. Guerreau, A. Thangaraj, S. W. McLaughlin, and F. J. Malassenet, "Practical quantum cryptography system using single sideband scheme and WDM compensation technique, " The International Conference on Solid State Quantum Information processing, SSQIP 03, Amsterdam (Netherlands), p. 167, Dec. 2003.
41) A. Thangaraj and S. W. McLaughlin, "On iterative hard decision decoding of EG codes," IEEE International Symposium on Information Theory 2002, Jun. 2002.
42) A. Thangaraj and S. W. McLaughlin, “Quantum codes from cyclic codes over GF(4^m),” IEEE International Symposium on Information Theory 2001, Jun. 2001.

National Conferences (peer-reviewed)

1) K. Dheeraj, R. Ganti, A. Thangaraj, "Equalization in Amplify-Forward Full-Duplex Relay with Direct Link, " National Conference on Communications (NCC) 2015, IIT Bombay, Feb. 27 – Mar. 1 2014.
2) K. Ravindran, V. P. Boda, A. Thangaraj, S. Bhashyam, B. Joshi, W. Li, "Optimized codes for bidirectional relaying," National Conference on Communications (NCC) 2014, IIT Kanpur, Feb. 28 – Mar. 2 2014.
3) S. Subramanian, A. K. Pradhan, A. Thangaraj, "Node-splitting constructions for large girth irregular and protograph LDPC codes," National Conference on Communications (NCC) 2014, IIT Kanpur, Feb. 28 – Mar. 2 2014.
4) B. Joshi and A. Thangaraj, “EXIT Chart Based Design of LDPC Codes for Higher Order Constellations,” Proc. National Conference on Communications (NCC) 2013, IIT Delhi, India, 15-17 Feb. 2013.
5) K. V. Sreenath and A. Thangaraj, “Implementation of Physical Layer Key Sharing Schemes Using Software Defined Radios,” Proc. National Conference on Communications (NCC) 2013, IIT Delhi, India, 15-17 Feb. 2013.
6) A. Alapati, A. Krishnakumar, A. Thangaraj, "Public-private separation in linear network-coded simultaneous multicast and unicast," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.

7) Balakrishna S., S. Bhashyam, A. Thangaraj, "A dirty paper coding scheme for the Multiple Input Multiple Output Broadcast Channel," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.
8) N. Kashyap, Y. Sankarasubramaniam, A. Thangaraj, "Jamming to foil an eavesdropper," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.
9) Rajaraman V and A. Thangaraj, "EG-LDPC Codes for the Erasure Wiretap Channel," National Conference on Communications (NCC) 2010, IIT Madras, Jan 2010.
10) Gautham T. S. V., A. Thangaraj and D. Jalihal, "Common Architecture for Decoding Turbo and LDPC Codes," National Conference on Communications (NCC) 2010, IIT Madras, Jan 2010.
11) M. Bama, S. Bhashyam, A. Thangaraj, “Throughput of Wireless Relay Networks with Interference Processing,” National Conference on Communications 2009, Jan. 2009, IIT Guwahati.
12) M. K. Dileep, S. Bhashyam, A. Thangaraj, “Low Density Parity Check Codes in OFDM Systems,” National Conference on Communications 2009, Jan. 2009, IIT Guwahati.
13) R. Upadrashta, A. Thangaraj, "Key Reconciliation Using Nested LDPC Codes", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
14) M. Bama, S. Bhashyam, A. Thangaraj, "Capacity of Network-Coded Wireless Multicast using Node-Based Scheduling", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
15) P. Sankar, Arun Kumar Sharma, D. Jalihal, A. Thangaraj, "Turbo Product Codes for a Satellite Modem", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
16) K. Chaitanya, A. Thangaraj, "Luby Transform Codes with Priority Encoding", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
17) M. Madhavan, A. Thangaraj, "An Implementation Of A Soft-Input Stack Decoder For Tailbiting Convolutional Codes", National Conference on Communications 2007, Jan. 2007, IIT Kanpur.
18) S. Kaimalettu, A. Thangaraj, S. W. McLaughlin, "Constellation Shaping using Codes with a Tree Tanner Graph," National Conference on Communications 2007, Jan. 2007, IIT Kanpur.
19) A. S. Mohan Vamsi, A. Thangaraj, B. Ramamurthi, "HARQ Schemes using LDPC codes with Diversity-Combining", National Conference on Communications 2007, Jan. 2007, IIT Kanpur.

Patents

1) Advanced forward error correction, Granted Patent, United States Patent 6842873, Filed in 2005.
2) Methods and apparatus for improving error indication performance in systems with low-density parity check codes, Patent Application US20080155372, Filed in 2006.

