

MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY
Allahabad- 211004

Minutes of the Seventh meeting of the Board of Governors held on September 09, 2005 at 2:30 PM at Jaypee Sidharth, Jaypee Hotels Ltd., 3 Rajendra Place, New Delhi

The following members of the Board of Governors attended the meeting:

1. Shri N. D. Gupta Chairman
608 – 609, Ratan Jyoti Building,
18, Rajendra Place,
New Delhi
2. Sri A. K. Bishnoi Member
Secretary,
Government of Uttar Pradesh
Department of Technical Education
Lucknow
3. Sri AVNS SHASTRY Member
DESK OFFICER TS III
(Nominee of Joint Secretary (I))
Govt of India, MHRD, New Delhi
4. Prof. Venkateswara Rao Member
Advisor (UG/PG)
All India Council for Technical Education
New Delhi
5. Prof. Sureshwar Sharma Member
Member UGC
Former Vice-Chancellor,
Rani Durgawati Vishwavidyala,
"Udyachal", 1881 Gupteshwar
Jabalpur
6. Prof. N. Sathyamurthy Member
Department of Chemistry
I.I.T, Kanpur
(Nominee of Director, IIT, Kanpur)
7. Sri M. P. Garg Member
Executive Director
Recron Synthetic Ltd.
Naini, Allahabad

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| 8. | Prof. Krishna Kant
Professor
Department of Computer Sc. & Engg.
MNNIT, Allahabad | Member |
| 9. | Prof. Mahesh Chandra
Professor,
Department of Civil Engineering
MNNIT, Allahabad | Member |
| 10. | Sri B. K. Ray
Desk Officer, IFD
(Nominee Integrated Finance Division)
Govt of India
MHRD, New Delhi | Member |
| 11. | Prof. B.D. Chaudhary
Director
MNNIT, Allahabad | Member/Secretary |

The following members were granted leave of absence:-

1. Dr. Vivek Man Singh
Country Manager
DELL Product Group
No.12-1,12-29,13-29, Diyvasree Greens
Varthur Hobli
Banglore.
2. Sri G. R. Morarka
Chairman & Managing Director
Dwarkesh Sugar Industries Ltd.
Dwarikesh Nagar, Bijnor
3. Sri Sanjay Gupta
Editor, Dainik Jagran
501, INS Building, Rafi Marg
New Delhi

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The Chairman welcomed the members of the Board and thanked them for taking time out to attend the meeting.

- 7.01 To confirm the Minutes of 6th Meeting of the Board of Governors held on 10.06.2005.

The Board of Governors considered the minutes of its 6th meeting held on 10.06.2005 and confirmed the same.

- 7.02 Action Taken Report on the decisions taken in the 6th Meeting of the Board of Governors held on 10.06.2005

The Board of Governors considered the action taken report of the institute on the decisions taken in the 6th meeting held on 10.06.2005 and noted the same.

- 7.03 Director's Report regarding Academic and Development Activities

The Board of Governors noted the report of the Director.

- 7.04 To consider the confirmation of the faculty and administrative staff of the institute.

The Board of Governors considered the above proposal and approved the confirmation of following Faculty and Administrative staff of the Institute:

- | | | |
|----|----------------------------------|-------------------|
| 1. | Sri Anoj Kumar, Lecturer, CSED | w.e.f. 06.01.2005 |
| 2. | Sri Subhash Patil, Lecturer, AMD | w.e.f. 17.01.2005 |
| 3. | Sri Raghendra Singh, APHM | w.e.f. 19.01.2005 |

- 7.05 To consider and approve the change of designation of Reader to Assistant Professor.

The Board of Governors considered the above proposal and approved the same.

- 7.06 To report the re-constitution of Selection Committee for direct recruitment and including for grant of financial up-gradation under Career Advancement Scheme (CAS) by the MHRD.

The Board of Governors noted the same.

- 7.07 To consider the recommendation of the Finance Committee meeting scheduled to be held on 9.9.2005.

The Board of Governors considered the recommendations of the Finance Committee meeting held in the forenoon of 09.09.2005 and approved the same.

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Confidential

- 7.09 To consider Effective Working Arrangement in Administrative Functions.

The Board of Governors considered the recommendations of the Finance Committee in this regard and the urgent need presented by the institute and approved the same.

- 7.10 To consider and approve the proposed guidelines for prescribing higher qualification, specialization, academic achievements and criteria and their relative weightage for short-listing of candidates for recruitment of faculty in the institute.

The Board of Governors considered the above proposal (enclosed as Annesure-7.10) and approved the same.

- 7.11 To consider and approve a proposal to organize Faculty Orientation Workshop on regular basis in each semester.

The Board of Governors considered the above proposal (enclosed as Annesure-7.11) and approved the same.

- 7.12 To consider and approve the proposal to start the M. Tech in GIS & Remote Sensing and Information Security from 2006- 2007.

The Board of Governors considered the above proposal (enclosed as Annesure-7.12) and approved the same.

- 7.13 To consider and approve the proposal to start the Master of Technology in Mechanical Engineering (Product Design and Development) from 2007-2008.

The Board of Governors considered the above proposal (enclosed as Annesure-7.13) and approved the same.

- 7.14 To consider and approve the proposal to start the Bachelor of Technology in Chemical Engineering from 2006- 2007.

The Board of Governors considered the above proposal (enclosed as Annesure-7.14) and approved the same.

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- 7.15 To consider and approve the proposal to start the Bachelor of Technology in Printing and Media Technology Course from 2007-2008.

The Board of Governors considered the above proposal (enclosed as Annexure-7.15) and approved the same.

- 7.16 To consider the proposal for starting the MBA-IBIT Course in the Department of School of Management Studies (S.M.S.).

The Board of Governors considered the above proposal and approved as under:

- Starting the MBA (IBIT) course from the session 2006-07.
- An initial grant of Rs.50.00 lacs (non-recurring) for infrastructural facilities.
- Fee of Rs. 51,000/- per student per annum from MMS and MBA (IBIT) courses to meet recurring expenditure.
- Creation 5 faculty positions as under:
Professor-01, regular basis,
Reader -01, regular basis
Lecturer -03, contract basis on full scale and prescribed allowances

- 7.17 To consider and approve additional teaching posts in view of the increased intake and new B. Tech and M. Tech courses.

The Board of Governors considered the above proposal and approved the additional teaching posts as under:

Sl. No.	Department	Faculty positions Sanctioned prior to increase in intake	Required Faculty positions after increase in intake	Additional Faculty positions Sanctioned after increase in intake
1	Applied Mechanics	20	20	00
2	Chemistry	04	04	00
3	Civil Engineering	28	31	03
4	Computer Science & Engineering	21	70	49
5	Electrical Engineering Department	17	21	04
6	Electronics & Communication Engineering	14	28	14
7	Humanities & Social Science	04	04	00
8	Mechanical Engineering	32	36	04
9	Mathematics	09	09	00
10	Physics	05	05	00
11	School Of Management Studies	05	10	05
12	Industry Institute Interaction	01	01	00
13	Training and Placement	01	01	00
	Total	161	240	79

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7.18 To consider and approve the plan of the works to be taken up during three financial years for the academic and infrastructural development of the Institute as per approved five-year plan.

The Board of Governors noted the plan and schedule of works to be taken up by the institute and approved the outsourcing of services and appointment of consultant. The details are enclosed as annexure 7.18.

7.19 To Consider criteria for A.C.R. evaluation of Non-teaching employees for continuance in service upto 60 years of age after attaining the age of 58 years.

The Board of Governors considered the above proposal and approved as under:

Criteria for objective Screening with fixing specific point for different items of A.C.R. for 5 years of the concerned non-teaching employees.

