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Central Pulp & Paper Research Institute Saharanpur (U.P.)

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News Bulletin on Pulp & Paper Research and Development

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MANAGEMENT NEWS

COUNCIL OF ASSOCIATION (CoA) MEETING OF CPPRI

The 42nd meeting of Council of Association of CPPRI was held on March 31, 2011 at Udyog Bhavan, New Delhi. The meeting was chaired by Shri Rajinder Pal Singh, IAS, Secretary, IPP, Ministry of Commerce and Industry, Govt. of India and President, Council of Association of CPPRI. The meeting was attended by Shri Tallen Kumar, IAS, Joint Secretary, Shri Mukul Ratra, Deputy Secretary (IF-Wing-IPP), Shri Harsh



*CoA Meeting in progress at Udyog Bhavan, New Delhi.
Shri Rajinder Pal Singh, IAS, Secretary, IPP;
Shri Tallen Kumar, IAS, Joint Secretary, IPP;
Dr. R. M. Mathur Director, CPPRI
with other Honb'le member of CoA.*

Pati Singhania, MD, J. K. Papers Ltd., Dr. Vimal Kumar, Scientist G & Head, FAU-DST, Dr. Satish Kumar, Prof. & HOD, DPT, IIT-Roorkee, Shri R. C. Rastogi, President, IRPMA & CMD, Khatima Fibres Ltd., Shri Pramod Aggarwal, President, IARPMA & CMD Rama Paper Mills Ltd., Shri Madhukar Mishra, President, IPMA & MD, Star Paper Mills Ltd., Shri Anil Kumar, Executive Director & CEO, Shreyans Industries Ltd., Shri C. S. Panigrahi, President, Voith Paper Tech. (India) Ltd., Dr. R. M. Mathur, Director, CPPRI and Shri Shyamal Mishra, IAS, Director (IPP), Mrs. Gurpreet Gadhok, Under Secretary (IPP) and senior Scientists from CPPRI.

RESEARCH & DEVELOPMENT ACTIVITIES

RAW MATERIAL AND PRODUCT DEVELOPMENT

Optimization of Wet end Operation of Papermaking to Improve the Quality of Paper

R&D activities were carried out to study the effect of surface charge and soluble charge on First Pass Retention & Filler Retention during neutral sizing of paper employing model stock solution using Mutek Drainage Freeness Retention (DFR) & Magendans Dynamic Filtration System (DFS).

Printing Quality Evaluation - Assessment and Possibilities of Improvement for Indigenous Coated Paper and Paperboard

The samples were evaluated for printing properties viz printing gloss and print density. Sheets were also evaluated for Parker Print Surf (PPS) smoothness. Results indicated that not much difference was observed in the values of print density with the variation of pore size distribution. However, there was a notable change in the values of print gloss, especially when the pore size distribution of coated sheet narrowed down. Same effect was observed with PPS smoothness, whose values were prominent with narrow pore size.

ENERGY CONSERVATION & ENVIRONMENTAL MANAGEMENT

Integrated Approach for Improving Environmental Status of Pulp & Paper Industry

Under the project following activities were carried out:

- **Studies on ETP Adequacy Assessment to Achieve Stipulated Discharge Norms:-** Studies were carried out in eight number of paper mills based on recycled waste paper, producing writing & printing and kraft paper.
- **Modification/Up-gradation of Existing Effluent Treatment Plants to Reduce Waste Water Consumption:-** Studies were undertaken in identified pulp & paper mills and recommendations



were submitted in the form of detailed reports to the paper mills.

An Integrated Approach on Application of Biotechnology in Pulp & Paper Industry

The project basically aims to promote the biotechnological applications in Pulp & Paper Industry to pursue the clean & green technology. The following issues related to resource conservation, quality upgradation and environmental improvement were addressed.

- **Enzymatic Prebleaching of Wood & Non-wood based Chemical Pulps:** Enzymatic prebleaching experiments were performed on the Hardwood pulp (ODL) received from a large integrated pulp and paper mill. The identified commercial enzymes (xylanase) were used and process conditions for enzyme prebleaching were optimized in respect of doses of enzymes, temperature, time and pH. Enzyme treated pulp showed improved brightness level of more than 2% ISO, with improvements in whiteness lables. Further, 20-30% reduction in post colour number (PC) is also observed. It was also established that there were possibilities of savings of ClO_2 to the tune of more than 20%, while reducing the AOX level in the bleach effluent.
- **Enzymatic Refining of Pulps:** In continuation of studies related to enzymatic refining, experiments were conducted on two numbers of pulps (cotton comber and cotton linter) utilizing the identified enzymes for producing the value added products viz. Currency papers and other similar items. Enzymes were procured from a leading enzyme manufacturing company. Studies showed encouraging results and indicated the potential to reduce the energy consumed during refining of pulps and improved strength properties of fibre in respect of tear index and double fold. It was also observed that the morphological characteristics of fibre were also improved indicating better fibrillation after enzymatic refining.
- **Bioremediation of Paper Mill Effluent:** Experiments were continued on isolation and screening of bacterial strains using different samples from various sources viz. sludge, soil etc. Preliminary studies on screening of isolated

bacterial strains showed encouraging results in respect of reduction in colour (10-15%) and lignin around 10% in the effluents with screened bacterial isolates. Studies on acclimatization of selected bacterial strains in paper mill effluent are continued.

Improving the Rheological and Combustion Behaviour of Non-wood Black Liquor for Enhanced Efficiency of Energy and Chemical Recovery

Based on the exhaustive R&D at CPPRI over a period of more than 10 years, CPPRI developed a technology for removal of potassium (K) and chlorides (Cl) from chemical recovery cycle wherein it has been possible to remove more than 60% potassium and 80% chlorides from the chemical recovery cycle. The technology is being up-scaled to Pilot plant level. Pilot plant has been fabricated and is under commissioning. After commissioning of the pilot plant at CPPRI will be able to take up the mill's specific problems as sponsored project activity.

Further, studies on Non Process Elements (NPE) were conducted in a bagasse based mill. Studies are under progress. Institute is regularly conducting studies on build up and removal of chloride and potassium from chemical recovery cycle as sponsored activities.



Commissioning of Pilot Plant for Removal of Non Process Elements at CPPRI

INFRASTRUCTURE AND DEVELOPMENT ACTIVITIES

Strengthening of Training and Human Resource Development (HRD) Infrastructure in Pulp, Paper and Allied Industry

Training were imparted to the B.Tech, M.Tech, M.Sc students as part of industrial training for their Dissertation work in different areas of pulp & paper.

