भारतीय प्रौद्योगिकी संस्थान रूड़की
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
रूड़की–247 667 / ROORKEE - 247 667

भवन एवं निर्माण समिति की 36वीं बैठक का कार्यवृत्त

MINUTES OF THE 36th MEETING OF THE BUILDING & WORKS COMMITTEE

DAY & DATE: WEDNESDAY, THE 15th MARCH 2017

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Minutes of the 36th meeting of the Building & Works Committee held on 15.03.2017 at 12.00 Noon in the Board Room of the Institute.

The following were present:

1. Prof. Ajit K. Chaturvedi, Director	- Chairman
2. Prof. P.K. Ghosh, Deputy Director	- Member
3. Prof. Z. Ahmad, Chairman, E&W	- Member
4. Er. Rajeev Garg, Superintending Engineer, IIT Kanpur	- Member
5. Er. M.L. Prasad, Deputy General Manager Uttarakhand Power Corporation Ltd., Roorkee	- Member
6. Prof. (Mrs.) Pushplata, Architecture & Planning Deptt.	- Member
7. Prof. N.K. Samadhiya, Civil Engg. Department	- Member
8. Prof. N.P. Padhy, Electrical Engg. Department	- Member
9. Er. Ajay Sharma, Institute Engineer	- Member
10. Prof. U.P. Singh, Dean, Finance & Planning	- Special Invitee
11. Shri Prashant Garg, Registrar	- Secretary

At the outset, the Registrar, Secretary, B&WC welcomed Prof. Ajit K. Chaturvedi, Director and Chairman, B&WC for chairing his first meeting.

The Chairman welcomed the members of the B&WC and thanked the under mentioned outgoing members & recorded its appreciation for their valuable contribution in the meetings of the B&WC: -

1. Prof. Pramod Agarwal
   Department of Electrical Engineering

2. Prof. Pradeep Kumar
   Department of Civil Engineering

The Chairman also welcomed the following new members and solicited their valuable contributions and active participation:

1. Er. Rajeev Garg, Superintending Engineer, IIT Kanpur

2. Er. M.L. Prasad, Deputy General Manager, Uttarakhand Power Corporation Ltd., Roorkee – 247 667

3. Prof. Pushplata, Department of Architecture & Planning Indian Institute of Technology Roorkee

4. Prof. N.P. Padhy, Department of Electrical Engineering Indian Institute of Technology Roorkee

5. Prof. N.K. Samadhiya, Department of Civil Engineering Indian Institute of Technology Roorkee

Deliberations:

The B&WC took up the following agenda items for discussion, deliberation and consideration:

Item No. 36.1: To confirm the minutes of the 35th meeting of the Building & Works Committee held on 05.12.2016.

Having received no comments, the minutes of the 35th meeting of the Building & Works Committee, as recorded and circulated, were **confirmed**.

Item No. 36.2: To receive a report on the actions taken to implement the decisions of the 35th meeting of the Building & Works Committee held on 05.12.2016.

The Building & Works Committee **noted** the actions taken on the minutes of the 35th meeting, as reported.

Item No. 36.3: To consider the proposal for implementing Sewerage System including STP with odor-less technology at IIT Roorkee campus.

The B&WC noted the status and ratified the approval given by the Chairman, B&WC for net increase in BOQ of cost Rs. 2.0 lacs which is insignificant in respect of total cost for implementing Sewerage System including STP with odor-less technology at IIT Roorkee campus as approved by the Chairman, B&WC.

Item No. 36.4: **To consider the proposal for Centralized Air Conditioning System in Lecture Hall Complex–II under construction.**

The B&WC considered the recommendations of the A.C. Committee regarding the provision of Centralized Air Conditioning System in Lecture Hall Complex–II under construction and recommended the same for the consideration and approval of FC/BOG alongwith the proposed tentative additional estimated cost of Rs. 1.20 crore.

Item No.36.5: **To consider the proposal regarding provision of Centralized Air Conditioning System in ICC buildings.**

The B&WC considered the proposal of provision of Centralized Air Conditioning System in ICC building with tentative estimated cost of Rs. 3.30 crore and recommended the same for the consideration and approval of FC/BOG.