SN	Quality	Outstanding (10)	Very Good (8)	Good (6)	Average (5)	Poor (3)	Marks
1.	Temperament						
2.	Amenability to Discipline						
3.	Physical Capacity						
4.	Promptness in disposal of work						
5.	Proficiency of work						
6.	Attitude towards Colleagues / Superiors /Subordinates						
7.	Work other than routine work						
8.	Perseverance of learning						

- Integrity 10 (TEN) OR 0 (ZERO)
- For every reward and training 5 marks to the maximum of 10
- Adverse and communicated entry (for first instance - 5 marks and for every subsequent entry -10 marks are to be deducted)
- Total Maximum Marks 100 per year

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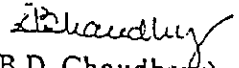
7.20 To consider the Rationalizations of Scales of Pay of non-teaching employees of the institute.

The Board of Governors considered the rationalization of scales of pay of non-teaching employees of the Institute, which has been prepared in view of Office Memorandum No. F.20-46/2003-TS-III (ptIV) dated June 7, 2004 of Government of India, Ministry of Human Resource Development, Department Of Secondary & Higher Education and in consultation with Mr. B.K. Ray, Desk Officer, IFD, Ministry Of Human Resource Development, as desired by the Ministry vide letter F.20-46/2003-TS-III (ptIV) dated March 1, 2005. The rationalization of most of the existing pay scales are not required as these are in accordance to the Central Government pay scales except in the following cases:

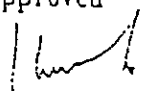
- ✓(a) The three existing cadres of Assistant Office Superintendent (4500-7000), Senior Noter & Drafter (SND) (4500-7000) and Junior Noter & Drafter (JND) (4000-6000) have been merged and put in one pay scale of 5000-150-8000 applicable for UDC.
- ✓(b) The scale of pay of Office Superintendent has been put as 5500-175-9000 i.e. next scale to that of (a) above.
- ✓(c) All the class IV employees presently in the pay scales of 2550-3200 and 2610-3540 have been merged and put in one scale of 2610-60-3050-65-3540.
- ✓(d) The scale of pay of Assistant Librarian has been changed to 5000-150-8000 because presently the scales of pay of Cataloguer and Assistant Librarian is same i.e. 4500-125-7000.
- (e) The scales of pay of Dispensary staff have also been upgraded in two cases based on the required qualification and prevalent in Central Government.
- (f) The scales of pay of Computer Centre staff have been adopted as per those available in the NIC for the same qualification.

The Board of Governors accepted the above rationalization of scales of pay of the non-teaching employees of the Institute and decided that after rationalization of class III and class IV posts of Institute the same shall be as per the enclosed Annexure 7.20.

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


(B.D. Chaudhary)
Director/Secretary

Approved


(N. D. Gupta)
Chairman, BOG

(A) Name of Post: Lecturer

Essential Qualification

Existing: M.Tech with B. Tech. Degree in the appropriate branch of Engineering/Technology both in Ist Class. In case of Science the candidate must possess Master level Degree in appropriate branch of Humanities/Social Sciences. Candidates should also have cleared the NET for lecturer conducted by UGC/CSIR

Proposed: Ph. D with First class at both B. Tech and M.Tech / Master Degree levels in the Appropriate branch of Engineering / Technology / Science / Management / Humanities and Social Science (English / Economics / Psychology).

Candidates with First class at both M.Tech and B. Tech levels and with strong aptitude for teaching and research may also be considered for contractual appointment initially for a period of three years and extendible by another two years in the regular scale of lecturer.

Experience:

Existing : Not applicable

Proposed : Candidates with at least one year of Post-doctoral in either teaching or research or industry will be placed in lecturer (Sr. Scale)



(B) Name of Post: Reader (Assistant Professor)

Essential Qualification

Existing: Ph. D Degree with the First Class Degree at Bachelor's or Master's Level in the appropriate branch of Engineering /Technology/Science/Social Sciences (Economics/English Language/Psychology/Management

Proposed: Ph. D with First class at both B. Tech (PG and UG for non-engineering) and M.Tech levels in the appropriate branch of Engineering / Technology / Science /Management / Humanities and Social Science (English / Economics / Psychology).

Experience:

Existing: 5 years experience in Teaching/ Industry/Research at the level of Lecturer or equivalent

Proposed: 3 years experience in Teaching /Research/Industry at the level of Lecturer (Senior Scale) or equivalent with proven evidence of scholarly achievements in terms publication of research papers in national and international journals, patents, externally funded consultancy project and contribution to teaching/ learning processes and resources.

Qualification & Experience for Candidates from Industry and Profession:

Existing: Candidates from Industry/Profession with First class Bachelor Degree in the appropriate branch of Engineering/Technology or First class Master Degree in the appropriate branch of Engineering/Technology, Ph.D./D. Phil in relevant branch of science or Social Sciences. And Professional works which significant and can be recognized as equivalent to Ph.D. Degree and with 05 years experience would also be eligible.

Proposed: Candidates from Industry / Profession with First Class at both B. Tech. and M.Tech levels in the appropriate branch of Engineering / Technology with proven evidence of achievements which can be recognized as equivalent to Ph. D degree and with five years experience will also be eligible.

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(C) Name of Post: Professor

Essential Qualification

Existing: Ph. D Degree with First Class Degree at Bachelor's or Master's Level in the appropriate branch of Engineering /Technology /Science. Post Doctoral work in appropriate branch of Science is desirable

Proposed: Ph. D with First class at both B. Tech (PG and UG for non-engineering) and M.Tech levels in the appropriate branch of Engineering / Technology / Science /Management / Humanities and Social Science (English / Economics / Psychology).

Experience:

Existing: 10 years experience in Teaching/ Industry/Research out of which 05 years must be at the level of Reader/ Asstt. Professor and /or equivalent.

Proposed: 08 years experience in Teaching/ Industry/Research out of which 05 years must be at the level of Asstt. Professor or equivalent with proven evidence of scholarly achievements in terms publication of research papers in national and international journals, patents, externally funded consultancy project and contribution to teaching / learning programmes.

Qualification & Experience for Candidates from Industry and Profession:

Existing: Candidates from Industry/Profession with Master's Degree in Engineering/Technology and with professional significant and work that can be recognized as equivalent to Ph. D degree. Candidate must have at least 10 years experience of which at least 05 years should be at a Senior Level comparable to that of an Asstt. Professor would also be eligible.

Proposed: Candidates from Industry / Profession with First Class at both B. Tech. and M.Tech levels in the appropriate branch of Engineering / Technology with proven evidence of achievements which can be recognized as equivalent to Ph. D degree. Candidate must have at least 10 years experience of which at least 05 years should be at a Senior Level comparable to that of an Asstt. Professor would also be eligible.

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Guidelines for prescribing higher qualification, specializations, academic achievements and criteria and their relative weightage for short – listing of candidates for recruitment of faculty in the institute.

The Institute desires to establish itself as one of leading research Institution and to improve the quality of under-graduate and post-graduate teaching. Students, faculty and technical staff are major components, which contribute to quality of research and teaching. The Institute is able to attract good quality students both at under-graduate and graduate level. It has become imperative to establish guidelines and procedures to attract recruit and retain faculty with proven record of good teaching, research and consultancy. Following are the Guidelines and procedures:

(A) On-line submission of applications for faculty positions.

The institute has developed software, in-house by our own students, for on-line submission of applications for faculty positions. The software prepares a database for applicants and can generate summary sheets for the Selection Committee and do partial grading in terms of points awarded for different features, which can be used by short-listing Committee. It can also generate interview letters for short-listed candidates.

(B) Modification in Essential Qualification and Experience.