Student Guidance

Graduated Doctoral Students (PhD)

1) M. Bama (jointly with Prof. Srikrishna Bhashyam): Graduated 2012
   Thesis topic: Enhancing Information Flow in Wireless Networks using Interference Processing
2) A. Ayyar (jointly with Prof. K. Giridhar): Graduated 2013
   Thesis topic: Interference Canceling Block Modulation

3) V. Rajaraman: Graduated 2015
   Thesis topic: Correlation Attacks on Physical Layer Security Protocols

Graduated Masters Students (MS by research)

1) A. S. Mohan Vamsi (jointly with Prof. Bhaskar Ramamurthi): Graduated 2007
   - **Thesis topic**: Low Density Parity Check Codes with Feedback
2) Sunil Kaimalettu: Graduated 2008
   - **Thesis topic**: Constellation Shaping using LDPC Tree Codes
3) P. Sankar (jointly with Prof. Devendra Jalihal): Graduated 2008
   - **Thesis topic**: Implementation of Turbo-Product Codes
4) Raviteja Upadrashta: Graduated 2009
   - **Thesis topic**: Nested LDPC codes for Key Reconciliation
5) Krishna Chaitanya: Graduated 2009
   - **Thesis topic**: Time-sharing and Priority Encoding for Raptor Codes
6) S. Srimathy: Graduated 2009
   - **Thesis topic**: Codes on Planar Graphs
7) Mukundan Madhavan: Graduated 2010
   - **Thesis topic**: Hopper-Blum lightweight authentication protocol
8) T. S. V. Gautham: Graduated 2010
   - **Thesis topic**: Implementation of turbo decoders
9) Amaranath Alapati: Graduated 2013
   - **Thesis topic**: Network coding
10) K Venkata Sreenath: Submitted 2015
    - **Thesis topic**: Implementation of physical-layer key distribution
11) Karra Chinmay Dheeraj (jointly with Radhakrishna Ganti): Submitted 2015
    - **Thesis topic**: Equalization of self-interference in full-duplex relays

Current Students

Doctoral Students : 5

Masters Students : 1

Professional Memberships and Service

- Editor, IEEE Transactions on Communications, 2012-
- Senior Member, IEEE
  - Societies: Information Theory, Communications, Signal Processing
- Member of Memberships and Chapters Committee of Information Theory Society
- Technical Program Committee Member
  - IEEE WCNC 2008, 2009, 2010, 2011, 2012
  - VTC 2009, 2011
  - ICC 2011, 2015
  - IEEE ITW 2011

- SPCOM 2010, 2012
- GLOBECOM 2008, 2013; GLOBECOM Workshop 2011
- PIMRC 2012
- NCC 2009-2013

- Technical Program Committee Chair
  - SPCOM 2014

Research Grants and Projects

1. **Codes for Bidirectional Relaying (2010-13):** funded by Renesas Corporation
2. **Physical Layer Security Primitives for Wireless Communications (2009-12):** funded by the Reliance Telecom Centre for Excellence
3. **Software/Hardware Implementations of LDPC Codecs:** funded by ORB Analytics, USA; DEAL (DRDO), Dehradun
4. **SENECOM: Secure Network Communications (2006-2009):** funded jointly by the international cooperation wings of DST, India and the Science Foundation of Portugal
5. **Quantum Key Distribution (2005-07):** funded by DST, India; Indo-French Centre for Promotion of Advanced Research (IFCPAR/CEFIPRA)
6. **National Program on Technology Enhanced Learning (NPTEL):** Institute coordinator, IIT Madras, http://nptel.ac.in

Awards and Honors

- IIT Madras Young Faculty Recognition Award 2012
- Indian National Academy of Engineering Young Engineer Award 2011
- IETE JC Bose Memorial Award 2006 for the Best Engineering Oriented Paper
- Col. Oscar P. Cleaver Award 1998 for Outstanding Graduate Students in Electrical Engineering at Georgia Institute of Technology

Curriculum Vitae – Prathap Haridoss

Name: Prathap Haridoss

Education: B.Tech. in Metallurgical Engineering, IIT Madras, 1992
PhD in Materials Science, University of Wisconsin-Madison, USA, 1999

Current Appointment: Professor (2013-), Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India

Previous Appointments: Associate Professor (2009-2013), Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India

(2003-2009), Assistant Professor, Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India

(2001-2003)Visiting faculty, IITM
(1999-2001) Senior Scientist, Plug Power Inc., Latham, New York
(1994-1999) Graduate Research Assistant, Los Alamos National Laboratory, Los Alamos, New Mexico, USA

Summary of Accomplishments:

Patents: 3 US patents Issued, in the area of PEM fuel cells

International Journal Publications: 25

Conference Publications: 7

NPTEL courses: Video and Web courses, titled "Physics of Materials"

Research Guidance:

	PhD	MS	M.Tech
Completed	3	6	14
Ongoing	7	1	2

Research Projects: Have participated either as Principal Investigator or, Co-Principal Investigator in 9 projects funded by external agencies for a total of 950 Lakh rupees. Areas of research include PEM fuel cells, Carbon nanomaterials, developing devices for assisting the differently abled, and recycling of electronic waste.

Conferences conducted: Served as **Convener**, for the International Symposium for Research Scholars, ISRS 2008

Service in Institute Positions:

1) **NPTEL Coordinator**, IIT Madras, 2013 onwards.
2) **Advisor Co-curricular** activities for the Institute 2010-2012
3) Served as Member of the IIT Madras Research Park Council
4) Served as Member of the Board of IC & SR

List of Patents and Publications

US PATENTS GRANTED:

1) **US Patent # 6,821,661**: Hydrophilic Anode Gas Diffusion Layer: P. Haridoss, C. Karuppaiah, and J. McElroy; Plug Power; **Granted:** November 2004
2) **US Patent # 6,774,637**: Method of Qualifying At Least a Portion of a Fuel Cell System and an Apparatus Employing the Same; R. Hallum, C. Comi, Y. Wu, P. Haridoss, and C. Karuppaiah; Plug Power; **Granted:** August 2004
3) **US Patent # 6,696,190**: Fuel Cell System & Method: P. Haridoss; Plug Power; **Granted:** February 2004