Item No. 36.6: **To consider the proposal for Electrical Energy Management and Conservation in IIT Roorkee Campus.**

The B&WC considered the proposal for Electrical Energy Management and Energy Conservation measures alongwith the proposal **(Appendix 'A')** for installation of smart metering system. Further, decided that this proposal be carried out in a comprehensive manner to optimize the number of substations and rating of transformers keeping in view the future expansion plans of the Institute. The tentative projected cost for this work is Rs. 5.50 crore. The B&WC recommended the same for the consideration and approval of FC/BOG.

Item No. 36.7: **To consider the proposal for Face Lifting of James Thomason Building at IIT Roorkee campus.**

The B&WC considered the proposal for Face Lifting of James Thomason Building. After deliberation over the proposal and keeping in view the sensitivity of the work, the B&WC advised that opinion of some experts from ASI and/or Archaeological Consultant be obtained and their advice be put up again for consideration of this proposal.

Item No. 36.8: **To consider the proposal for modernization and modifications in MRC, Azad Wing and GP Hostel (136 Rooms)**

The B&WC considered the proposal for modernization and modifications in MRC, Azad Wing and GP Hostel (136 Rooms) and approved the same in principle. Further, advised that estimate highlighting the scope of civil and electrical works, items specifications etc. be prepared and placed before the Chairman, B&WC for necessary administrative and financial approval.

Item No. 36.9: **To consider the proposal for Reconstruction and Demolition of structurally affected 6 nos. of rooms and 3 nos. of toilet (blocks old) in Ravindra Bhawan.**

The B&WC ratified the approval of the Director for dismantling of the effected structure covering 573 Sq. m. on all the floors. The tentative estimated cost of this reconstruction work is Rs. 1.50 crore. Further, as per the life cycle, the depreciated cost of the part of the affected building to be demolished was worked out of Rs. 76,152/-. The B&WC recommended the same for the consideration and approval of the FC/BOG.

Item No. 36.10: **To consider the proposal for Modernization and Modification in A.N. Khosla Married Hostel.**

The B&WC considered the proposal for modernization and modifications in A.N. Khosla Married Hostel and approved the same in principle. Further, advised that the estimate highlighting the scope of civil and electrical works, items specifications etc. be prepared separately and be placed before the Chairman, B&WC for necessary administrative and financial approval.

Item No. 36.11: **Approval of revised estimate for the work of Construction of PSEUDO -Dynamic Structural Testing Facility at the Department of Earthquake Engineering.**

The B&WC deliberated over this item and advised that the approval of additional amount be obtained from the Director as per the provision of GFR.

Item No. 36.12: **To consider letter No. F.32-43/2016-TS.1 dated Feb. 28, 2017 received from Additional Secretary (TE) and F. No. 32-43/2016-TS1 dated Feb. 7, 2017 from Under Secretary, MHRD, Government of India regarding amendment to the Rule 126 of General Finance Rule-2005 (GFR-2005) as well as construction work in IITs.**

The B&WC noted the contents of the said letters of the MHRD.

Item No. 36.13: **To consider the proposal for Construction of Students' Hostel 800 capacity at Vigyan Kunj.**

Keeping in view the acute shortage of accommodation for students and taking cognizance of projected requirements, the B&WC accepted in principle the proposal for construction of a Students' Hostel at Vigyan Kunj for 800 capacity and dismantling of 07 Nos. of those residences in the process, which are 50-70 years old. The total tentative estimated cost is Rs. 70.00 crore and recommended the same for the consideration and approval of FC/BOG.

Item No. 36.14: **To consider the proposal for Construction of Multi Storey Apartments for Faculty and Group 'A' Officers at Vikas Nagar.**

Keeping in view the acute shortage of faculty and Group 'A' houses and taking cognizance of projected requirements, the B&WC accepted in principle the proposal for construction of Multi Storey Apartments at Vikas Nagar and dismantling of 10 Nos. of those residences in the process, which are 50-70 years old, in Phase I & II. The total tentative estimated cost is Rs. 136.00 crore comprising of 181 houses and recommended the same for the consideration and approval of FC/BOG.

Item No. 36.15: **To consider the representation of NBCC Ltd. regarding clearance of pending adjustment of dues against final bill of HVAC work executed at Technology Building at DPT Saharanpur Campus.**

The B&WC considered the representation of NBCC Ltd. regarding clearance of pending adjustment against final bill of Rs. 681.18 lacs for HVAC work executed at Technology Building at DPT Saharanpur Campus.