The Proposed changes along with existing Essential Qualification and Experience are enclosed as Annexure – (1). Salient features of the proposal are-

- ◆ Prescribing Ph. D instead of M.Tech / Master Degree in a subject as essential qualification for the post of lecturer.
- ◆ Giving Lecturer (Senior Scale) to selected candidates with Ph. D and at least one year of post-doctoral experience in either teaching or research or industries.
- ◆ Offering contractual appointment to selected candidates with first class at both M.Tech and B. Tech (at PG and UG for non-engineering) with strong aptitude for teaching and research initially for a period of three years and extendible by another two years under regular scale of lecturer. Further, they may be permitted to register for Ph. D at the institute.

(C) Guidelines for identifying specialization to be advertised and used for short – listing of candidates and branches of Engineering / Science / Degrees to be included to interpret "appropriate branches of Engineering / Technology" in the Essential qualification.

The current practice is to include all existing and emerging areas in a discipline in the list of specializations to be advertised. The concerned Head of the Department conveys immediate and pressing needs in terms of specialization to the Selection committee through the Director.

To bring transparency and continuity in academic growth and planning, it is proposed that a committee consisting of the followings should recommend the specializations to be advertised and used for short listing of candidates and degrees to be considered appropriate from the department need.

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|----|--|---|----------|
| 1. | Head of Department | - | Chairman |
| 2. | All Professors
(Readers, if Professors are not available) | - | Members |
| 3. | Conveners of DUGC and DPGC | - | Member |
| 4. | One Professor from other department | - | Member |

The Committee will also recommend the degrees and branches to be considered "appropriate" in the light of academic programmes and projected need of the department. For Example, for Department of Electrical Engineering B. Tech in Electrical Engineering, Electrical and Electronics etc. may be considered appropriate.

(E) Guidelines for short-listing the candidates to be called for presentation and interview.

A Committee consisting of the following members will prepare summary of each applicant, award points as per guidelines enclosed as Annexure – "2" and short list candidates to be called for presentation and personnel interview.

- i. HOD or his nominee
- ii. One Professor of the Department/ Assistant Professor where post of professor is not available
- iii. One Professor from other Department
- iv. One Senate nominee.

The Committee will decide about minimum points to be secured by the applicants and the number of candidates to be called for one post and recommend the names of short listed candidates to be called for presentation and interview.

(F) Presentation by the short listed candidates

Each short listed candidate for the post of Professor and Assistant Professor is required to give a presentation of his / her current academic activities and achievements in the concerned department. All faculty members of the department may be invited in this presentation.

A Committee consisting of the following composition shall evaluate each presentation and will submit its report (confidential) to the Director for the consideration by the Selection Committee at the time of interview.


- a. All Professors of the Department
- b. One Professor from other Department
- c. One Senate nominee

(G) Each candidate called for presentation and interview shall be reimbursed to and fro travel expenses limited to II Ac Train fare by shortest route.

(H) The institute provides initial grant up to Rs. 50,000 for research to new entrant faculty. It is proposed to increase this limit up to Rs. 200,000. Further, this initial grant will be awarded to research proposal after evaluation by a Committee consisting of following members-

- | | | | |
|-------|-------------------------------------|---|----------|
| (i) | Head of the Department | - | Chairman |
| (ii) | Chairman, SPGC | - | Member |
| (iii) | One Professor from other department | - | Member |
| (iv) | Convenor, DPGC | - | Member |

The Committee will recommend the research project to be funded, the amount of grant and the output expected.



Guidelines For Awarding Points for Short Listing of Candidates:

1. Name of the Post:	Professor		
1.1	Essential Qualification and Experience:	-	25
	Qualification (05+05+10)	-	20
	Experience (05)	-	
*	Three points for First class and 05 points for Honors/Distinction		
*	One points for each year of experience		
1.2	Research (Maximum Points)	-	15
	Supervision of Ph.D thesis (Two points per Ph.D)	-	10
	Supervision of M.Tech thesis (Half points per M.Tech)	-	05
1.3	Publications (Maximum Points)	-	15
	International Journal (02 points / paper)		
	National Journal (01 points / paper)		
	International Conference (01 points / paper)		
	National Conference (1/2 points / paper)		
	Books (Subject specific) (3 points / book)		
*	Maximum of 30 points.		
1.4	Patents (02 pts. Per patent with maximum. of 05 points)-	-	05
1.5	Consultancy(1/2 points per lacs of Rs.)	-	20
	Externally Funded Projects	-	10
	Consultancy	-	10
1.6	Teaching / Learning Resource Development-(2 points per activity)		10
	◆ Laboratory Development		
	◆ Curriculum Development		
	◆ IT Application		
1.7.	Conference and Workshops (01 points per activity)	-	05



- ◆ Organized as Coordinator
- ◆ Chaired
- ◆ Invited
- ◆ Participated

1.8. Support to Administration
(02 points per assignment)

05

- ◆ Dean
- ◆ Dy. Dean
- ◆ HOD
- ◆ Warden
- ◆ Examination Controller
- ◆ Faculty In-charges
 - Games
 - Cultural activities
 - Laboratory



2. Name of the Post:		Reader (Assistant Professor)	
2.1	Essential Qualification and Experience:	-	25
	Qualification (05+05+10)	-	20
	Experience (05)	-	20
*	Three points for First class and 05 points for Honors/Distinction		
*	One points for each year of experience and maximum of 5 points.		
2.2	Research (Maximum Points)	-	15
	Supervision of Ph.D thesis (Two points per Ph.D)	-	10
	Supervision of M.Tech thesis (Half points per M.Tech)	-	05
2.3	Publications (Maximum Points)	-	15
	International Journal (02 points / paper)		
	National Journal (01 points / paper)		
	International Conference (01 points / paper)		
	National Conference (1/2 points / paper)		
	Books (Subject specific) (3 points / book)		
2.4	Patents (02 pts. Per patent)	-	05
2.5	Consultancy(1/2 points per lacs of Rs.)	-	20
	Externally Funded Projects	-	10
	Consultancy	-	10
2.6.	Teaching / Learning Resource Development- (2 points per activity)		10
	◆ Laboratory Development		
	◆ Curriculum Development		
	◆ IT Application		

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2.7. Conference and Workshops - 05
(01 points per activity)

- ◆ Organized as Coordinator
- ◆ Chaired
- ◆ Invited
- ◆ Participated

2.8. Support to Administration - 05
(02 points per assignment)

- ◆ Dean
- ◆ Dy. Dean
- ◆ HOD
- ◆ Warden
- ◆ Examination Controller
- ◆ Faculty In-charges
 - Games
 - Cultural activities
 - Laboratory

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Proposal for organizing Faculty Orientation Workshop on regular basis in each semester.

For last several years, this institute was constrained to hire large number of Guest Faculty to engage lecture, tutorial and practical classes due to acute shortage of regular faculty. The institute has organized four Faculty Orientation Workshop during last two academic sessions to educate the Guest Faculty about the followings:

- Teaching Methodology
- Grading Policy
- Course File Management
- Transparency in Evaluation
- Good practices and Ethics

Senior faculty members of the institute have coordinated and conducted these workshops. The duration of the workshop has been 3 days and has been conducted one week before start of the semester. Each guest faculty was paid Rs. 300/ per day for attending the workshop and faculty members taking the classes were paid honorarium at the rate of Rs750/- per day. The total expenditure for conducting this 3 days workshop was Rs55,000/- approx. including course material and miscellaneous expenditure.