Paper Making

- Four students of M. Tech., Chemical Engineering are carrying out project work as part of their M. Tech. Dissertation from Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonipat) in the area of "Paper Making" from January 25, 2011 to June 25, 2011.



Students working in different laboratory during training at CPPRI

Recycled Waste Paper

- One trainee from Bharat Kumar & Company Pvt. Ltd., Kolkata was imparted training in the area of "Recycled Fibre" from March 07, 2011 to March 10, 2011.

Biotechnological Applications in Pulp & Paper

- Fifteen number of B.Tech & M.Sc students of Biotechnology and Microbiology from CCS University, Meerut and Kurukshetra University, Kurukshetra were imparted training in the area of

biotechnological applications in Pulp & Paper Industry.

Infrastructure Development for Extension of Library & Documentation Service to the Indian Paper Industry

Under this project Library and Documentation division provided the following services:-

- **Current Awareness Service (CAS) & Selective Dissemination of Information (SDI)** is provided from the current journals on Pulp & Paper Industry to 50 Member Mills of CPPRI as well as Institute Scientists.
- **Rendered Reference/Referral/Reprographic Services** to the Indian Pulp and Paper and Allied Industries, R&D Centre, Member Mills and other organizations.
- **Procured Eight Books** on Pulp & Paper Technology & Allied Industries in order to provide latest developments taking place in Pulp & Paper Industry.
- **Published** and circulated CPPRI News Bulletin for the period of September-December, 2010 to Associations of Pulp and Paper Mills, Allied Industries, R&D Centre, Member Mills, valuable customer of CPPRI and other Government & Non-government organizations.
- **Eighteen visitors** from organizations visited the Library during the period.
- Bar coding of Library Holdings is also under process.

Integrated Approach for Processing of Recycled Fibre

Studies on complete stickies profile, inclusive of estimation & quantification of Macro & Micro stickies in pulp & back water samples using Pulmac Master Screen, Customized Image Analyzer & Extraction method, were conducted for M/s Servalaxmi Paper Mill, Tirunelveli (TN) producing newsprint. The study was sponsored by M/s Nalco India Ltd; Kolkata.

Infrastructure and Capacity Building - Development Activity for Information Technology/ Electrical/ Mechanical and Civil Services

Utility & support services were provided on continuous



basis for carry out R&D and pilot plant activities at CPPRI.

CESS FUNDED PROJECTS

Establishment & Demonstration of Wastepaper Collection, Sorting and Grading System in Selected Metropolis in India

For increasing the recovery rate of Waste-paper in India, CPPRI along with Industry Associations is preparing a discussion paper on "Waste-paper Collection in India" for Department of Industry Policy and Promotion (DoIPP).

An Integrated Approach for Utilization of Bagasse Pith for Production of Bio-ethanol and Value Added Lignin Products (CPPRI/IIP, Dehradun)

The project basically aims the production of bio-ethanol & other value added by-products from bagasse pith, a waste biomass from Sugar & Paper Industries adopting a biorefinery approach. During the period, Prehydrolysis of Bagasse pith was carried out under optimized conditions followed by saccharification of prehydrolysed pith for optimization of process conditions for enzymatic saccharification in respect of dose of enzymes, time, temperature & pH to obtain maximum saccharification efficiency of Bagasse pith.

SPONSORED PROJECTS

Evaluation of Xylanases and Laccases at Pilot and Mill Scale in Pulp & Paper Industry (CPPRI/DUSC/ KUK/ Jay Biozyme, Pune) sponsored by Department of Biotechnology, Govt. of India, New Delhi

Studies were undertaken on enzymatic prebleaching on hardwood pulp using Xylanase & Laccase enzymes developed and produced at University of Delhi South Campus. As a part of sponsored joint project, comparative studies on the bleach response of the DUSC developed enzymes were carried out in comparison to the indigenous leading enzyme producing company. DUSC enzyme developed was found to show better effect in terms of brightness gain & chlorine reduction.

Technological Improvement of a Process of Biological Reduction of AOX, Colour, COD and BOD of Waste Water Emanated from Large Pulp & Paper Industries (CPPRI / IGIB, Star Paper Mills Ltd.), sponsored Department of Biotechnology, New Delhi

Having successfully completed the laboratory studies, the batch scale pilot studies were conducted on biological treatment of paper mill effluent to reduce lignin, color & AOX using developed & screened identified consortia of bacteria. Results of the pilot scale studies conducted at M/s Star Paper Mills during last one year were highly encouraging. The microbial consortia isolated and screened at IGIB, CSIR, New Delhi was found to be highly effective in reducing the pollution load of effluents generated by pulp and paper mills and it resulted in reduction of COD, Color & lignin to the tune of more than 50%.

One of the added advantages of the process was the reduction in the generation of secondary sludge which was reduced to 1/5 to the quantity of secondary sludge generation in conventional activated sludge process.

Having completed successfully the pilot studies on batch scale, it was decided to pursue the pilot scale on continuous basis. Continuous pilot plant studies are under progress.

Improved Energy Efficiency through Utilization of Lignin based Waste Biomass from Agro Residue Paper Mills (Sponsored by Petroleum Conservation Research Association (PCRA), New Delhi

The project has been sponsored by PCRA as a second phase after successful completion of phase I. Under phase I, Institute has developed a process of production of lignosulphonate from waste lignin generated from Small Agro based Paper Mills. The lignosulphonates thus generated by the process developed by CPPRI were found to be useful for various industrial applications viz. Construction Industry & resin for ply wood etc. Now, as a follow up activity, PCRA continued to support the project activity to scale up on demo-commercial scale. With involvement of industrial partners, the technology is being scaled up to commercial scale for setting up of plant for manufacturing of Sodium lignosulphonates from waste lignin sludge obtained from small agro based mills.

Utilization of Fly Ash for Colour Removal (Sponsored by Centre for Fly Ash Research & Management, New Delhi)

Under this sponsored projects studies were conducted on removal of color from paper mill effluent by using fly ash generated in the mill itself. Studies conducted at pilot plant scale have shown encouraging result and it has been possible to remove the color to a level of more than 90% with simultaneous reduction in lignin, COD & BOD, TDS with residual color load of around 100 PCU. Final report has been submitted to sponsorer and based on the studies a semi commercial plant is under fabrication in one of the small agro based mill.