The B&WC noted that the ex-post-facto approval for HVAC work in new Technological Block at IIT Roorkee Saharanpur Campus of Rs. 530.27(449.24+70.55+10.48 lacs) was approved by the Board of Governors in the 46th meeting. After deliberation the B&WC sought more information on the matter and decided that the matter be deferred.

The meeting ended with a vote of thanks to the Chair.

PROPOSAL FOR ENERGY MANAGEMENT AND CONSERVATION

This proposal comprises both the activity Automation of all electric Substations as well as smart metering of whole campus as follows:

1. **Automation of all sub – stations**
2. **Smart Metering throughout the Campus.**

Automation of all sub – stations

Automation of all sub stations so that all the sub-stations can function in an unmanned manner. IIT Roorkee campus comprises a total of 22 Nos. (16 Nos. manned and 6 Nos. CSS) sub stations to distribute the power supply over the campus. The existing energy meters installed at sub stations shall have to be changed to smart meters so that they are capable of receiving and transferring data to a pre-determined control room via Gateway and DCU to the control centre by installing devices like soft adopters. Additional devices will have be installed on the Captive power Generators and in the sub-station so as to give an indication whether grid power is being consumed OR the power generator is being consumed.

In the Central Control Room we will have a 42" screen with UPS facility where all the data from each individual sub-station can be seen at any given point of time. In case there is any malfunctioning at any of the sub-station, an expert or a team of experts can be sent to check and rectify the fault. In order to ensure consistent and uninterrupted flow of data throughout the campus, the entire campus, along with those facilities outside the main campus shall be activated on a RF system.

Smart Metering throughout the Campus

Following additional work will be required

1. Activation of the entire campus on RF so as to enable smooth flow of data relating to our electrical system throughout,
2. Changing all the Energy Meters in the campus, including residential, hostel, commercial, Main building and also in the departments, from the conventional to Smart Meters so that they are capable of transmitting data to the Central Control Room through Bridge, Gateway and DCU,
3. There will also be software so that the data of all the Energy Meters in the entire campus shall be transmitted and available at the Central Control Room. It can be scrutinized any time.
4. The above data will be stored on Cloud and will be available for one complete year.
5. Software along with printer shall be provided so that the bills of all consumers like residential, commercial and others can be printed in the Control Room itself. This will save the time, and manpower resources required to collect the readings of Energy Meters every month.
6. It is anticipated that with such close scrutiny of the power consumption, only by way of monitoring & coordination, around 5% energy consumption within the campus can be reduced.
7. Software Application will be provided so that each consumer can see his / her energy reading at any given point of time on their Android / Smart phone with a facility to switch on / off their circuit from a remote location.

8. The Energy Meters will be having dual recording system so that one can observe separately the power consumed from Grid and that consumed from the Captive Power generator. This will also be recorded in the Control room so that dual tariff can be made applicable on Grid & Captive power respectively.

Advantage & Savings with Automation:

The calculations herein are based on the data existed in Electrical Wing of E&W

1.	Total No. of manned sub-stations	= 16 Nos.
2.	No. of shifts per day	= 03
3.	No. of persons / sub-station / shift	= 01
4.	Total no. of man-days in a year ((1) x (2) x (3))	= 16 x 3 x 365 = 17,520 Man days
5.	No. of persons required after automation / shift	= 08 nos. (a) Control room - 02 Nos. (b) Technical manpower - 06 Nos.
6.	Total man-days required after automation	= 8 x 3 x 365 Man days. = 8,760 Man days
7.	Total man-days saved per year (4–6)	= 8,760 Man days
8.	Wages and benefits of each person approx.	= Rs. 380/-
9.	Savings effected ((7) x (8))	= 8,760 x 380 = **Rs. 3,328,800.00**

Say Rs. 3,300,000/- (Rupees Thirty Three Lac Only)

ADVANTAGES & SAVINGS FROM SMART METERING SYSTEM:

1. The total annual savings envisaged after installation of system for AMR load management and sub-station automation and monitoring is estimated as:

   a) Savings of manpower as enumerated in Proposal–I with sub-station automation comes to approx. **Rs.33,00,000/-** (Rs. Thirty Three Lac per annum)

   b) Estimated saving in power consumption due to monitoring and co-ordination as approx. 5% of the current consumption.