Publications in Refereed International Journals:

1) Jagannatham M., Sankaran S., Haridoss Prathap
"Electroless nickel plating of arc discharge synthesized carbon nanotubes for metal matrix composites" Applied Surface Science, Volume 324, 1 January 2015, Pages 475-481
2) A. Joseph Berkmans, M. Jagannatham, S. Priyanka, Prathap Haridoss
"Synthesis of branched, nano channeled, ultrafine and nano carbon tubes from PET wastes using the arc discharge method" Waste Management, Volume 34, Issue 11, November 2014, Pages 2139-2145
3) Joseph Berkmans, A., Ramakrishnan, S., Jain, G., Haridoss, P.;
"Aligning carbon nanotubes, synthesized using the arc discharge technique, during and after synthesis", 2013, Carbon, 55, Pages 185-195.

4) Wasekar, N.P., Haridoss, P., Seshadri, S.K., Sundararajan, G.;
"Sliding wear behavior of nanocrystalline nickel coatings: Influence of grain size", 2012, Wear, 296, Pages 536-546.
5) John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;
"Enhanced mechanical and electrochemical durability of multistage PTFE treated gas diffusion layers for proton exchange membrane fuel cells", 2012, International Journal of Hydrogen Energy, 37 (14), Pages 10830-10835.
6) Radhakrishnan, V., Haridoss, P.;
"Effect of GDL compression on pressure drop and pressure distribution in PEMFC flow field", 2011, International Journal of Hydrogen Energy, 36 (22), Pages 14823-14828.
7) "John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;
Effect of electrochemical aging on the interaction between gas diffusion layers and the flow field in a proton exchange membrane fuel cell", 2011, International Journal of Hydrogen Energy, 36 (12), Pages 7207-7211.
8) Suresh, P.V., Jayanti, S., Deshpande, A.P., Haridoss, P.;
"An improved serpentine flow field with enhanced cross-flow for fuel cell applications", 2011, International Journal of Hydrogen Energy, 36 (10), Pages 6067-6072.
9) Berkmans, A.J., Haridoss, P.;
"High yield formation of carbon nanotubes using arc discharge assisted with a nitrogen jet", 2011, Transactions of the Indian Institute of Metals, 64 (1-2), Pages 137-142.
10) Vijay, R., Seshadri, S.K., Haridoss, P.;
"Gas diffusion layer with PTFE gradients for effective water management in PEM fuel cells", 2011, Transactions of the Indian Institute of Metals, 64 (1-2), Pages 175-179.
11) Radhakrishnan, V., Haridoss, P.;
"Differences in structure and property of carbon paper and carbon cloth diffusion media and their impact on proton exchange membrane fuel cell flow field design", 2011, Materials and Design, 32 (2), Pages 861-868.
12) Radhakrishnan, V., Haridoss, P.;
"Effect of cyclic compression on structure and properties of a Gas Diffusion Layer used in PEM fuel cells", 2010, International Journal of Hydrogen Energy, 35 (20), Pages 11107-11118.
13) Joshi, R., Engstler, J., Haridoss, P., Schneider, J.J.;
"Formation of carbon nanotubes from a silicon carbide/carbon composite", 2009, Solid State Sciences, 11 (2), Pages. 422-427.
14) Ravi Joshi, Jorg Engstler, P. Kesavan Nair, Prathap Haridoss, Jorg J. Schneider;
"High yield formation of Carbon Nanotubes using a rotating cathode in open air";
Diamond and Related Materials, 17 (2008) Pages 913 – 919
15) Ravi Joshi, Roland Schierholz, Jorg J. Schneider, Prathap Haridoss; "Catalytic Induced Thermal Conversion Amorphous Carbon to Single Walled Carbon Nanotubes"; J. Anorg. Allg. Chem., 2008, 634, Pages 911-915
16) T.S. Vaishnavi, Prathap Haridoss, C. Vijayan;
"Optical properties of Zinc Oxide nanocrystals embedded in Mesoporous silica", 2008, Materials Letters, 62 (10-11), Pages 1649-1651
17) K. Suresh Kumar, Prathap Haridoss, and S. K. Seshadri;
"Synthesis and Characterization of Electrodeposited Ni-Pd Alloy Electrodes for Methanol Oxidation", 2008, Surface and Coatings Technology, 202 (9), Pages 1764-1770.

18) R. Vetri Murugan, S. Bharat, Abhijit P. Deshpande, Susy Varughese, and Prathap Haridoss;
"Milling and separation of the multi-component printed circuit board materials and the analysis of elutriation based on a single particle model", (2008) Powder Technology, 183 (2), Pages 169-176.

19) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"The influence of Parameters of Chemical Synthesis on the Optical properties of CdS nanocrystals", Materials Research Bulletin, Volume 42, Issue 7, July 2007, Pages 1251-1261.

20) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Properties of size-tuned PbS nanocrystals stabilized in a polymer template", Materials Research Bulletin, Volume 42, Issue 6, June 2007, Pages 996-1003

21) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Effect of PbS nanocrystal concentration on the physical properties of a polymer-nanocrystal composite", Materials Science and Engineering: C, Volume 27, Issue 4, May 2007, Pages 922-927

22) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Synthesis of Size Tunable and Stable CdS nanocrystals in DMF", Materials Letters, Volume 60, Issue 1, January 2006, Pages 124-128

23) K. Suresh Babu, T. Ranjith Kumar, Prathap Haridoss and C. Vijayan; "Effect of the organic solvent on the formation and stabilization of CdS and PbS semiconductor nanoclusters", Talanta, 66, 2005, Pages160-165

24) Mohan Chand Paladugu, K. Maneesh, P. Kesavan Nair, Prathap Haridoss; "Synthesis of Carbon Nanotubes by Arc Discharge in Open Air", Journal of Nanoscience and Nanotechnology, May 2005, Pages 747 - 752

25) P. Haridoss, F. A. Uribe, F. H. Garzon, T. A. Zawodzinski, Jr.;
"Structural Modifications of Disordered Mesocarbon Microbeads with Lower Temperatures of Heat Treatment." Journal of Materials Research, Vol 13, #7, July 1998, Pages 2015-2022

International Conferences Proceedings:

1) Cheryl Maria Tellis, Prathap Haridoss, S.S. Bhattacharya, R. Natarajan; “Tribological properties of carbon nanotubes and their effectiveness as lubricant additive” Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 102-105**
2) R. John Felix Kumar, Prathap Haridoss; “Effect of cyclic changes in relative humidity on mechanical durability of SPEEK and SPEEK blended membranes in a simulated PEMFC environment”, Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 110-115**
3) S Ramakrishnan, Prathap Haridoss; “Purification of carbon nanotubes using liquid Bromine”, Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 128-132**
4) Krishnan,Kalyana R; SusyVarughese; PrathapHaridoss; “Concepts in Engineering Design — An Introductory Course in Design Offered in Undergraduate Engineering Curriculum”ICORD 09: Proceedings of the 2nd International Conference on Research into Design, Bangalore, India 07.-09.01.2009, **pages 587-594**

5) R. Vijay, Prathap Haridoss; “Determination of Sag in Gas Diffusion Layer Used in PEM Fuel Cell”Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2008), IIT Madras, **pages 118-122**
6) Vetrimurugan, R., A. P. Deshpande, S. Sankara Narayanan, Susy Varughese and Prathap Haridoss; “Studies on size reduction and air classification of printed circuit boards for material recycling”, International Seminar on Mineral Processing Technology (MPT 2005), **pages 113-122**, Dhanbad, (2005)
7) Vetri Murugan R. A., A. P. Deshpande, S. Varughese, P. Haridoss, “Recycling of printed circuit boards”, International Seminar on Advances in Polymer Technology, **pages 334-341**, Kochi, (2004).

Curriculum Vitae – Kushal Sen

Prof. Kushal Sen
Department of Textile Technology
Indian Institute of Technology Delhi
New Delhi-110016
India
kushal@textile.iitd.ernet.in

Prof. Kushal Sen obtained his B. Tech. Degree in Textile Chemistry in 1977 and Ph. D.

Degree in 1981- both from IIT Delhi. He joined the Department of Textile Technology,IIT Delhi as a faculty in 1981 and is currently a professor in the same Department.His areas of specialization include textile chemical processing, texturing, structurepropertyanalysis, and geo-technical textiles. His current areas of research include microencapsulationand electrically conductive textiles.He has keen interest in Educational Technology. Has made several films on textilechemical processing for handloom workers and has produced video courses for theundergraduate and postgraduates textile courses. He initiated the educational transmissionof video programmes from IIT Delhi in 2001, which resulted in a full fledged 24-hourEducational channel- **Eklavya**. Since 2004, he is also the IIT Delhi coordinator of**NPTEL**-a project.On the administration front at IIT Delhi, he has been the Dean, Alumni Affairs andInternational Programmes Head, Department of Textile Technology and Head, andEducational Technology Services Centre. Has been member Board of Governors, IITDelhi. Currently, he is Dean (Faculty), at IIT Delhi.

Curriculum Vitae – Satyaki Roy

Prof. Satyaki Roy
Head, Design Programme
Coordinator, Media Technology Centre
Humanities and Social Sciences
Indian Institute of Technology Kanpur
Pin: 208016, Uttar Pradesh, India

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E-mail satyaki@iitk.ac.in

Brief Summary

Dr.Satyaki Roy is jointly associated with the Department of Humanities and Social Sciences and Design Programme with research interest in Design Thinking, Creativity, Visual Communication, Folk Art & Craft, Film Studies, Education andE-Learning and User Experience Design. He has developed and taught several courses over the years and guided many students for their M.Des thesis. He established the Media Technology Centre at IIT Kanpur in 2004 which is fully equipped with state of the art infrastructure for video production and web based design research. He has been the Institute Coordinator and a member of PIC for NPTEL (National Programme on Technology Enabled Learning) project, sponsored by the Ministry of Human Resource and Development, Govt. of India and has been involved with several other projects in e-learning, video project and design of products. In 2010 he started a community radio station (90.4FM) that broadcasts programmes for 8 hours every day catering to the information needs of the community within and out side the IIT Kanpur premises. He has served as a Member of the Board for National Institute of Fashion Technology and USID Foundation of India. He has been a mentor to several design companies under the students entrepreneurship programme initiated by SIIC SIDBI and very recently started a private limited company called Gestures Design and Media Solutions.