Utilisation of Lignin in Plywood and Rubber Industry (Sponsored by Lignoil Technologies, Mumbai)

The project is sponsored by Lignoil technologies, Mumbai for studies on utilization of Bagasse lignin in rubber and plywood Industry. Based on the primary studies carried out at CPPRI it has become possible to replace Phenol by bagasse lignin for manufacturing of PF resin being used in plywood industry. This should help the small agro based mills to improve the economics of Lignin removal process & for improving overall economics of these paper mills. The studies are under progress.

Techno-economic Feasibility for Setting up of Common Chemical Recovery Plant (CCRP) & Common Effluent Treatment Plant (CETP) for Pulp & Paper Industries Operating in Identified Cluster of Uttar Pradesh & Uttrakhand

CPCB has sponsored a joint study - "Techno-economic Feasibility for Setting up of Common Chemical Recovery Plant (CCRP) & Common Effluent Treatment Plant (CETP) for Pulp & Paper Industries Operating in Identified Cluster of Uttar Pradesh & Uttrakhand " to CPPRI, IIT - Roorkee (DPT), IIT Delhi & IIT Kanpur. The Cluster Include: Thakurdwara - Kashipur Region, Muzaffarnagar (Bhopa road), Meerut - Mawana Road & Moradabad.

A detailed assessment of pollution load generated, feasibility and techno-economic viability study was carried out for setting up CCRP & CETP in above clusters. Further the study also includes the water

consumption benchmark for agro based mills and RCF based mills to reduce waste water discharge. A presentation on the outcome of the study was made by Dr. S. Panwar & Dr.Nitin Endlay before officials of various state pollution control boards in a meeting chaired by Shri S.P.Gautam, Chairman CPCB. The



Dr S. Panwar & Dr. Nitin Endlay making presentation on the outcomes of CPCB sponsored study at CPCB Delhi

feedback of the CPCB Chairman, Shri Kamyotra, Member Secretary and participants were incorporated in the report and submitted to CPCB .

Establishing the Base Line Specific Energy Consumption (SEC) and Target SEC under Perform, Achieve and Trade (PAT) Scheme for Pulp & Paper Sector (Sponsored by BEE)

The broad objective of the project is to carry out validation of data for finding out the accuracy in order to calculate the targets for pulp & paper mills and to calculate targets of energy consumption in the mills. The data was analyzed and validated using normalization factors, to take into account the variability due to raw material, capacity utilization, technology used and the finished products - Work is under progress.

Development of formats for "Baseline Energy Audit" under PAT (Sponsored by BEE)

The main objectives of the project are:-

- Complete review of the energy consumption data as reported by Industry to BEE.



- Energy performance assessment of sub-systems, sub-processes, major equipments & comparison with design data or performance guaranteed data/report.
- Detailed report specifying facts and figures, analysis, if any, technology status, and energy consumption trends etc. Has been prepared and it also highlights the possible improvements in energy savings based on the best available technologies.

The development of Baseline Energy Audit format under this activity will be exclusively used by the energy auditors & conducting the baseline energy audits.

As per the objectives of the study, work has been completed and report has been submitted to BEE.

Energy Data Collection from DC's through Form-1 and e-filing System *(Sponsored by BEE)*

As per the EC- Act 2001, eight industrial sectors (i.e. Thermal Power Station, Fertilizer, Cement, Iron & Steel, Chlor-Alkali, Aluminium, Textiles, Pulp and Paper and Railways) have been notified as Designated Consumers (DC) based on the annual energy consumption criteria.

As per the requirement of EC Act (Section 14(K)) and subsequent regulation notified by the Gazette of India, each DC needs to submit the energy consumption details through the notified forms as well as through online submission every year. CPPRI has been awarded a project as a consultant, a certified energy auditing firm and empanelled agency by BEE to collect such information for five financial years' (i.e. 2005-06 to 2009-10) from 20 pulp & paper mills of North India. This activity will also form basis for establishing the baseline of each DC in the PAT scheme of NMEEE.

The data has been collected as per the scope of work from 20 mills and duly filled form has been submitted to BEE.

OVERSEAS PROJECTS

Effect of Storage Period on Quality of Bleached Kraft Pulp of Acacia Wood (Logs) and Chips *(Sponsored by P.T. Tanjungenim Lestari Pulp and Paper, Indonesia)*

An International Project on "Effect of Storage Period on Quality of Bleached Kraft Pulp of Acacia Wood (Logs) and Chips" has been entrusted to CPPRI by P.T. Tanjungenim Lestari Pulp and Paper, Indonesia. The activities of the project will be initiated on receiving the wood sample. The objective is to study the effect of storage quality of pulp.

TECHNICAL/CONSULTANCY SERVICES

Technical Assistance / Consultancy in following areas were provided to:

- Testing of fibre and loading materials for M/s Claridge Moulded Fibre Ltd; Distt. Solan (H.P)
- Testing of repulpability of Splicing tape as per TAPPI Standard UM 213 Method for M/s Stockvis Prostick Tapes Pvt. Ltd; Pune.
- Testing of Waste paper sample for M/s VLS Fibre; Chennai.
- Testing of repulpability of Splicing tape liner for M/s Stockvis Prostick Tapes Pvt. Ltd; Pune.
- Testing of Wet Strength Properties for M/s Unisource Paper Pvt. Ltd; Mumbai.
- Testing of Bamboo and Wood Chips was carried out for Kohinoor Pulp & Paper Pvt. Ltd., Guwahati.
- Production of unbleached & bleached pulp of EFB fibre was carried out for Eko Pulp & Paper, Malaysia.
- Calibration service was provided to cellulose and paper branch of FRI, Dehradun for following instrument Micrometer, CSF Tester, L&W Tensile, Tester, Gurley Tester, Burst-o-matic Tester.
- Water Audit & ETP adequacy Assessment was carried out at following mills:
 1. ABC Paper Ltd, Sailakhurd, Punjab
 2. Sahota Paper Mills Ltd, Kashipur, U.K.
- Water Audit was carried out at Vishwanath Paper & Boards Ltd, Kashipur, U.K.
- Environmental Monitoring was carried out at Ballarpur Industries Ltd (Unit Shree Gopal), Yamunanagar and Star Paper Mills Ltd,

Saharanpur, U. P.