During evaluation of effectiveness of these workshops, it has been felt at the institute level that this program should be enlarged in scope and should include regular faculty also. This workshop should become forum to launch and train for new academic initiatives including new education technologies, teaching and evaluation methodologies etc. It is proposed to organize this Faculty Orientation Workshop every semester for both regular and guest faculty. The two offerings of the workshop will be scheduled in the first fortnight of July and December of every year, and will be of 5 days duration. Number of participants will be limited in the range of 20 to 30. It will be planned in such a manner that every faculty of the institute attends one workshop in three year. The suggested topics includes

- Teaching Methodology
- Grading and Course File Management
- Adaptation of IT and related innovation
- Quality Assessment and Certification
- Any teaching and evaluation related policy change

The estimated expenditure per semester is as given below:

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|---|-------------------------------|-------------|
| • Remuneration to Guest Faculty | Rs. 300/ day for 5 days 15 GF | Rs 22,500/- |
| <i>(To be paid from salary head)</i> | | |
| • Honorarium to institute faculty (Speaker) | Rs. 200/ hour 45 hours | Rs 9,000/- |
| • Honorarium to external faculty (Speaker) | Rs. 400/hour 10 hours | Rs 4,000/- |
| • Course material and miscellaneous expenditure | | Rs 12,500/- |
| • TA / DA for external expert | | Rs 17,000/- |

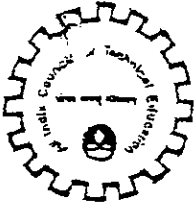
Total

Rs 65,000/-
Rs 1,30,000/-

Expenditure per year 2*Rs.65,000/-

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Annexure: 7-13(A)



अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक जाविकिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

F.No.: XV-AIBPG/APP-1524/ET/2001

Date: JULY 19, 2001

To,

Secretary, Technical Education
Govt. of Uttar Pradesh
Vidhan Bhawan
Lucknow - 226 001.

Principal's Camp Office

Diary No. 201

Date 24/7/2001

Sub: AICTE approval to MOTILAL NEHRU REGIONAL ENGINEERING COLLEGE, TELIARGANJ ALLAHABAD UP for the conduct of P.G. Course in GIS & REMOTE SENSING for the academic Session 2001-2002 for three years period.

Sir,

I am to state that on consideration of the recommendations made by the Task-Force constituted by AICTE to assess the proposals for approval of new or on-going post-graduate programmes and on the spot evaluation by the Expert Committee which visited the institution and subsequent decision by the All India Board of Post Graduate Education in Engineering & Technology, All India Council for Technical Education (AICTE) has accorded approval to MOTILAL NEHRU REGIONAL ENGINEERING COLLEGE, TELIARGANJ ALLAHABAD UP to conduct the following PG Course(s):

Degree	Course (Specialization)	Annual Intake	Duration (Full Time)
M.E.	COMPUTER SC. & ENGG. (GIS & REMOTE SENSING)	25	18 Months

This approval is subject to adherence norms and standards prescribed by AICTE from time to time.

Further in the event of infringement/contravention or non-compliance of the norms and standards as prescribed by the AICTE, the council shall take further action to withdraw approval and the liability arising out of such withdrawal of approval will be solely that of Management/Trust/Society and/or Institution.

The council may inspect/visit the institution any time it may deem fit to note the progress/compliance.

[Signature]

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The Approval given above is subject to the following conditions and specific conditions as at Annexure - I :

1. 16 (sixteen) Regular + 4 (four) SC/ST + 5 (five) Sponsored candidates shall be admitted for the above Full Time PG programme.
2. No New PG course in Engg/ Tech/ Arch & Planning/ Pharm/ Management/ Applied Arts & Crafts shall be started by the Institution without prior approval of the AICTE.
3. The intake for the above course shall not be increased or decreased without the prior approval of the AICTE.
4. No Scholarships/any other financial assistance will be provided by the AICTE/MHRD for conduct of the above programme(s).
5. The admission to the above PG programme(s) should be made in accordance with the AICTE guidelines given as Annexure-II to this letter.
6. Extension of approval shall be considered after 3 years period through Expert Committee visit or otherwise as deemed fit by the Council.

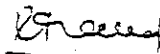


(PROF. R.S. GAUD)
Adviser (E&T)

Copy to :-

1. THE REGIONAL OFFICER, NORTHERN REGIONAL OFFICE, AICTE, 1-A, LAXMANBAGH, NAWABGANJ, KANPUR - 208 002.
2. THE REGISTRAR, UNIVERSITY OF ALLAHABAD
3. THE DIRECTOR/PRINCIPAL MOTILAL NEHRU REGIONAL ENGINEERING COLLEGE, TELLARGANJ, ALLAHABAD, UP.
4. GUARD FILE (AICTE)

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(PROF. R.S. GAUD)
Adviser (E&T)


ANNEXURE - I

MOTILAL NEERU REGIONAL ENGINEERING COLLEGE
TELIARGANJ ALLAHABAD

SPECIFIC CONDITIONS :

1. Core faculty at senior level should be recruited with specialisation in the concerned field as per AICTE norms.
2. Internet facility should be extended to students.
3. Laboratory and other infrastructural facilities should be created as per requirement of P.G. syllabus & AICTE norms.
4. Library should be augmented with international journals and required titles.
5. Campus development with all recreation facilities should be created.

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(Tarun Pandeya)
Asst. Director

GUIDELINES FOR ADMISSION OF SPONSORED
CANDIDATES TO FULL-TIME PG DEGREE PROGRAMMES

Ref. 8th Meeting of the RO of the AICTE held on 15-02-95

The following guidelines are laid down for admission sponsored candidates to full time PG degree programmes.

- (i) The candidates who possess Bachelor's degree in Engineering / Technology / Pharmacy / Architecture / Planning or equivalent from AICTE approved institutions which at least 55% marks will be eligible for admission.

The minimum percentage of marks may be waived for those who are teachers either in Engineering college or Polytechnic joined before 28-02-1989, the date on which the circular was issued prescribing the AICTE pay scales and qualifications.

Preference should be given to those candidates who are GATE qualified. Sponsored candidates will not be eligible to receive Scholarship, even if they are admitted based on GATE score.

- (ii) The candidates must have a minimum two years of full-time work experience in a registered firm/company/industry/educational and research institutions/any Government Department of Government Autonomous Organizations in the relevant field in which admission is being sought.
- (iii) There will not be any age restriction. However, preference should be given to those who are below 45 years of age.
- (iv) The mode of selection shall be such that merit is the sole criterion. No capitation fee or donation will be charged for admission.
- (v) A letter from the employer must be furnished stating that the candidate is being sponsored to get admission. The employer should also indicate that the candidates will not be withdrawn midway till the completion of the courses.
- (vi) The fee structure for the sponsored candidates should be as decided by the concerned institutions. The fee for the candidate should normally be borne by the sponsoring organization wherever possible.

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(GUIDELINES FOR ADMISSION OF NON-SPONSORED CATEGORY STUDENTS TO FULL TIME PG COURSE)

(Ref. : 10th meeting of Ec of the AICTE held on 25-05-95)

Admission to Full Time PG programmes for Non-sponsored category of students should be made through GATE. (When GATE qualified candidates are not available, admission may be given to Non-Gate candidates on merit.

For receiving PG Scholarship a student must have qualified in GATE. However, a GATE qualified student does not automatically become eligible to receive a Scholarship. Scholarship to a GATE qualified student will depend on availability of the sources in the institution. When the number of scholarships is less than the number of GATE qualified students admitted the distribution of scholarships shall be on merit.

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Ordinance and Course Structure

For

M.Tech. (GIS and Remote Sensing) Full-Time and Part-Time Programs

1. Eligibility

(A) M.Tech. in GIS and Remote Sensing(Full-Time)

The candidates having Bachelor's degree in Engineering in the branches of Computer Science and Engineering or Information Technology or Electronics and Communication Engineering or Civil Engineering or equivalent are eligible for admission to M.Tech. in **GIS and Remote Sensing**. Further, candidates having M.Sc. (Computer Science) or Master of Computer Application are also eligible for the admission.

The candidates have to full-fill the additional academic requirements at the time of admission as specified by the department.

(B) M.Tech. in GIS and Remote Sensing (Part-Time)

Eligibility qualification is as above in (A). In addition, the candidate must have two years of teaching experience.