Current Research Design Thinking, Creativity, Visual Communication, Folk Art& Craft, Film Studies, Education,User Experience Design

Academic Record

Degree	Institution	Year
Bachelor of Fine Arts	Visva Bharati University, Santiniketan	1997
Master of Fine Arts	Visva Bharati University, Santiniketan	1999
Ph.D	Visva Bharati, University, Santiniketan	2007

Teaching Experience

Duration	Organization
October 2001-Till Date (13 Years)	Indian Institute of Technology Kanpur
2001 April – October	New Era High School, Panchgani
1999 June – 3 March	Sahyadri School, Krishnamurti Foundation of India, Pune

Courses Taught

Course No. & Title	Level	Developed
Art101 Indian Art and Civilization	UG	No
Art103 Introduction to Western Art	UG	Yes
Art402 Modern Art	UG	No
Art410 Video Production Theory &Practice	UG	Yes
Art105 Introduction to the Art of Video Making	UG	Yes
Des620 Design Theory	PG	No
Des621 Creative Visualization	PG	Yes
Des622 2D and 3D Visual Design	PG	Yes
Des623 Topics in Motion Pictures	PG	Yes
Des626 Interaction Design	PG	Yes
Des681 Design Project I	PG	No
Des682 Design Project II	PG	No
Des628 Design Culture & Society	PG	Yes
Des698 Special Topics in Design	PG	Yes

Scholar in Residence at IIT Gandhinagar, May-June 2014. Taught a course on Film Making and Appreciation
A short term course, *Effective Ways for Video Making*, Design Factory, Aalto University, Finland, 2009
A short term course, *Film Theory and Practice*, PDPMIIITDM Jabalpur, 2010
A short module, *Design and Creativity,* VLFM Product Design Course, Department of Industrial Management and Engineering, IIT Kanpur, 2009 – 2011

Thesis (M.Des) Supervision

Name	Year	Title of Thesis
Pillai, S Jayesh	2008	*3D CHILD Virtual Platform for Evaluation of Products for Children*
Kumar, Senthil	2009	*Application UI Design for a Collaborative Network Portal*
Bathla, Siddharth	2011	*Applying user centric design to architecture*
Singh, Neha Kiran	2010	An Awareness through Print Media
Ghosh, Mainak	2006	A conceptual Model of Information Architecture
Karnika	2009	Board Game for Indian Family
Dutta, Sourav	2007	Building an Interactive Visual Archive of Indian Heritage – An Information Portal
Chowdhury, Payal	2009	*Co-designing a learning device for children with emphasis on product semantics*
Rangnekar, Parul	2007	*Communication Design and Media Services for Children with Special Needs*

Siddhartha, Partha	2005	Design and Development of Graphic User Interface Brihaspati – The Virtual Classroom
Khera, Richa	2011	*Creativity Intercrossed*
Chaudhary, Shibika	2006	*Design Cell: A User Centered Design Toolkit*
Yadav, Alok	2009	*Design & Development of Products for Promotional Marketing of Higher Education*
Sharma, Shanu	2011	*"Design for barriers"-Stairs climbing Manual Wheel Chair*
Banerjee, Prantik	2009	Designing a Mobile School Communicator Device with Special Emphasis on Developing a Collaborative GUI
Shah, M M	2004	Design of an Effortless Vertical Upright Hard Baggage – Internal Space Organization
Subramanya, T N	2007	*Design of a web portal for Campus Relations, Oracle*
Roy, Adita	2009	*Design of classroom chair for student with Cerebral Palsy*
Shah, Alap Harshad	2010	Design of Future Magazine (SENSE Service) and User Experience and User Interface Design of Interactive Magazine(MAG X)
Abbas, Butool	2009	*Design of Signage and way finding system of Kanpur zoological park*
Solanki, Mona	2006	Design Principles for Print – A Contextual Model as Cookbook
Sekar, Sathish	2011	"Drift" - Three Wheeler for a Green Ride
Rajamanohar, K S	2004	*Edutainment - Multimedia Education Content Development for School Children*
Ahuja, Simarjeet Singh	2007	*Games as Interactive Systems*
Jain, Prachi	2005	Golden Section - A Notation of Aesthetics
Dasgupta, kaustav	2009	*Graphic Adaptation of "The Conqueror Worm" by Edgar Allan Poe*
Mallya, Prabha	2008	Illustration as Visual Essay
Sawant, Nutan	2011	*Impact of Social Media on Design*
Manjiri, Arvind Joglekar	2005	Instructional Aids for Special Education
Verma, Kratika	2011	*iServe: A Smart Phone Application*
Kumar, Ankit	2011	*Mobile Applications in the Realm of Location Based Services*
Verma, Paridhi	2005	Saksham – A Documentary Film About Spastic Children
Desai, Niral Ajaybhai	2010	*Study of 3D Technology and Application in Visualization and Tele-immersion*
Singh, Akansha	2009	*U.P. Handloom: A Neo-Retail Experience*
Rathor Pragam	2011	*Urban housing eco-system of low income groups: A human centric exploration*
Banerjee, Bidisha	2012	*GUI, UX Reconstruction of IITK Website*
Yaramilli, Praveen	2012	*Product Innovation in Indian Craft Clusters: Tribal Art and Craft from Phad, Rajasthan*
Chopra, Vikas	2012	*Touch Pad Based Gaming Application*
Kumar, Prasoon	2012	*Interactive textbooks for school children*
Mondal, Chirapriya	2012	*Impact of Social Media on Brand Building*
Siddhartha	2012	Iron Wielding Practices in India – video ethnography and Ux design project
Hangshing, Mangkhankhual	2014	Research on Public Perception Towards Mental Disorder - Designing to Mend the GAP
Kumar, Mritunjay	2014	The Possible Impact of Wearable Computing on productivity: Design proposition with experiments
Vivek Anand, Polasapalli	2013	REASSIGNMENT OF E-WASTE: EXPLORING CONSTRUCTIVE DESIGN RESEARCH
Jacob, Thomas	2013	Future of Travel - User Experience in the Air Travel Industry