➤ ETP Adequacy Assessment was carried out at following mills:

1. Bindlas Duplux Limited, Muzaffarnagar, U. P.
2. Tehri Pulp & Paper Limited, Muzaffarnagar, U.P.
3. Goraya Paper Mills Ltd, Kashipur, U.K.
4. Bhageshwari Paper Mills Limited Unit-I, Muzaffarnagar, U.P.
5. Bhageshwari Paper mills Limited Unit-II, Muzaffarnagar, U.P.
6. Sidhballi Papers Limited, Muzaffarnagar, U.P.
7. Shakumbari Paper Mills PVT. Limited, Muzaffarnagar, U.P.
8. Silverton Papers Limited, Muzaffarnagar, U.P.
9. Garg Duplex Board Mills Limited, Muzaffarnagar, U.P.
10. Mahaluxmi Paper Mills Limited, Muzaffarnagar, U.P.
11. Rana Papers Ltd, Muzaffarnagar, U.P.

- Technical services were rendered to the 14 mills and organizations by analyzing their effluents / solid waste samples or carrying out air monitoring studies for various pollution parameters.
- Fibre Furnish Analysis carried out in 30 nos. of samples of Pulp, Paper & Board were analyzed.
- Moisture Content, Proximate Chemical Analysis and carried out in 79 nos. of samples of raw materials were analyzed.
- Purity carried out in 2 nos. of samples of non Non Fibrous Raw Material & White Liquor Analysis.
- Soda Loss carried out in 2 nos. of pulp samples was analyzed.
- Elemental analysis, as well as Lignin, Purity, Sugars, Molecular Weight Distribution etc. was carried out in 61 nos. of Black liquor, lime stone,

scales, soil, pulp, coal, soap stone, effluent, lignin and enzyme samples were analyzed.

- Total Coliform, Faecal Coliform, E.Coli analysis was carried out in 2 nos. of water samples received from M/s Century Pulp & Paper Mills, Lalkua.
- Cellulase activity, Temperature & pH profile of Xylanase Activity was carried out in 1 nos. of enzyme sample received from M/s Krishna Specialty Chemicals Pvt. Ltd., Bilaspur.
- GSM, Thickness, Tensile, Tear, Burst, Brightness, Opacity, Gloss, (l,a,b values), whiteness, double fold, RCT, smoothness, porosity, formation, bending stiffness printing properties and fibre furnish carried out in 627, nos. of Paper & Paper Board samples received from various organizations/ mills were tested.
- Calibration carried out in 12 nos. samples of tiles/paper was also tested.

WORKSHOP/SEMINAR/MEETING

WORKSHOP ORGANISED

Workshop on Commercial Scale Desilication at APPM Rajahmundry

With the imposition of stringent legislations laid by the regulatory authorities to achieve stipulated pollution norms, the straw based pulp and paper mills were left with no option except to install chemical recovery system to process the Black Liquor generated from pulping. However, the installation of chemical recovery in these mills required removal of silica from the black liquors so as to effectively process it in chemical recovery system.

Coastal paper (unit of M/s Andhra Pradesh Paper Mills Limited, Rajahmundry, A.P.) using rice straw as a major raw material for paper making took initiative to set up the first commercial scale desilication plant in a rice straw based mill with the technical support of CPPRI employing desilication process developed and patented by CPPRI. This has enabled the mill to efficiently process the silica rich black liquor from rice straw pulping in chemical recovery system thereby recovering the cooking chemicals & energy from the black liquor which has helped the mill in meeting the stipulated pollution norms.



Dr. R. K. Jain, presenting a technical paper during desilication Workshop. Sh. M. K.Tara, MD APPM, Sh. G.Raju, Director, Delta Paper Limited, Dr. R.M.Mathur, Director, CPPRI and Dr. A.K.Dixit, Scientist, CPPRI during Technical session

One day workshop on Rice straw desilication was organized at Coastal Papers Limited on January 20, 2011 which basically aimed to demonstrate the desilication process to pulp and paper mills based on agro residues and bamboo. More than 40 delegates of senior and middle level management, technocrats from various pulp & paper mills across the country participated in the workshop and witnessed the commercial scale desilication process which has created the confidence among the entrepreneurs in desilication technology developed by CPPRI.

3rd Life Long Learning (3 L) Program on Perform Achieve & Trade (PAT) workshop for Pulp & Paper Sector

CPPRI conducted a Life Long Learning (3 L) Program



Perform, Achieve & Trade (PAT) workshop at CPPRI, Saharanpur

on Perform Achieve & Trade (PAT) workshop for Pulp & Paper Sector organized by Bureau of Energy Efficiency (BEE) Ministry of Power, Govt. of India at CPPRI, Saharanpur. The workshop was attended by 35 participants from Industry. Faculty from BEE and CPPRI Scientists presented lectures on the subject during the workshop on February 17, 2011.

WORKSHOP/SEMINAR ATTENDED

Workshop on "Results Framework Document (RFD): An Instrument for Improving Government Performance"

- Dr. R K Jain participated in the workshop on "Results Framework Document (RFD) : An Instrument for Improving Government



Sh. Prajapati Trivedi, Secretary, Performance Management Division, Cabinet Secretariat and Dr. R K. Jain, Scientist F, CPPRI during the Workshop

Performance" held at Vigyan Bhawan, New Delhi on 22.02.2011 organized by Performance Management Division, Cabinet Secretariat, Govt. of India, New Delhi and presented the Results Framework document of CPPRI during the workshop.

- Dr. R. K. Jain Sc. F & Dr. B.P. Thapliyal Sc. E-II attended IPPTA annual seminar on "**3E's of Paper Industry- Energy, Environment & Ecology**" in Mumbai on March 3, 2011.
- Dr. Vimlesh Bist, Sc. F, Dr. A. K. Dixit, Sc. E-I, Dr. Priti S. Lal, Sc. E-I, Dr. Vasanta V Thakur, Sc. B, Sh. Arvind Sharma & Mr. Diwakar Pandey attended a Seminar on "**Advances in Wood**

Science and Technology Research: Recent Trends, Future Challenges and Opportunities"
on March 09 to 10, 2011 at FRI, Dehradun.