2. Credit Hours Required

Credit Hours and performance criterion are to be followed as given in Article 7.1 and 7.7 of PG ordinances, salient points of which are reproduced below:

- (a) The minimum credit hours required for the award of the M.Tech degree is 64. Out of these minimum of 32 need to be credited through course work and 32 through the M.Tech. thesis work and seminar.
- (b) These 64 credit hours may be earned through maximum of Six Semesters and minimum of Four Semesters.
- (c) For Part Time Students 64 credit hours may be earned through maximum of Ten Semesters and minimum of Six Semesters.
- (d) The preferred credit hours per semester is 16. However, a student can register for minimum of 8 credit hours and maximum of 20 credit hours.
- (e) There is provision of two semesters leave in the duration of the M.Tech. Program.
- (f) The students have to maintain CPI (Cumulative Performance Index) of 6.0 (out of 10) and SPI (Semester Performance Index) of 5.5 (out of 10) in every semester to continue in the M.Tech. program.

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3. Program Structure

(i) For Full-Time Program

Each semester is of 16 credits.

Each elective contains list of courses.

Each course in the elective list is of 4 credits.

(ii) For Part-Time Program

Each Semester is minimum of 8 credits.

Each elective contains list of courses.

Each course in the elective list is of 4 credits.

(A) M.Tech. (GIS and Remote Sensing) Program (Full-Time)

Semester 1 :

S.No.	Course Title	Course Code	Credit
1.	Elective 1	GIS Pool	4
2.	Elective 2	Computer Pool	4
3.	Elective 3	Computer Pool	4
4.	Elective 4	GIS Pool	4

Semester 2 :

S.No.	Course Title	Course Code	Credit
1.	Elective 5	GIS Pool	4
2.	Elective 6	Computer Pool	4
3.	Elective 7	Computer Pool	4
4.	Elective 8	GIS Pool	4

Semester 3 :

S.No.	Course Title	Course Code	Credit
1.	Seminars on GIS and Remote Sensing	GR381	4
2.	Thesis-1	GR382	12

Semester 4 :

S.No.	Course Title	Course Code	Credit
1.	Thesis-2	GR481	16

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(B) M.Tech. (GIS and Remote Sensing) Program (Part-Time)

Semester 1 :

S.No.	Course Title	Course Code	Credit
1.	Elective 1	GIS Pool	4
2.	Elective 2	Computer Pool	4

Semester 2 :

S.No.	Course Title	Course Code	Credit
1.	Elective 5	GIS Pool	4
2.	Elective 6	Computer Pool	4

Semester 3 :

S.No.	Course Title	Course Code	Credit
1.	Elective 3	Computer Pool	4
2.	Elective 4	GIS Pool	4
3.	GIS & Remote Sensing	GR381	4

Semester 4 :

S.No.	Course Title	Course Code	Credit
1.	Elective 7	Computer Pool	4
2.	Elective 8	GIS Pool	4

Semester 5 :

S.No.	Course Title	Course Code	Credit
2.	Thesis-1	GR382	12

Semester 6 :

S.No.	Course Title	Course Code	Credit
1.	Thesis-2	GR481	12

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List of Electives (GIS Pool)

Sl.No.	Course No.	Course Title	L	T	P	C
1	GR171	Introduction to Geomorphology	4	0	0	4
2	GR172	Geographic Information System	3	0	2	4
3	GR173	Computer Processing of Remotely Sensed Data	3	0	2	4
4	GR174	Urban and Regional Planning	4	0	0	4
5	GR175	Watershed Development Management	3	0	2	4
6	GR176	Natural Resource Management	3	0	2	4
7	GR177	Disaster Management	4	0	0	4
8	GR178	Web GIS	4	0	0	4
9	GR179	Agriculture Monitoring	4	0	0	4

List of Electives (Computer Pool)

Sl.No.	Course No.	Course Title	L	T	P	C
1	GR181	Advanced Computer Networks	4	0	0	4
2	GR182	Advance Database Systems	4	0	0	4
3	GR183	Embedded Systems	4	0	0	4
4	GR184	Advanced Operating System	4	0	0	4
5	GR185	Software Project Management	4	0	0	4
6	GR186	Data Warehousing & Mining	4	0	0	4
7	GR187	Advanced Data Modeling	4	0	0	4
8	GR188	Topics in Image Processing	4	0	0	4
9.		Thesis & Seminars				

Thesis & Seminar

Sl.No.	Course Code	Course Title	Credit
1.	GR381	Seminars on GIS & Remote Sensing	4
2.	GR382	Thesis-1	12
3.	GR481	Thesis-2	16

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APPROXIMATE BUDGET ESTIMATE:

(1)	Faculty Designation Expenditure	Scale	Number	Annual (Rs. in Lacs)
	(a) Professor	16,400-22,400	1	3.75
	(b) Reader	12,000-18,300	1	2.75
				Total 6.50
(2)	Non Teaching Staff Add 25%			1.60
(3)	Department Operating Grant & other charges			1.50
(4)	Grant for Library (Recurring)			0.40
(5)	Fellowship to 40 students at Rs5000/- for 12 months			24.00
(6)	Contingency to 40 students at Rs5000/- per year			2.00
(A)	<u>Total Recurring expenditure :</u>			<u>36.00</u>
(B)	Non-Recurring:			
	(Furniture)			
	Books + Journals			3.00
	Equipments for laboratories			2.00
	Building			45.00
	<u>Total Non Recurring expenditure</u>		40.00	<u>90.00</u>
GRAND TOTAL (A + B) = 36.00 lacs + 90.00 lacs = 126.00 lacs				

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**LIST OF ADDITIONAL LABORATORIES REQUIRED FOR
M.TECH DEGREE IN GIS AND REMOTE SENSING**

- Database and GIS Laboratory
- Image Processing and Remote Sensing Laboratory
- M.Tech Thesis Laboratory

(A) Laboratories

- Database and GIS Laboratory
- Image Processing and Remote Sensing Laboratory
- M.Tech Thesis Laboratory

Approximately Rs12.00 lacs for getting proper partitions and segregations for above said labs in the new CSE building.

(B) Staff Colony:

(i)	Professor Type Quarters	1 x 175 m ²	175 m ²
(ii)	Reader Type Quarters	1 x 150 m ²	150 m ²
			<u>325 m²</u>

Plinth Area: 1.25 x 325 = 406.25 m²
 Cost @ Rs.7000/m² = Rs.2843750

28.44 lacs

TOTAL COST OF BUILDING:

(A) Labs	Rs. 11.56 lacs
(B) Staff Colony	Rs. 28.44 lacs

	Rs. 40.00 lacs

ay

Proposal to start the Master of Technology in Mechanical Engineering (Product Design and Development) from 2006-2007

The institute desires to start Master of Technology degree programme in Mechanical Engineering (Product Design and Development) from academic session 2006-2007. The focus of Product Design and Development Course is integration of Marketing, Design, & Manufacturing functions of the firm in creating a new product. In addition to bringing together the core disciplines of marketing, design and manufacturing, strong emphasis is placed on product quality and cost, as well as on the key aspects of the design and development phase. Since product design and development activity within a company is inter-disciplinary by nature, group and team working skills are also emphasized in this course by way of giving project assignments to the student.

Product Design & Development specialization is increasingly on demand by industrial employers. The range of skills taught on the course would greatly enhanced employment opportunities of the students. The total expense required for running the course would be Rs 2.61 crores.