Shukla, Parth	2014	Study of Dhokra Art & Craft clusters of Chhattisgarh and West Bengal
Singh, Yogendra	2014	User Centered Approach To Architecture
Agarwal, Charul	2014	Active Ageing: Life and Wellness in Later Years
Shankar, Vivek	2014	Understanding And Supporting Desktop Management For Multiple Monitor Users

Sponsored Projects

Period	Sponsoring Organization	Title of Project
2003-07	Ministry of Human Resource & Development	National Program on Technology Enhanced Learning (NPTEL Phase I) IIT Kanpur
2008-14	Ministry of Human Resource & Development	National Program on Technology Enhanced Learning (NPTEL Phase II) IIT Kanpur
2005-07	Ministry of Information Technology	Digital Ecosystem for Agriculture and Rural Livelihood (Digital Mandi Phase II)
2008-09	European Commission	OPAALS – Social Sciences
2007-10	Ministry of Textiles	Design Center in Leather Handicrafts Products for Development of Kanpur Cluster
2013-14	Alumni Association, IIT Kanpur	Creating Health Awareness Among Community – In and Around IITK (Focus on Laborers and School Children)

Consultancy

Period	Organization	Nature of Work
2003-04	CHIPS, State Government of Chattisgarh	Design of Electronic Class Rooms at Raipur and Bilaspur University for *IT enabled distant learning*
2011	Nokia Research Center	Bhasha: Encouraging Use of Indian Languages Through Mobile Phone Developing concepts to promote use of vernacular language and empowering the rural segment

Video Projects & Documentaries

Celiac, A documentary film sponsored by Grow India Foundation, 2014
60 short videos for a project related to armed forces , DRDO, 2013
A promotional film for Kanpur Plastipacks Ltd, 2013
A short film on research initiatives of the Engineering Research Lab, IIT Kanpur, 2013
A short video supporting the functioning of International Relations office, IIT Kanpur, 2013
A short film on research and development initiatives and facilities at Indian Institute of Technology Kanpur, Doordarshan 2012-2014
Giving back, A film on liquid and solid waste management, 2012
Digital Ecosystem for Knowledge and Learning: Indian agriculture Extension Service screened at the 3rd International OPAALS (Open Philosophies for Associative Autopoietic Digital Ecosystems) Conference on Digital Ecosystems, Aracaju – SE- Brazil,2010
Digital Ecosystem for Knowledge around KVK in North India screenedat the London School of Economics, London, UK, 2009

A film on *IITK* - An informative documentary focusing on the varied aspects of research, education and life at Indian Institute of Technology Kanpur, screened at the FinIndia Conference, Design Factory, Helsinki, Finland, 2008
Saksham – A short video on the children suffering with cerebral palsy screened at the 'WE CARE Film Festival', New Delhi 2006
Digital Proudyogiki Aur Samajik Nirman – A documentary film on the research initiatives of Media Lab Asia, IITK hub, 2003
A promotional advertisement campaign (Video) for *Weather Risk Management Services Pvt. Ltd. (WRMSPL)*on company's schemes for weather insurance and the financial risk management for weather based risks. Originally created in Hindi and then dubbed in multiple languages and distributed across 5 states in India. 2007
A corporate video and multimedia presentation for Lohia Starlingers, 2005
Mandu – apromotional video on Mandavgarh (Mandu), for MP Tourism, 2003-2004
SAMTEL – an instructional video on the manufacturing and fabrication facility of SAMTEL Research Center, 2007
BSBE –a promotional video on the Department of Bio-Sciences and Bioengineering, IIT Kanpur, 2003

Administrative Experience

Department of HSS and Design Programme			
2005-2009	IIT Kanpur	Department Post Graduate Committee	Convener M.Des
2004-2005	IIT Kanpur	Department Under Graduate Committee	Convener HSS
2003-2004	IIT Kanpur	Department Library Committee	Convener HSS
2005-2006	IIT Kanpur	Department Seminar Committee	Convener HSS
2008-2010, 2011-2012	IIT Kanpur	Department Placement Committee	Convener M.Des
2011-2012	IIT Kanpur	Department Computer's Committee	Convener HSS
2010-2011	IIT Kanpur	Department Web Committee	Convener HSS
2007-2008	IIT Kanpur	Department Space Committee	Convener HSS
Institute			
Since 2005	IIT Kanpur	Media Technology Center	Coordinator
Since 2010	IIT Kanpur	Management and Creative Head of the 90.4 FM, IIT Kanpur Community Radio Station	Coordinator
2002-2005 2012-2014	IIT Kanpur	Hall of Residence II Hall of Residence XI	Warden Warden Incharge
2009-2011	IIT Kanpur	Golden Jubilee Organizing Committee	Co Coordinator
Since 2013	IIT Kanpur	Design Programme	Head
Others			
Member of the Board, Universal Sustainable Innovative Design Foundation, Hyderabad, India, 2011-12			
Served as a Member of the Board, NIFT, Rae Barely, India, 2009-10			
Served as a Member of PIC, NPTEL (National Programme for Technology Enhanced Learning) since 2004			
Invited as a faculty reviewer in the Product Design Gala 2011, as part of the Product Development Project course with industry partners organized by Design Factory, Aalto University, Finland			
Member of Review Committee for Design Project s under NMEICT, MHRD			