MEETINGS ATTENDED

- Dr. B. P. Thapliyal Sc. E-II attended the Annual General meeting of IPMA, at New Delhi.
- Dr. R K Jain Sc. F attended a meeting in connection with project activities "**Evaluation of Xylanases and Laccases at Pilot and Mill Scale in Pulp & Paper Industry**" under a multi institutional project to review project at progress & chalk out the future action plan for pilot and mill scale trials at University of Delhi, South Campus, New Delhi .
- Dr. S. Panwar & Dr. Nitin Endlay attended meeting related to CPCB Project on Techno- economic viability for setting up CCRP & CETP in Identified Clusters of UP & Utrkhand at IIT Delhi.
- Dr. R. K. Jain, Dr. A.K.Dixit, Mr. Diwakar Pandey & Mr. Vipin Gupta attended a meeting related to the activities of Cess funded collaborative project at Indian Institute of Petroleum, Dehradun.
- Dr. R. K. Jain attended meeting with Dr. Vimal Kumar, Sc. 'G' & Adviser in connection with the preparation of Document of Business Model of CPPRI at Department of Science & Technology.

LECTURES AND PRESENTATIONS

- Dr Nitin Endlay delivered series of lectures on various subjects like Environmental Issues & Challenges, Effluent Treatment Practices, Factors Influencing Biological Treatment Process, Monitoring & Performance Evaluation of ETP, Water Conservation, Air Pollution, Odor Control, Air Pollution Control Equipments in Indian Pulp & Paper Industry as Guest Faculty in Training Programme on Environmental Management in Pulp & Paper Industry organised by Engineering Staff College of India, Hyderabad, January 19 - 21, 2011.
- Dr. B. P. Thapliyal, presented a technical paper entitled "Baseline Energy Audit & Methodology of Data Verification" during 3rd Life Long Learning (3 L) Program on Perform Achieve & Trade (PAT)

workshop for Pulp & Paper Sector on perform at CPPRI Saharanpur on February 17, 2011.

- Sh. Alok Kumar Goel, presented a technical paper entitled " Means to Achieve the PAT Target in Pulp & Paper - opportunities of Energy saving , EE Technologies , Waste minimization & Energy Productivity" during life Long Learning (3 L) Program on Perform Achieve & Trade (PAT) workshop for Pulp & Paper Sector, organized by Bureau of Energy Efficiency (BEE) Ministry of power. Govt. of India at CPPRI Saharanpur on February 17, 2011.
- Dr. M. K. Gupta delivered a lecture on "Biomethanation of Pulp & Paper Mill Waste" at a one day workshop on Biomethanation & Cogeneration in Pulp & Paper Industry organised by IARPMA at Kashipur , Utrkhand on February 25, 2011.
- Dr. Vasanta V Thakur delivered a lecture on "Second Generation Biofuels- Bioethanol from lingo-cellulosic Materials" in workshop on Biomethanation & Cogeneration in Pulp & Paper Industry organised by IARPMA at Kashipur , Utrkhand on February 25-26, 2011.
- Dr. R. K. Jain, presented a paper entitled "Bioethanol from Bagasse Pith: A Lignocellulosic Waste Biomass from Paper/Sugar Industry" in



Dr Nitin Endlay scientist at Training Programme on Environmental Management in Pulp & Paper Industry, ESCI, Hyderabad



IPPTA Seminar at Mumbai in March 3 - 4, 2011.

- Dr. Priti S. Lal, presented a Research Paper on "ECF and TCF Bleaching - Cleaner and Cost Effective Options for Pulp & Paper Mills" in a Seminar on "Advances in Wood Science and Technology Research: Recent Trends, Future Challenges and Opportunities" held on March 09 to 10, 2011 at FRI, Dehradun.
- Dr. B. P. Thapliyal presented a technical paper entitled "PAT- a Market Based Mechanism for Energy Efficiency in Pulp & Paper" during IPPTA Seminar at Mumbai in March 2011.
- Dr. A. K. Dixit presented a paper on "Incineration of Black Liquor mixed with Biomass- A Potential option to achieve Zero Black Liquor Discharge in Small Agro Based Mill" in National seminar on "Advances in wood science and technology research: Recent trends, future challenges and opportunities" at Forest Research Institute, Dehradun from 09-10 March, 2011.
- Dr. Vasanta V Thakur presented a poster on Agro forestry lignocellulosic biomass- A potential source for biofuel in National seminar on "Advances in wood science and technology research: Recent trends, future challenges and opportunities" at Forest Research Institute, Dehradun from 09-10 March, 2011.

INTERNAL LECTURES

- Dr. R. D. Godiyal, delivered a lecture on "Fundamental Properties of Fibres and their Influence on Paper Making Properties" on February 2, 2011.
- Sh. P. C. Pande, delivered a lecture on "The Physical Properties of the Paper" on March 3, 2011.

REPORTS & PUBLICATIONS

REPORTS

- Adequacy of Effluent Treatment Plant for Treatment of Effluent Generated from 150 tpd Kraft Paper at Genus Paper Products Ltd, Agwanpur, U.P.
- Audit of Fresh Water Consumption in Existing Plant Operation and Technical Opinion to Reduce

Specific Fresh Water Consumption at ABC Paper Ltd, Sailakhurd, Punjab.

- Adequacy Assessment of Modified ETP for Treatment of Mill Effluent at Goraya Straw Boards Mills Pvt Ltd, Kashipur, Uttrakhand.
- Adequacy Assessment of Existing ETP for Treatment of Mill Effluent Generated from Waste Paper at following mills:
 1. Nikita Papers Ltd, Shamli, U.P.
 2. Sahota Papers Ltd, Jaspur, Uttrakhand.
 3. Rana Papers Ltd, Muzaffarnagar, U.P.
- Adequacy Assessment of Existing ETP for Treatment of Mill Effluent Generated at following mills:
 1. Bindlas Duplux Limited, Muzaffarnagar, U.P.
 2. Tehri Pulp & Paper Limited, Muzaffarnagar, U.P.
 3. Bhageshwari Paper Mills Limited Unit-I, Muzaffarnagar, U.P.
 4. Bhageshwari Paper mills Limited Unit-II, Muzaffarnagar, U.P.
 5. Sidhballi Papers Limited, Muzaffarnagar, U.P.
 6. Shakumbari Paper Mills Private Limited, Muzaffarnagar, U.P.
 7. Silverton Papers Limited, Muzaffarnagar, U.P.
 8. Garg Duplex Board Mills Limited, Muzaffarnagar, U.P.
 9. Mahaluxmi Paper Mills Limited, Muzaffarnagar, U.P.
- Hindi Translation of CPPRI Laboratory Manual "Paper & Paper Board" is in progress.
- Report of RAC Project on "Storage & Preservation of Fibrous Raw Materials used in Indian Pulp & Paper Industries" was prepared.
- A report on "Investment and Profitability Assessment of Technology Up-gradation Fund Scheme (TUFS) in Pulp & Paper Sector" was submitted to DoIPP, Ministry of Commerce & Industry.
- Report on Stickies testing at Servalakshmi Paper

Mill, Tirunelveli (TN) for M/s NLS NALCO INDIA Ltd; Kolkata.