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**Course Structure For M. Tech. Mechanical Engineering
(Product Design and Development)**

S. No.	Code	Subject	L	T	P	Credit
First Semester						
1	ME-917	Product Design and Development-I	3		2	4
2	ME-918	Materials and Manufacturing Technology	3	-	-	3
3	ME-919	CAD/CAM in Product Development	3	-		3
4	ME-925	Project-1	3	-	-	3
5	ME-923	Programming and Software Practices	2	-	2	3
Total :			14	-	4	16

S. No.	Code	Subject	L	T	P	Credit
Second Semester						
1	ME-921	Product Design and Development-II	3	-	2	4
2	ME-922	Applied Ergonomics	3	-	-	3
3	ME-951	Rapid Prototyping and Manufacturing	3	-	-	3
4	ME-926	Project- 2	3	-	-	3
5		Elective-I	3	-	-	3
Total :			15	-	2	16

S. No.	Code	Subject	L	T	P	Credit
Third Semester						
1	ME-924	Design for Manufacturing and Assembly	3	-	-	3
2		Elective-II	3	-	-	3
3	ME-907	Seminar	-	-	-	2
4	ME-998	State of Art Seminar	-	-	-	2
5	ME-999	Thesis	-	-	-	6
Total :			6			16

S. No.	Code	Subject	L	T	P	Credit
First Semester						
1	ME-999	Thesis	-	-	-	16

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List of Electives
For
M. Tech (Product Design and development)

1. ME-953 Reverse Engineering
2. ME-954 Nanotechnology
3. ME-955 Precision Engineering
4. ME-957 Artificial Intelligence in Engineering
5. ME-958 Evolutionary Algorithms
6. ME-959 Systems Dynamics
7. ME-960 Flexible Manufacturing Systems
8. ME-961 Design Against Fatigue and Fracture
9. ME-962 Noise and Vibration
10. ME-963 Computer Graphics
11. ME-964 Turbo Pumps design
12. ME-965 Design of Mechanical Systems
13. ME-966 Tool Design
14. ME-967 Logistics and Supply Chain Design
15. ME-968 Machine Tool Dynamics
16. ME-969 Advanced Welding Technology
17. ME-970 Modeling and Simulation in Engineering
18. ME.-971 Total Quality Management
19. ME-972 Micro Electrical Mechanical Systems
20. ME-973 Market Research and Forecasting
21. ME-974 Management of Technology and Innovation
22. ME-901 Finite Element Method
23. ME-905 Mechatronics
24. ME-906 Computer Integrated Manufacturing
25. ME-909 Robotics
26. ME-920 Advanced Manufacturing Technology



List of Electives
For
M. Tech (Common for all Specialization)


1. ME-951 Rapid Prototyping and Manufacturing (Only for CAD/CAM, Production, and Design)
2. ME-952 Product Development (Only for CAD/CAM, Production, and Design)
3. ME-953 Reverse Engineering
4. ME-954 Nano-technology
5. ME-955 Precision Engineering
6. ME-956 Concurrent Engineering (Only for CAD/CAM, Production, and Design)
7. ME-957 Artificial Intelligence in Engineering
8. ME-958 Evolutionary Algorithms
9. ME-959 Systems Dynamics
10. ME-960 Flexible Manufacturing Systems
11. ME-961 Design Against Fatigue and Fracture
12. ME-962 Noise and Vibration
13. ME-963 Computer Graphics
14. ME-964 Turbo Pumps design
15. ME-965 Design of Mechanical Systems
16. ME-966 Tool Design
17. ME-967 Logistics and Supply Chain Design
18. ME-968 Machine Tool Dynamics
19. ME-969 Advanced Welding Technology
20. ME-970 Modeling and Simulation in Engineering
21. ME-971 Total Quality Management
22. ME-972 Ergonomics (Only for CAD/CAM, Production, and Design)
23. ME-973 Design for Manufacturing (Only for CAD/CAM, Production, and Design)
24. ME-974 Micro Electrical Mechanical Systems
25. ME-975 Market Research and Forecasting
26. ME-976 Management of Technology and Innovation
27. ME-902 Computer Aided Design (Only for Production)
28. ME-903 Computer Aided Manufacturing (Only for Design)
29. ME-901 Finite Element Method (Only for Product Design and Development)
30. ME-905 Mechatronics
31. ME-906 Computer Integrated Manufacturing (Only for Design, Production, and Product Design and Development)
32. ME-909 Robotics (Only for Design and Product Design and Development)
33. ME-920 Advanced Manufacturing Technology (Only for CAD/CAM, Design, and Product Design and Development)

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APPROXIMATE BUDGET ESTIMATE FOR M. TECH. IN MECHANICAL ENGINEERING (PRODUCT DESIGN AND DEVELOPMENT):

(1)	Faculty Designation	Scale	Number	Annual Expenditure (Rs. in Lacs)
	(a) Professor	16,400-22,400	1	3.45
	(b) Reader	12,000-18,300	1	2.53
	(c) Stipend to the students	Rs. 5000/- P.M Fixed	12×12	7.20
	(d) Remuneration and TA-expenses for Invited-external and internal-faculty members			<u>2.50</u>
				<u>15.68</u>
(2)	Non Teaching Staff			
	Add 25% of above			3.92
(3)	Department Operating Grant & other charges			1.50
(4)	Grant for Library (Books and Journals)			<u>10.00</u>
(A)	<u>Total Recurring expenditure (1-4) :</u>			<u>Rs. 31.10</u>
(B)	Non-Recurring:			
	Furnitures			5.00
	Equipments for laboratories			125.00
	Building			<u>99.92</u>
				<u>Rs. 229.92</u>

GRAND TOTAL (A+B) = 31.1 lacs +229.92 lacs = 261.02 lacs



**LIST OF ADDITIONAL LABORATORIES REQUIRED FOR
M.TECH DEGREE IN MECHANICAL ENGINEERING (PRODUCT DESIGN AND
DEVELOPMENT)**

1. Product Development Lab
2. Rapid Prototyping and Tooling Lab

A handwritten signature in black ink, appearing to be 'ah' or similar, located below the list of laboratories.

BUILDING REQUIREMENT :

(A) Building for Instructional Area :

(i)	Lecture Room cum seminar room	1	150 sqm.	160 sqm.
(ii)	Faculty rooms	2	@ 10 sqm	<u>20 sqm</u> 180 sqm.

Plinth Area : $1.25 \times 180 = 225.0 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 15.75 lacs

(B) Hostels:

Extension of one wing of 15 rooms in the hostel

(i)	Single seated room	-	15 rooms @ 9 m ² /room	135 m ²
(ii)	Toilets & Bathroom	-	1 x 12	<u>12 m²</u> 147 m ²

Plinth Area : $1.25 \times 147 = 183.75 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 1286250 = Rs. 12.86 lacs

(C) Labs :

- (i) Product Development lab
- (ii) Rapid Prototyping and Tooling lab

Plinth Area : $2 \times 200 = 400 \text{ sqm.}$

Cost @ Rs. 7000/m² = Rs. 28.00 lacs

(D) Staff Colony :

(i)	Professor Type Quarters	1 x 175 m ²	175 m ²
(ii)	Reader Type Quarters	1 x 150 m ²	150 m ²
(iii)	Technicians & Assistant	1 x 100	100 m ²
(iv)	Class IVth	1 x 70	<u>70 m²</u> 495 m ²

Plinth Area : $1.25 \times 495 = 618.75 \text{ m}^2$

Cost @ Rs.7000/m² = Rs. 4331250 = Rs. 43.31 lacs

TOTAL COST OF BUILDING :

(A)	Building for Instructional area	=	Rs. 15.75 lacs
(B)	Hostels	=	Rs. 12.86 lacs
(C)	Labs	=	Rs. 28.00 lacs
(D)	Staff Colony	=	Rs. 43.31 lacs

Rs. 99.92 lacs

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Proposal to start the Bachelor of Technology in Chemical Engineering from 2006- 2007

The institute desires to start Bachelor of Technology degree program in Chemical Engineering from the academic session 2006-2007. The main objectives of this proposal are to offer a need-based demand responsive, development centric and industry oriented B.Tech course in Chemical Engineering in a highly efficient and cost effective manner. The B.Tech course in Chemical Engineering was earlier approved by AICTE. The institute could not start the course earlier due to lack of adequate faculty and facilities to run the program, as there was ban on the recruitment of the faculty by the government. Since the Government of India has permitted the recruitment of the faculty, the institute proposes to start the program.