Patents

Title	Indian Patent No.	Dated
"The Drift-Battery Operated Campus Vehicle"	Indian Patent No: 234987	07/03/11
"Stair Climbing Wheel Chair"	Indian Patent No: 238758	09/11/11

Workshops Organized & Conducted

Break out session Day1: '*IDI 75*', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy, Atul Tiwari, Jayanta Chatterjee, 2011
Break out session Day2*:* 'Innovation Think - Work', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011
Opportunity Translation to Marketable Innovation: IDI 3, Organized by TYE for secondary school students, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011
PD6 workshop during the VLFM Course in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly Conducted by Satyaki Roy and Kalevi Ekman, 2011
A short module (3 Hours), Design Innovation, Prabandhan'11, the annual management conclave in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011
A short module (3 Hours), *Design and Creativity,* Tata Motors, Lucknow, 2010
A short module (12 Hours), *Principles and Elements of Motion Pictures,* Organized by Parivartan Forum for secondary school students, Merchant Chamber, Kanpur, 2010
A short module (6 Hours), *Design and Emotion*, Department of Design, IIT Guwahati, 2010
A workshop (6 hours) for students and industry participants on India Centric Design Problem Identification and Problem Solving at the Design Factory, Aalto University, Finland, during FinIndia Conference, 2008
USID Gurukul 2011, International Design Workshop, IIT Kanpur, 2010, 2011, 2013
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Civil Engineering, Core Sciences (including Physics, Chemistry and Mathematics)', IIT Kanpur, August 2011
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Electrical & Electronics Engineering, Computer Sciences and Engineering, Mechanical Engineering, JSS Noida, October 2010
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses'f or Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, IIT Kanpur, July 2010
National Design Challenge, "Tractors for 2020" in collaboration with ESCORTS Pvt. Ltd, IIT Kanpur, as part of ADEX 2010
National Design Challenge, "Inter City Bus Exterior Styling" in collaboration with JCBL, IIT Kanpur, as part of ADEX 2009
National Workshop (NPTEL Phase I) on 'Deployment and Use of NPTEL Courses'f or Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, Civil Engineering, and Core Sciences, IIT Kanpur, March 2007

Exhibition of Prints and Pantings

Exhibition Organized by Saga Art Collage, Japan, 2000
Avantika National Exhibition, New Delhi and Jaipur, 2000
Annual exhibition of Birla Academy of Fine Arts & Culture, Kolkata, 1997-1999
Annual exhibition of Prints, All India Fine Arts and Craft Society (AIFACS), New Delhi, 1998
An Exhibition organized by Lalit Kala Academy, Calcutta Information Center, 1998
An Exhibition organized by Lalit Kala Academy, Nandan, Shantiniketan, 1998
A group Show at Birla Academy of Fine Arts & Culture, Kolkata, 1997
Exhibition organized by the Oriental Association of India, Birla Academy of Fine Arts & Culture, Kolkata, 1996
A group Show at Academy of Fine Arts, Kolkata, 1995
Eastern Zonal Biennial of prints, Lalit Kala Academy, 1996
Printmaking workshop, Bharat Bhavana, Bhopal 1997
Artists Camp and Exhibition, Birbhum Jila Chatra Yuva Utsav, Bolpur, 1997
Camlin Art Material Awareness Camp and Exhibition, Shantiniketan, 1998

Annexure - II

The table given below is a sample of the permanent assets acquired during NPTEL phases II and III. It is not exhaustive but gives an idea of the nature of assets that will be acquired this time too.

CATEGORY BELONGING TO	ITEM DESCRIPTION	VALUE
COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO(Includes Apple Mac for Video editing and conversions, Desktops, Players, Spare Parts, Computers,Taptops)	APPLE IMAC 2.93 GHZ	873600
	MAC PRO 2.26 GHZ+--	1200603
	APPLE MAC PRO	6517794
	TOW PUR OF NOTE BOOK	112000
	APPLE MAC PRO	367342
	APPLE MAC PRO	2188243
	APPLE MAC	3117221
	APPLE MAC PRO	2290716
	APPLE MAC PRO	717432
	TOW HP ELITE BOOK 87	140000
	TOW APPLE MACPRO& AP	925600
	NOTEBOOK COMPUTER	116970
	COMPUTER SYSTEM WITH	259858
	DESKTOP	250000
	SONY DVD 100'S PACK	132000
	L3CFB (200MTR)	265211
	FUJIFILM DV171HD 276	104000
	APPLE MAC PRO WITH S	2895916
	PUR OF DELL INSPIRON	481140
	SPARE PARTS	530422
	LENOVO DESKTOP	172200
	SPARE PARTS	265211
	LENOVO DESKTOP	172200
	APPLE IMAC 27	701456
	DELL LATITUDE XT3	444000
	SPARE PARTS	265211
	TOW CD-325	206600
	DELL PRECISION WORKS	124500
	DAC -70 CROSS CONVER	109920
	SUPPLY OF COMPUTER C	186635
	SONY LAPTOP	141980
	FUJI VIDEOCASSETTE	114000
	TOSHIBA LAPTOP	126000
EQUIPMENT RELATED TO	VIDEO RECORING EQUIP	39651437