- Technical Appraisal and vetting of Technical prefeasibility Report of M/s Saber Paper Mill the report has been submitted to the mill.

PUBLICATIONS

- R.M. Mathur, B.P. Thapliyal and S. Garnaik "Perform Achieve and Trade (PAT)- A market Based Mechanism for Energy Efficiency in Pulp and Paper" published in IPPTA Journal Volume 23, Issue No-1 (January- March) 2011.
- R. K. Jain, A. K. Dixit, R. Tandon, Aash Muni Singh & R. M. Mathur "Impact of Desilication on Physico-chemical Properties of Black Liquor and Chemical Recovery Operation" published in the proceedings of the Workshop on "Commercial scale Desilication of Black Liquor" held at Andhra Pradesh Paper Mills Limited, Rajahmundry on January 20, 2011.
- A. K. Dixit, R. K. Jain, A. V. Janbade and R. M. Mathur "Pilot Scale Studies on Desilication of Silica Rich Black Liquor for different Mills Based on Various Raw Materials" published in the proceedings of the Workshop on "Commercial Scale Desilication of Black Liquor" held at Andhra Pradesh Paper Mills Limited, Rajahmundry on January 20, 2011.
- Y. P. Singh, Purnima Dhall, R. M. Mathur, R. K. Jain, Vasanta Vadde Thakur, Rita Kumar, Anil Kumar "Bioremediation of Pulp & Paper Mill Effluent by Tannic Acid Degrading Enterobacter sp." Published in Water, Air Soil and Pollution on November 2010.

INTERACTION WITH INDUSTRY

- A team of scientists comprising of Dr. R. K. Jain, Scientist F and Dr. A. K. Dixit, Scientist E-I interacted with M/s Delta Paper Mills Limited, Vendra, for desilication and NPE removal studies. The mill has sponsored a study to CPPRI for conducting process audit of Chemical Recovery System.
- Dr. B. P. Thapliyal, Scientist E-II & Shri. Alok Kumar Goel, Scientist C visited BEE, New Delhi

for discussion on implementation of PAT scheme in pulp and paper sector.

- Dr. B. P. Thapliyal, Scientist E-II & Shri. Alok Kumar Goel, Scientist C visited IIT Delhi for development of Regression Models between investment & profitability for TUFs.
- Dr. Sanjay Tyagi, Scientist C visited Security Printing and Minting Corporation of India limited (SPMICL) New Delhi as technical expert
- Dr. Sanjay Tyagi, Scientist C visited IGNOU, New Delhi as technical expert
- Dr. R. K. Jain, Scientist F & Dr. Vasanta V Thakur, Scientist B visited M/s Star Paper Mill to discuss the pilot plant studies of biological effluent treatment plant.

VISITS OF EXPERTS

- A team of representatives from Bhartiya Note Mudran Nigam Ltd. (a wholly owned subsidiary of Reserve Bank of India) visited CPPRI in order to discuss the results under the sponsored project on Enzymatic refining of cotton samples.
- Dr. Rita Kumar, Scientist G, IGIB, New Delhi visited CPPRI & Star Paper Mills to discuss & review the progress of project "Technological improvement of a process of biological reduction of AOX, Colour, COD and BOD of waste water emanated from large Pulp & Paper Industries" sponsored by Department of Biotechnology, Govt. of India, New Delhi.
- Director FRI, Dean (Deemed University), Head Cellulose & Paper Division from ICFRE, Dehradun visited the Institute February 2011 in connection with joint (ICFRE & CPPRI) M. Sc. Programme in Pulp & Paper from July 2011.
- A High Power delegation from Nepal and Bangladesh comprised of senior level officials led by Mr. Iswar Singh Thapa, Joint Secretary, WECS, Nepal visited CPPRI for one day to interact with CPPRI Scientists and for discussion on Energy Efficiency initiatives in pulp and paper sector. Visitors interacted with Dr. B.P. Thapliyal, Sc. E-II & Head Paper Testing & Energy Management Division, Shri Alok Kumar Goel, Scientist C and



Shri Sanjay Tyagi, Scientist C during the visit. The delegation comprised of 28 members engaged in the area of energy conservation in Nepal & Bangladesh. The visit was sponsored by BEE, New Delhi & GTZ, New Delhi.



Dr. B P Thapliyal, Sr. Scientist, CPPRI addressing the delegates from Nepal & Bangladesh

VISITS TO MILLS & OTHER ORGANISATIONS

- Dr. R K Jain, Head CR & Biotech Division along with Dr. A.K.Dixit visited M/s Delta Paper Mills Limited, Vendra For studies on chemical recovery cycle.
- Dr. S. Panwar, Head Environment Division along with scientists Dr. M. K. Gupta, Dr. S. Mishra, Dr. Nitin Endlay, Mohd Farid and Mohd Salim visited and collected effluent & water samples from 11 paper mills for Water Audit & ETP Adequacy Assessment.
- Dr. S. Panwar, visited Naini Papers Ltd, Kashipur, Uttrakhand in connection with CPCB project Techno- economic viability for setting up CCRP & CETP in Identified Clusters of UP & Uttrakhand.
- Dr. B. P. Thapliyal, Head PT & Energy Division along with Dr. Sanjay Tyagi visited M/s Pragati Papers Limited, Ambala for technical study.
- Dr. B. P. Thapliyal, Head PT & Energy Division along with Mr. N. K. Naik, Mr. Akhil Naihani visited 21 paper mills for data collection & verification in connection with TUF Scheme