The Senate has approved the structure and curriculum of B. Tech (Chemical Engineering) in its meeting held on 24-06-2005. The approved course structure is enclosed as Annexure-7.14 A.

The duration of the course will be four years and the intake will be limited to sixty per year. The major laboratory (details are given in Annexure-7.14 B) needed for this programme includes:

- Simulation Heat & Mass Transfer Lab
- Momentum Transfer/Material handling Lab
- Mass Transfer Lab
- Heat Transfer Lab
- Process Control Lab
- Computer Lab

Additional faculty requirement for the course includes:

Professor – 3
Reader - 5
Lecturer - 8

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The total non-recurring and recurring expenses required to run the program is approximately Rs. 11.61 crores as per details given below:

(A) Recurring Expenditure

(1) Salary of Faculty and Staff

(i) Faculty

Designation	Scale (Rs.)	Number	Annual Expenditure (Rs. In Lacs)
(a) Professor	16,400-22,400	3	10.37
(b) Reader	12,000-18,300	5	12.64
(c) Lecturers	8,000-13,500	8	13.48
Total			<u>36.49</u>

(ii). Non Teaching Staff

Add 25%

Total (i)+(ii)

09.13

45.62

2. Department Operating Grant & Other charges

05.00

3. Grant for Library

00.40

Total Recurring Expenditure (1+2+3)

51.02

B. Non-Recurring : (TLB Books + Furniture)

03.00

(Books + Journals)

10.00

Equipments for laboratories

245.10

Building

852.35

Total

1110.45

GRAND TOTAL (A+B) = 51.02 lacs + 1110.45 lacs = 1161.47 lacs

The details are given in Annexure-7.14 C.

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Annexure-7.14 A

MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY, ALLHABAD
Structure for B.Tech in CHEMICAL Engineering

Total Credits: 205

SEMESTER-I						SEMESTER-II					
S.N.	Subject	L	T	P	Cr.	S.N.	Subject	L	T	P	Cr.
PH-101	Physics - I	3	1	3	5	PH-201	Physics - II	3	1	2	5
MA-101	Mathematics-I	3	1	0	4	MA-201	Mathematics-II	3	1	0	4
CS-101	Introduction to Engg. Profession	2	0	2	3	CS-201	Computer Programming	2	1	2	4
EX-101	Electrical & Electronics Engg.	4	0	2	5	HS 101/ CH 101	English Language and Composition /Chemistry	2 3	1	1 2	3 5
HS 101/ CH 101	English Language and Composition /Chemistry	2 3	1	1 2	3 5	AM-201	Engineering Mechanics	3	1	2	5
ME 101/ MC 101	Introduction to Manufacturing Process/ Engineering Graphics	2 2	0 0	2 4	3 4	ME 101/ MC 101	Introduction to Manufacturing Process/ Engineering Graphics	2 2	0 0	2 4	3 4
		16/17	3/3	10/13	23/26			15/16	5/5	9/12	24/27

SEMESTER-III						SEMESTER-IV					
S.N.	Subject	L	T	P	Cr.	S.N.	Subject	L	T	P	Cr.
MA-301	Mathematics-III	3	1	0	4	AM-405	Applied Computational Methods	3	1	2	5
CE-301	Environment and Ecology	3	0	1	4	AM-404	Fluid Mechanics	3	1	2	5
AM-301	Material Science & Engineering	3	1	2	5	ChE-401	Mass Transfer Operation-I	3	1	2	5
ChE-301	Chemical Engineering Thermodynamics	3	1	2	5	ChE-402	Fuel Technology	2	1	0	3
AM-302	Strength Of Material	3	1	2	5	ChE-403	Heat Transfer Fundamental and Operations	3	1	2	5
ME-302	Industrial Engineering	3	1	0	4	ChE-404	Chemical Process Calculations	3	1	0	4
		18	6	6	27			17	6	8	27

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SEMESTER-V						SEMESTER-VI					
S.N.	Subject	L	T	P	Cr.	S.N.	Subject	L	T	P	Cr.
ChE-501	Mass Transfer operation II	3	1	2	5	ChE-601	Chemical Technology II	3	1	2	5
ChE-502	Chemical Reaction Engg.I	3	1	2	5	ChE-602	Chemical Reaction Engg. II	3	1	2	5
HS-501	Principles of Management.	2	1	0	3	HS-602	Soft Skill workshop	0	0	2	0
ChE-504	Instrumentation process and control	3	1	2	5	ChE-603	Heat Transfer Operations	3	1	2	5
ChE-505	Chemical Technology I	3	1	2	5	ChE-604	Process Equipment Design I	3	1	0	4
ChE-505	Chemical Process Industries	3	0	0	3	ChE-605	New Separation Processes	3	1	0	4
						ChE-606	Biochemical Engineering	3	1	0	4
		17	5	8	26			18	6	8	27

SEMESTER-VII						SEMESTER-VIII					
S.N.	Subject	L	T	P	Cr	S.N.	Subject	L	T	P	Cr
ChE-701	Multiphase systems	3	1	0	4	ChE-801	Process Utilities & Safety	3	1	0	4
ChE-702	Electronic, Polymeric & Ceramic Materials and Processing	3	1	0	4	ChE-802	Elective-II	3	1	0	4
ChE-703	Process Equipment Design-II	3	1	0	4	ChE-803	Elective-III	3	1	0	4
ChE-704	Elective-I	3	1	0	4	ChE-804	Env. Protection & Pollution Control	3	1	0	4
ChE-705	Project	0	0	16	8	ChE-805	Project	0	0	16	8
		12	4	18	24			12	4	16	24

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PH 101 PHYSICS-I

3-1-3-5

Special Theory of Relativity: Frame of Reference, Galilean Transformation, Inertial and Non-inertial frames, Postulates of Special Theory of Relativity, Michelson-Morley Experiment Lorentz transformation of space and time, Length contraction, Time dilation, Simultaneity in relativity theory, Addition of velocities, Relativistic dynamics, Variation of mass with velocity, Equivalence of mass and energy.

Thermal Physics: Maxwell-Boltzmann Law of distribution of molecular velocities, Evaluation of r.m.s. velocity and of average and most probable speeds, Mean free path, Transport phenomena.

Geometrical Optics: Combination thin lenses, Cardinal points of coaxial optical systems, thick lenses, location and properties of cardinal points, Newton's formula, graphical construction of images. Eye pieces, Aplanatic points. Optical Instruments- Spectrometer (Prism and grating), Sextant.

Physical Optics: Interference- Condition of observing interference. Degree of coherence and visibility of fringes. Production of interference fringes and determination of wavelength using Fresnel's Biprism. Michelson interferometer and its uses. Interference due to thin films. Wedge shaped films. Newton's rings.

Diffraction- Fresnel's Diffraction, Fresnel's Half Period Zone, Zone Plate, Fraunhofer's diffraction by single slit, double slit. Theory of plane grating. Width of principal maxima. Rayleigh's criterion of resolution. Resolving power of prism and grating.

Polarisation- Unpolarised, polarized and partially polarized lights. Polarisation by reflection. Double refraction by uniaxial crystals, Polaroids, Hygen's theory of double refraction. Half wave and quarter wave plates. Production and analysis of plane elliptical and circularly polarized light. Optical activity. Fresnel's theory of optical rotation, Specific rotation, Biquartz and Laurent half-shade polarimeters

Holography: Basic principles Holography and its applications.

Laser: Stimulated and spontaneous emission, Einstein's coefficients, relative contribution of stimulated and spontaneous emissions, population inversion, Laser emission, Ruby and He-Ne lasers, characteristic of Laser light.