STUDIO	VIDEO RECORDING EQUI	2748254
	TOW HIGH DEFINITION	3856723
	TOW PUR OF HD LCD TV	4131250
	TOW HD LCD TV MONIT	197820
	TOW PUR OF HDV RECORDER	487125
	TOW PUR OF INTEL SYSTEM	232000
	TOW HD LCD TV MONITO	110460
	TOW HIGH DEFINITION	1285065
	TOW HD LCD TV MONITO	197820
	TOW HD VIDEO CAMERA	230011
	TOW HVR DIGITAL HD V	676695
	TOW PUR OF DIGITAL CAMERA	156800
	TOW HIGH DEFINITION	1282481
	TOW HD LCD TV MONITO	282600
	TOW HD LCD TV MONITO	669060
	TOW HD LCD TV MONITO	298143
	PROJECTOR	125950
	VIDEO RECORDING EQUI	6789091
	TOSHIBA EXTERNAL HAR	192500
	WACOM INTERACTIVE PE	155000
	LENS KIT	211825
	ACOUSTIC PARTITION &	163437
	AUDIO EQUIPMENT FOR	1000000
SERVER RELATED	M5000 SERVER	1059119
	M5000 SERVER	2987612
	ADDITIONAL EXTERNAL STORAGE	1213928
	TOW HP WORKSTATION Z	148995
	SPARE PARTS	265211
	SPARE PARTS	265211
MISCELLANEOUS	PROVISION OF AC FACI	585294
	TOW CUSSTOM DUTY	2955793
SOFTWARE	CAMTASIA STUDIO SOFT	110668
	ACROBOT PROFESSIONAL	13490240
	PROFESSIONAL VIDE CA	1796047
	CHEMBIO DRAW ULTRA P	1102530
	NPTEL MEDIA AND APPL	2279550

The table given below is a sample of the recurring expenses during NPTEL phases II and III. It is not exhaustive but gives an idea of the expenditure that will be required. D

Consumables cost - sample expenditure from IIT Madras NPTEL project

Consumables include filing cabinets/ stationery/ software licenses/ Labour/furniture/ refreshment/ flooring/ repairs/ books/ fans / Video Tapes

	Amount in Rs
2009 Sub-Total	2933017
2010 Sub-Total	6140804
2011 Sub-Total	831892
2012 Sub-Total	1108505
2013 Sub-Total	1871254
2014 (partial) Sub-Total	943061
Total	**13828533**

Staff salary cost - sample expenditure from IIT Madras NPTEL Project

Staff Salaries include salaries paid to administrative / accounts/ designers/ coders/ server maintenance personnel

	Amount in Rs
2009 Sub-Total	3984054
2010 Sub-Total	7536713
2011 Sub-Total	9145656
2012 Sub-Total	7973171
2013 Sub-Total	8444998
2014 (partial) Sub-Total	4656883
Total	**41741475**

Travel cost - sample expenditure from IIT Madras NPTEL project

Travel includes travel by PIs, NPTEL coordinators, partner institution faculty, SMEs, PIC members.

	Amount in Rs
2009 Sub-Total	607941
2010 Sub-Total	923737
2011 Sub-Total	1720184.75
2012 Sub-Total	2645889
2013 Sub-Total	2077612
2014 (partial) Sub-Total	1828029
Total	**9803392.75**

Other cost - sample expenditure from IIT Madras NPTEL project

Other includes payment made to vendors for services and miscellaneous payments.

	Amount in Rs
2009 Sub-Total	80511322
2010 Sub-Total	160444200
2011 Sub-Total	92555350
2012 Sub-Total	220838610
2013 Sub-Total	49028992
2014 (partial) Sub-Total	20820605

Total	**624199079**

Annexure – III: List of NPTEL Programme Implementation Committee Members

Prof. Bhaskar Ramamurthi - Chairman, NPTEL PIC & Director, IIT Madras

Prof. R. K. Shevgaonkar - Co-Chairman, NPTEL PIC & Director, IIT Delhi

Prof. M. S. Ananth, Professor Emeritus, Indian Institute of Science, Bangalore

Prof. Kushal Sen - National Video Coordinator and TEL coordinator, IIT Delhi

Prof. K. Mangala Sunder - National Web Course Coordinator and NPTEL Coordinator, IIT Madras

Prof K. R. Srivathsan - Director, Chinmaya Institute of Technology, Kannur, Kerala (Special invitee)

Prof. Andrew Thangaraj - NPTEL Coordinator, IIT Madras

Prof. Prathap Haridoss - NPTEL Coordinator, IIT Madras

Prof. K.Gopakumar – NPTEL Coordinator, IISc Bangalore

Prof. Bani Bhattacharya - NPTEL Coordinator, IIT Kharagpur

Prof. Shyamal Kumar Das Mandal - CET, IIT Kharagpur

Prof. Bikash Mohanty - NPTEL Coordinator, IIT Roorkee

Prof. A.N. Chandorkar - NPTEL Coordinator, IIT Bombay

Prof. Satyaki Roy - NPTEL Coordinator, IIT Kanpur

Prof. Pradeep Yammiyavar, NPTEL Coordinator, IIT Guwahati

Dr. Kandasamy - NPTEL Coordinator, NIT K Surathkal

Dr. S. Vaidhyasubramaniam- NPTEL Coordinator, SASTRA University

Prof. K. S. Rajan - NPTEL Coordinator, SASTRA University, Thanjavur

Prof. Neelakrishnan - NPTEL Coordinator, PSG College of Tech, Coimbatore

NMEICT

Mission Secretariat