Estimated Total Energy consumption / year	- 2,20,00,000 units
Estimated savings @ 5% per annum	- 11,00,000 units
Cost of each unit inclusive of taxes	- Rs.4.15 / unit
Monetary savings every year	- 11,00,000 x 4.15 = **Rs.45,65,000/-**

   c) Mandays saving on account of Bill recording - 3 x 365
   = 1095

   Savings due to automation - 1095 x 380
   = **Rs. 4,16,100/-**

   d) Total estimated savings annually comes to
   Rs. 33,00,000/- from manpower by sub-station automation as per proposal I
   Rs. 45,65,000/- from load management & monitoring as per Proposal II

Rs. 04,15,000/- Manpower saving on account of manual bill recording

Total Savings from complete automation comes to:

Rs. 82,80,000/-

Say **Rs. 82,00,000/-(Rs. Eighty two Lac only)**

2. In Built system of dual metering enables Institute to recover the actual cost of DG power consumed by a user at the actual cost rather than on proportional pro rata basis which is the current scenario.
3. Qualitative improvement in the metering and control over electrical distribution.
4. It will also be possible to switch off any energy meter from control room for any reason what so ever.
5. Every consumer will have the facility of checking their own meter at any given point of time and can switch ON / OFF their system at will. For this an application shall be provided which can be uploaded on all Android phones.
6. The consumer will also have the facility of switching his power ON / OFF from a remote location.
7. With this system installed, it will also be possible to regulate the power supply to the individual meters during power cut period and when the captive power generator is running. This will enable to maintain control over the power distribution at such time and maintaining load on the power generators.
   E.g. In case the main power supply allowed to an individual meter is 5 KW on grid power; it is possible to regulate the power input to that meter to 2 KW while operating on captive power. In case on captive the power input is regulated to 2 KW, the power will trip if meter is drawing more than the set amount of power. As soon as the drawn power is reduced to within set limit, the meter will allow the power to flow automatically.
8. The monthly billing will be accurate as there will be no manual error, and the Bills & alerts can be sent by SMS to each and every consumer. Also the bills can be printed in the control room itself without actually visiting each and every establishment / residence within the campus.
9. This will also ensure the safety of your equipment as phase balancing can be achieved and alerts are generated on any fault / overload / malfunction.
10. The entire overview of the campus shall be available at one point and it would be easy to locate and thereby rectify any fault that comes up.

Bill of Materials for Automation of Sub stations

The total equipment required for the automation is as under:

S.No.	PARTICULARS	QTY	UOM
1.	Dual Source CT Operated Multifunction Energy Meters without CT but with necessary Control wiring for each Energy Meter	256	Nos.
2.	Bridge for Data acquisition to connect to Energy Meter support embedded Client-server module for Energy meters with wiring for communication with below soft adaptation.	32	Nos.
3.	Soft -Adopter for each Energy Meter to perform the following along-with pre-defined sequential address & isolation.- Interval based and on-demand data acquisition & storage for each consumer meter. Meter Reading Functionality- a) Fault detection b) Data validation c) Alert generation d) Configuration mgmt. for each meter e) Communication protocol to read meter data of each meter All notification by SMS	256	Nos.
4.	RF module to be fixed with Bridge to communicate with M2M Gateway, DCU and DG Sensing Hardware. Data Concentration Unit (DCU) to communicate with Bridges and to initiate the DG sensing.	55	Nos.
5.	M2M Gateway to communicate with Remote Server	4	Nos
6.	DG sensing Hardware with interface RF module per Sub-Station Hardware on DG	04	Nos.
7.	42" Screen with UPS	16	Nos.

SCHEDULE OF QUANTITIES OF LOCAL CONTROL ESTABLISHMENT AT IIT ROORKEE

S. No.	PARTICULARS	QTY	UOM	AMOUNT
01.	Server with following specifications: Intel Xenon E3-1220 (3.10 GHz/4- core/8MB/80W, 1333, Turbo 1/2/3/4) OR Intel Smart Cache 1 x 500GB 3G SATA or more 7.2K rpm LFF (3.5-inch) 4GB (2x2GB) PC3-10600E DDR3 UB ECC , Ethernet : HO NC112i 1-Port Ethernet Server Adapter (x2) HP Embedded Smart Array B110i SATA RAID Controller (RAID 0/1/10) SATA DVD ROM Kit HP Integrated Lights-OUT Standard (iLO 3) Micro ATX Tower (4U), Cent OS based operating system.	01	No.	**To be provided by IIT Roorkee**
02.	Offline Laser printer (Black and White).	01	No.	