- Sh. P.C. Pande, Sh. Arvind Kumar and Sh. Kuldeep Sharma various paper mills for the collection of Pulp & Paper sample from different section of the mill.
- Dr. M. K. Gupta, Dr. S. Mishra, Mr. R. P. Singh, Mr. M.S. Bhandari, Mohd. Farid, Mohd. Salim and Mr Nitin Mishra visited Deen Bandhu Chottu Ram Thermal Power Plant, Yamuna Nagar, Panipat Thermal Power Station, Panipat, Bharat Starch Industries Yamunanagar Haryana and Bilt, Yamunanagar for Environmental Monitoring.
- Dr. A. K. Dixit visited M/S Ballarpur Industries Limited, Yamunanagar for ESP ash collection and studies on NPE.
- Dr. Sanjay Tyagi visited 3 paper mills for For data collection & verification in connection with TUF Scheme.
- Mr. B. Pandey, Mr. Diwakar Pandey, Mr. Dharmendra and Mr. Vipin visited M/s Star Paper Mill, SRE for the collection of effluent samples for analysis of pilot plant trials and pulp samples for enzymatic prebleaching study.
- Mr. Diwakar Pandey & Mr. Vipin Gupta visited Indian Institute of Petroleum, Dehradun Under the collaborative project with IIP.

CPPRI INSTITUTE MEMBERSHIP

CPPRI welcomes the new member, Shri Kiran Shesh, Sr. Executive (CEO) M/s Pall India Pvt. Ltd; Mumbai on becoming the part its membership brigade.

ABSTRACTS

Title: A Practical Approach to Provide Cost Savings in a Kraft Mill's Pulping Operation.

Author: Jonas Johakimu, Tammy Bush and Lucian Lucia.

Abstract: The effect of green liquor pre-treatment (GLP) on Kraft pulping of Pinus Patula has been investigated. Wood chips were pre-treated with green liquor, and subsequently subjected to Kraft pulping to achieve a target Kappa number of 65- 70.

The results here in have revealed that GLP has the

potential to substantially improve the delignification rate during Kraft pulping. Compared to regular Kraft pulping; the H-Factor can be reduced by almost 52% when GLP is applied. In addition, if the H-Factor is maintained at the same level as was used during regular Kraft pulping, the liquor charge can be reduced by 33%. GLP followed by Kraft pulping produced pulp samples with superior strength properties to those produced by regular Kraft pulping.

The potential benefits of GLP technology to the Kraft pulping industry are; providing cost savings, increased digester productivity and mitigation of some environmental impacts. Depending on the process economics of the pulping process of a Kraft pulp mill, GLP can be used to shortening of the digester pulping time or down sizing the limekiln requirements.

Source: *TAPPSA Journal*, Vol. 2, 2011, Pg. 20 - 26.

Title: Reductive Bleaching of Mechanical Pulps by Amineboranes - Molecular Simulation of the Reaction Mechanisms.

Author: Nancy L'ecuyer, Marie-Claude Laplante and Sylvain Robert.

Abstract: This paper describes the application of computer modelling techniques to study reductive bleaching of mechanical pulps by amineboranes. Amineboranes have been studied as reductive bleaching chemicals for mechanical pulps. The general understanding of the structure-reactivity relationship found in the literature cannot explain either their bleaching efficiencies or their reaction mechanisms. We studied a wide range of both synthesised and commercially available primary, secondary and tertiary amineboranes of the $H_3B:NR_3$ type (where R=H, methyl, ethyl, i-propyl, t-butyl) and compared our experimental results with those predicted by the use of molecular simulation. The simulations were done at various levels of theory from semi empirical to ab initio calculations. While computer simulations of reactions in vacuum gave us erratic results, simulations of reactions in an aqueous media, either with a continuum or explicit solvent, correctly predicted the experimentally observed reactivity order of our amineboranes. The aqueous media induces a charge delocalization on the boron hydrides; modulated by the

steric hindrance of the amine part.

Source: *APPITA Journal*, Vol. 64 No.2, 2011, Pg. 165 - 168.

Title: Hydromechanical Response of Different Pulp Fibre Suspensions.

Author: Alvaro Vaz, Rogerio Simoes and Jacques Silvy.

Abstract: This paper reports on studies of the influence of the refining operating variables on the hydromechanical response of paper pulp fibre suspensions using a Valley beater. *Pinus sylvestris*, *Eucalyptus globulus* and *Betula verrucosa* chemical pulps were used. The normal and tangential average forces exerted on the pulp suspension in the gap clearance were evaluated, the distance between rotor and stator was measured and the shear factor evolution during refining was calculated. The refining trials took place in a laboratory Valley beater, and the studied variables were the load on the roll, the rotor speed of rotation and the specific applied energy. Relationships between shear factor and shear rate were tested for the suspensions of the three fibre species, showing shear-thinning like behaviour. The results were analysed in terms of a floc capture process and fibre properties.

Source: *Appita Journal*, Vol. 64 No.2, 2011, Pg. 175 - 184.

Title: Using Laser Speckle to Measure the Roughness of Paper.

Author: Abdiel Pino, Josep Pladellorns, Iosep F. Co 10m, ariol Cusola, and Agustin Tosas.

Abstract: Paper surface roughness is an important consideration in paper and board destined for printing. The amount of coating and method of application depend on the roughness of the base paper. We present a method to measure the roughness of the paper based on analysis of speckle pattern on the surface. Images are captured by means of a simple configuration using a laser and a charge-coupled device (CCD) camera. Then, we apply digital image processing using a co-occurrence matrix, providing for a non-contact surface profiling method that can be used online.

Source: *TAPPI Journal*, Vol. 10 No.3, 2011, Pg. 7 - 13.



Title: Managing Anionic Detrimental Substances in Peroxide Bleached Mechanical Pulps-unique Benefits of Enzymatic Treatment.

Author: Przem Pruszyński, Michael Quinn, Bjoern Kamlin, Laura Sherman, Jane Wong Shing and Steve Govoni.

Abstract: Brightening processes are the major contributors to variability in wet end chemistry in production of papers based on mechanical pulps. Reductive brightening (hydrosulfite brightening) contributes mainly to increased levels of conductivity, while hydrogen peroxide brightening, due to its initial high pH, generates increased levels of anionic, polymeric materials giving rise to elevated cationic demand values. Both increased conductivity and cationic demand can negatively affect retention, drainage and colloidal stability. Consequently, machine efficiency and product quality are impacted.

This paper reports on continuation of earlier studies dedicated to process water variability in papermaking. Sources and chemical nature of anionic trash generated during hydrogen peroxide brightening are reviewed together with developments in hydrogen peroxide brightening technology. Finally, available anionic trash control strategies, specifically the unique potential of enzymatic treatment are discussed. Results of preliminary laboratory studies and practical applications of pectinase enzymatic technology for two mills are presented.

Source: *APPITA Journal*, Vol. 64 No.2, 2011, Pg. 169 - 174.

Title: The Influence of a Fisher-Tropsch Wax Emulsion on the Linting Propensity of Newsprint.

Author: Madelyn Bekker, Nicolaas Roussouw Louw and Glenda Vanessa Webber.

Abstract: Linting is the removal of poorly bonded material from the surface of a paper sheet. This material can then be deposited on the printing press. Linting is a problem in offset printing and can reduce production efficiency. The amount of linting is influenced by the strength of fibre-to-fibre bonding on the paper surface. There is currently no standard method to determine linting. Different types of tests that all are related to testing inter-fibre bonding strength on the surface of the

paper were applied here to measure linting. A Fisher-Tropsch wax emulsion was tested as an anti-linting agent. The Fischer-Tropsch wax emulsion showed great potential as an anti-linting agent and appeared to improve the fibre-to-fibre bonding strength on the paper surface when added to the wet-end during papermaking. The Fischer-Tropsch wax emulsion also appeared to show increased lint reduction when compared to a Polyamidoamine-epichlorohydrin (PAAE) resin added at the concentration recommended by the supplier for optimum performance and the same manufacturing conditions.

Source: *TAPPSA Journal*, Vol. 2, 2011, Pg. 27 - 31.

Title: The Development of a Flexible, Re-useable Thermal Buffering and Insulating Liner for Packaging Temperature Sensitive Products.

Author: James H. Johnston and Margaret A. Dodds.

Abstract: Phase change materials (PCMs) contained in a re-useable liner offer the opportunity to provide thermal buffering for packaging temperature sensitive products. When using PCMs it is necessary to contain the liquid phase upon melting to prevent PCM loss and contamination of the produce. A composite proprietary nano-structured calcium silicate (NCS) phase change material (PCM) as a dry powder, wherein the PCM is accommodated in the high pore volume of the NCS avoiding the leakage problem, has been developed here. The NCS-PCM is contained in polythene bags or in bubble wrap bags to provide additional insulation. This provides a flexible, re-usable, thermal buffering packaging liner.

The thermal resistance, thermal conductivity and thermal buffering properties of this NCS-PCM have been measured and presented here. The results show this new material is very effective in providing both thermal insulation and thermal buffering properties. It could have significant potential for use in liners for paperboard packages containing temperature sensitive produce to better maintain the inside temperature of the package and prevent unwanted warming or cooling and consequent produce spoilage. This paper presents the development and applications testing of a new NCS-PCM bubble wrap liner for this purpose.

Source: *Appita Journal*, Vol. 64 No.2, 2011, Pg. 153-157.



गणतंत्र दिवस समारोह 2011

गणतंत्र दिवस की 61 वीं वर्षगांठ की पावन बेला पर संस्थान के प्रांगण में निदेशक डा. आर. एम. माथुर द्वारा ध्वजारोहण किया गया। इस अवसर पर निदेशक महोदय ने सम्बोधित करते हुये कहा कि इस संस्थान का कार्य क्षेत्र देश के लुब्धी एवं कागज उद्योग की समस्याओं को सुलझाने और उन्हें तकनीकी सहायता उपलब्ध कराना है ताकि वे वैश्विक प्रतिस्पर्धा के समकक्ष हो सकें। इसीलिये संस्थान 11 वीं पंचवर्षीय योजनाओं में कागज उद्योग की मुख्य समस्याओं पर आधारित परियोजनाओं पर कार्य कर रहा है।

संस्थान कागज एवं लुब्धी उद्योग को अपनी विशिष्ट सेवायें देने के लिये लगातार प्रयत्नशील है। संस्थान को बहुत से सरकारी विभागों व अभिकरणों द्वारा विभिन्न परीक्षण नमूनों के मूल्यांकन/परीक्षण, जिसमें कच्चा माल, रसायन, कागज और पर्यावरण के लिए, मान्यता प्रदान की गई है। विगत कई वर्षों से संस्थान ने ऊर्जा प्रबन्धन के क्षेत्र में सार्थक भूमिका निभाई है और वर्ष के

दौरान संस्थान ने लगातार 'ऊर्जा कार्यकुशलता ब्यूरो' को लुब्धी एवं कागज उद्योग में ऊर्जा खपत के दिशा-निर्देश के क्रियान्वयन के लिए लुब्धी एवं कागज मिलों के आंकड़े इकट्ठे करने में सहायता उपलब्ध कराई।

भारत में अभी तक रद्दी कागज को एकत्रित करने उसकी शेडिंग व वितरण हेतु कोई संगठित, अनुपातिक व वैज्ञानिक विधि नहीं है। अतः संस्थान उपकर से पोषित इस परियोजना पर कार्य कर रहा है। संस्थान पर्यावरण एवं वन मंत्रालय, भारत सरकार को भी रद्दी कागज के आयात के नीति निर्धारण में भी सहायता प्रदान कर रहा है। राष्ट्रभाषा हिन्दी को आफिस के दैनिक कार्यों में उपयोग हेतु बढ़ावा दिया जा रहा है। सभी कर्मियों को अपने दिन-प्रतिदिन के कार्य हिन्दी भाषा में प्रतिपादित करने हेतु प्रोत्साहित किया जा रहा है ताकि भारत सरकार द्वारा समय-समय पर जारी दिशा-निर्देशों का पालन सुनिश्चित रूप से हो सके।

इस अवसर पर निदेशक महोदय ने संस्थान के हर कर्मचारी को अपनी भागीदारी को निष्ठापूर्वक निभाने का भी आह्वान किया।

मेधावी छात्र/छात्रायें सम्मानित

हर वर्ष की भांति इस वर्ष भी गणतंत्र दिवस के अवसर पर संस्थान के निदेशक डा. आर.एम. माथुर के द्वारा संस्थान के कर्मचारियों के मेधावी बच्चों, जिन्होंने वर्ष 2009-10 के शैक्षणिक सत्र में कक्षा 10 एवं कक्षा 12 की परीक्षा में 75 प्रतिशत से अधिक अंक प्राप्त किये उन्हें सम्मानित किया गया।

Address for Communication

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We welcome suggestions & comments for further improvement of this News Bulletin