BILL OF MATERIALS for Smart Metering

The Bill of Quantities has been worked out on the data available as under:

1. There are residential & other 3- phase connections 294 nos., CT Meters (other than sub stations) 305 nos., Total CT meters (in sub-stations - checked) 256 nos. and single phase meters (including Commercial connections) 1356 nos.

The total equipment required for the automation of complete campus along with sub-stations is given here below:

SR. NO.	PARTICULARS	QTY	UOM
1.	BIS approved 10-60A direct connected Dual source Single Phase energy meter with in-built disconnection with AMR communication port and necessary control wiring for each meter	1356	Nos.
2.	BIS approved 10-60A direct connected Dual source Three Phase energy meter with in-built disconnection with AMR communication port and necessary control wiring for each meter	294	Nos.
3.	Dual source CT operated energy meter without CT but with necessary control wiring. (305+256)	561	Nos.
4.	Bridge for Data acquisition to connect to Energy Meter support embedded Client-server module for Energy meters with wiring for communication with below soft adaptation. (12+32)	44	Nos
5.	Soft -Adopter for each Energy Meter to perform the following along-with pre-defined sequential address & isolation.- Interval based and on-demand data acquisition & storage for each consumer meter. Meter Reading Functionality- a) Fault detection b) Data validation c) Alert generation d) Configuration mgmt. for each meter e) Communication protocol to read meter data of each meter All notification by sms. (1356+294+305+256)	2211	Nos.
6.	RF module to be fixed with Bridge and otherwise to		

	communicate with M2M Gateway, DCU and other Hardware. (20+55)		
7.	Data Concentration Unit (DCU) to communicate with Bridges and to initiate the DG sensing. (08+04)	75	Nos.
8.	M2M Gateway to communicate with Remote Server. (04+04)	12	Nos.
9.	DG sensing Hardware with interface RF module per DG at each sub station	08	Nos.
10.	Hardware on DG	01	No.
11.	42" Screen with VGA port with integrated keyboard and mouse along with UPS for control room to observe minute by minute situation	01	No.

SCHEDULE OF QUANTITIES OF LOCAL CONTROL ESTABLISHMENT AT IIT ROORKEE

SR. NO.	PARTICULARS	QTY	UOM	RATE	AMOUNT
01.	Server with following specifications: Intel Xenon E3-1220 (3.10 GHz/4-core/8MB/80W, 1333, Turbo 1/2/3/4) OR Intel Smart Cache 1 x 500GB 3G SATA or more 7.2K rpm LFF (3.5-inch) 4GB (2x2GB) PC3-10600E DDR3 UB ECC , Ethernet : HO NC112i 1-Port Ethernet Server Adapter (x2) HP Embedded Smart Array B110i SATA RAID Controller (RAID 0/1/10) SATA DVD ROM Kit HP Integrated Lights-OUT Standard (iLO 3) Micro ATX Tower (4U), Cent OS based operating system.	01	No.	**To be provided by IIT Roorkee**	
02.	Offline Laser printer (Black and White).	01	No.		

COST ESTIMATES

I. Automation of sub stations

1.	Cost of the Equipment & material	- Rs. 97,00,000/-
2.	VAT @ 5% on (1)	- Rs. 04,85,000/-
3.	Packing & Handling @ 1%	- Rs. 00,97,000/-
4.	Installation & commissioning	- Rs. 06,00,000/-
5.	Service Tax @ 14% on (4)	- Rs. 00,84,000/-
	Total	**- Rs.1, 08,69,000/-**

(Rs. One Crore Eight Lac Sixty Nine Thousand Only)

II. Smart Metering

1.	Cost of the Equipment & material	- Rs. 3,85,00,000/-
2.	VAT @ 5% on (1)	- Rs. 0.19,25,000/-
3.	Packing & Handling @ 1%	- Rs. 0,03,85,000/-
4.	Installation & commissioning	- Rs. 0,15,00,000/-
5.	Service Tax @ 14% on (4)	- Rs. 0.02,10,000/-
	TOTAL	**- Rs.4,25,20,000/-**

(Rs. Four Crore Twenty Five Lac Twenty Thousand Only) including Automation as above

JUSTIFICATION AND FUTURE READINESS:

Following are the upcoming new projects in the campus:

a. Boys Hostel
b. Transit Hostel
c. Lecture Hall Complex
d. Student Activity Centre

The current power load required in the campus is approx. 5.20 MVA estimated power requirement is expected to go up by 1.00 MVA approx. in the next years. This will put additional load on your existing DG's which are already overloaded as per the following calculation:

a. Total installed capacity of captive power (4Nos x 1.5 MVA)	= 6 MVA
b. Safe Working load @ 80% of installed capacity (6 x 0.8)	= 4.8 MVA
c. Present max, load required	= 5.2 MVA
d. Load requirement for new Project	= 1.0 MVA
e. Load requirement after completion of new Projects	= 6.2 MVA

In case we do not install the smart metering system in your campus, which is capable of rationing the power supply on captive power supplied to residential apartments / departments, institute will have to install the additional 02 nos. Of D.G. Set of 1.5 MVA capacities each which will cost approx. Rs. 6,00,00,000/- (rupees six crore only) inclusive of installation and retro fittings with the existing system.

Considering the above statistics, the total cost of Smart Metering Installation in your premises will be carried out in your campus at almost half the cost of the installation of your additional Captive Power Requirement.

Coordinator
Green Energy Committee

In view of the growing electricity consumption and a large number of sub stations with multiple source of supply, it is proposed that we may carry out following activities for optimum, reliable and cost effective operation and maintenance of electricity distribution system in the campus:

1. Automation of the sub stations
2. Smart metering

Automation of all sub stations so that all the sub-stations can function in an unmanned manner. IIT Roorkee campus comprises a total of 22 Nos. (16 Nos. manned and 6 Nos. CSS) sub stations to distribute the power supply over the campus.Existing energy meters installed at sub stations shall be changed to smart meters so that they are capable of receiving and transferring data to a pre–determined control room.Additional devices will be installed on the diesel captive power Generators and in the sub-station so.

PIR (Passive Infra red) in the toilets & corridors shall be helpful in reducing the electricity consumption. As per estimates about 1500 number of PIR shall be required to be installed in toilets & corridors.

Smart metering shall involve changing all the Energy Meters in the campus, including residential, hostel, commercial, Main building and also in the departments, from the conventional to Smart Meters so that they are capable of capturing dual recording of multiple energy source transmitting data to the Central Control Room. The data shall be used for different purposes including load management, auditing and conserving energy.There are residential & other 3-phase connections 294 nos., CT Meters (other than sub stations) 305 nos., Total CT meters (in sub-stations - checked) 256 nos. and single phase meters (including Commercial connections)1356 nos.

It is estimated that the automation of sub stations shall on one hand reduce annual recurring expenditure for the manpower deployed which will reduce to 48 number to 24 number for all three shifts and on other hand shall have required input for checking and rectifying the faults quickly.

By smart metering it is estimated that not only the load management especially during operation of diesel generating set to keep the load within the generating

capacity but also auditing and access the energy consumed at each and every consumer end. The budgetary cost of the proposal is given below. However the actual cost would be worked out after inviting & finalization of EOI.

Item	Estimated cost	Tentative Annual Saving	Priority	Time taken
a) Automation of the sub stations.	1.10 crore	0.33 crore	I	6 months
b) SITC of PIR Switches	0.30 Crore	0.10 crore		6 months
Total Phase-I	**1.40 crore**			
Smart metering	3.15 crore	0.49 crore	II	6 months
Total Phase-II	**3.15 crore**			
G. Total	**4.55 crore**	**0.92 crore**		**12 months**

It is requested Rs 1.40 crore may be granted during the current year for phase-I & phase-II may be considered next year. Expression of interest for Automation of the sub stations. & Smart metering shall be invited.

3/2/16
(Navneet Kr Saini)
J.E.-T (Elect)

3/2/16
(D P Singh)
AEE (Elect)

03/2/2016
(S M Garg)
Executive Engineer (E/M)

3/2/16
Chairman EC & W

3/2/16
संस्थान अभियन्ता
Institute Engineer