Acoustics: Production and detection of Ultrasonics, Measurement of Velocity in Liquids, Applications of Ultrasonics. Acoustics of building.

List of Experiments

Minimum ten experiment to be completed out of the following-

1. To determine the co-efficient of viscosity of water by capillary flow.
2. To determine the co-efficient of viscosity of liquid by rotating cylinder method.
3. To determine the surface tension of water by capillary rise.
4. To determine the surface tension of water by Jager's Method.
5. To determine the co-efficient of thermal conductivity of good conductor by Searle's method.
6. To determine the co-efficient of thermal conductivity of bad conductor by Lee's method.
7. To determine the co-efficient of thermal conductivity of rubber.
8. To determine the value of mechanical equivalent of heat by Callender's & Barne's method.
9. To determine the height of building by Sextant.

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10. To determine the focal length of combination of two thin lenses by Nodal slide assembly and its verification.
11. To determine the wavelength of light by Fresnel's experiment.
12. To determine the wavelength of light by Newton's ring method.
13. To determine the wavelength of light by Diffraction Grating.
14. To determine the dispersive power of the given material of the prism.
15. To determine the specific rotation of canesugar using Polarimeter.

MA 101 Mathematics-I

3-1-0-4

Quadric surfaces in three dimensions, Sequences and series, Power series, Limit, Continuity, Differentiability, Mean value theorem, Taylor's theorem for functions of one and two variables, Transformation of one system of coordinates into another system, Extrema of functions of multi-variables, Definite integrals, Trapezoidal and Simpson rule, Improper integrals, Applications, Vector calculus- Gradient, Directional derivatives, Curl and divergence, Double, triple, line and surface integrals, Green, Gauss, Stoke's theorems and applications.

CS 101 Introduction to Engineering Profession

2-0-2-3

An introduction to the engineering profession: overview, history of technology, Role of engineers in the society.

Introduction to current branches of engineering: brief description and applications.

An overview of the current research, emerging and interdisciplinary areas.

Studies of engineering systems: inventiveness, analysis, design, manufacturing and management case studies and application of engineering tools.

Information Technology portion:

MS WINDOWS commands, editing and saving files, word processing, file management.

LINUX Commands, editors, Files & Directories, UNIX tools.

Internet and World Wide Web : Introduction to Internet, www, Internet browsers Netscape & Explorer, Introduction of PINE/ELMN, FTP, Telnet, Search Engines.

Hypertext Markup Language, HTML Tags, Frames, Creating HYML documents, DHTML.

EX 101 Electrical and Electronics Engineering

3-1-2-5

A. Electrical Engineering

Introduction to Electrical Energy

Generation: Types of power Plant, Functional Block diagram of Generating stations (Hydel & Thermal Stations)

Transmission: Standards (AC & DC), Substations, Grids

Distribution: Industrial, Commercial and Domestic Standards.

Utilization: Types of loads, UPS and domestic inverters.

Domestic Wiring: Materials, accessories & ratings of the wiring materials, types of wiring: stare case, fluorescent tube and simple domestic wiring layout, earthing and electricity rules.

Steady-state analysis of AC circuits: Sinusoidal and phasor representation of Voltage & current, single phase ac circuit behavior of R, L and C. Combination of R, L and C in series and parallel. Resonance.

Three Phase AC circuits: Line and phase voltage/current relationship for star & delta connections.

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Measuring Instruments: Types of instruments, working principles of Ammeter, Voltmeter, Wattmeter & Energy meter.

Transformer & Rotating Machines: Principle of operation and construction of single phase transformer, phasor diagram and equivalent circuits, efficiency and voltage regulation. Principle of electromagnetic energy conversion, Starting and speed control of DC and AC motors

B. Electronics Engineering

Junction Diode : p-n junction, v-i characteristics, diode resistance, capacitance, switching time, diode applications. Breakdown mechanism, Zener and avalanche, breakdown characteristics, Zener diode and its applications voltage regulator.

Bipolar -junction Transistor : Bipolar junction transistor, CE, CB and CC configurations and characteristic curves, Requirement of biasing, types of biasing.

JFET and MOSFET: The JFET and MOSFET action; characteristics.

Linear IC and its applications

Digital Electronics: Number systems, conversion of bases, Boolean Algebra, logic gates, Concept of universal gate, Flip-Flops and counter.

Electronics Instruments : Oscillators, Digital Multimeter and its applications, CRO and its applications.

HS 101/201 English Language and Composition

2-1-1-3

Remedial Grammar: It is the basic core for the development of the English language and it can be more enhanced through our mini language lab currently, though in future with computerised language lab containing tense busters and other softwares to develop interests in students to learn language through games.

Content: Articles, Prepositions, Tenses, Active and Passive forms.

Effective comprehension: In this global era effective comprehension is an attempt to develop in technical students to comprehend different topics relative to varied scientific and social myriad happenings in the world thus bridging the gap from the scientific-technical culture from the liberal arts culture.

Content: Passages from News Papers, magazines and short comprehensions from GRE packages

Effective Composition: Liberal space has been devoted to written composition and an overall initiative will be taken to show the students that most effective writing-scientific or literary-adapts certain principles of rhetoric which can be learnt and put into practice through artistic writing.

Content: Discussions on varied topics in tutorials, excerpts from magazines and newspapers.

Pronunciation Skill: One of the important aspects in communication and personality impression of the students. This will be enhanced through the aid of language lab and the instructors own drilling exercises. So that availing such a skill can create great space for them and for job in this age of globalisation, where overall developed personality is more easily absorbed.

Content: With the help of language lab and instructors drilling exercises.

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CH 101/201

Chemistry

3-1-2-5

Chemical Bonding: Valence bond theory, molecular orbital theories of bonding in metals and semi-conductors (Band theory), imperfection in solids.

Polymers : Classification of polymers, types of polymerisation and their principles, structure property relationship, polymer materials of industrial importance, biopolymers.

Phase rule: Derivation of the phase rule, application of phase rule to one component system.

Chemical kinetics: Reaction rates, order and molecularity of reactions, factors influencing reaction rates, complicating factors in reaction kinetics- opposing reactions, consecutive reactions, side reactions and surface reactions.

Water Chemistry: Sources and nature of impurities, characteristics of natural water, water treatment processes, boiler feed water.

Fuels: Classification, calorific value, analysis of solid fuels, carbonisation of coal, gaseous fuels including LPG and natural gases, liquid fuels and its properties, power alcohol, knocking and octane, rating, anti-knocking agents, diesel as a fuel, cetane number.

Corrosion: Theories of corrosion, types of corrosion and its protective measures, detailed account of paints, varnishes and resins.

Lubricants: Definition, functions, mechanisms and classification of lubricants, properties and testing of lubricating oils.

ME 101/201 Introduction to Manufacturing Processes 2-0-2-3

Introduction to Materials and Manufacturing: Introduction to engineering materials such as metals and alloys and their applications. Art of manufacturing; Classification of manufacturing processes, Guide to processing of metals and alloys.

Machining Processes and Machine Tools: Classification of machining processes and machine tools; Construction and working of lathe, Drilling machine, Shaper, Slotter and Planer, Boring Machine, Milling Machine, Grinding Machine, Brief introduction of Newer Machining Processes such as EDM, ECM, USM, LBM, WJM etc.

Casting Processes: Elements of Sand Mould, Method of preparation of Sand Mould, Introduction of casting defects.

Press Working Operations: Classification of press working operations, Construction of Power Presses, Press working terminology, Types of dies and their operations.

Fabrication Processes: Classification of welding operations, Types of joints and welding positions. Brief description of arc, Resistance and gas welding techniques. Brazing and Soldering.

Modern Trends in Manufacturing: Automation, Concept of CAD, CAM and CIM; Concept of Micro manufacturing and nano-technology.

MC-101/201

Engineering Graphics

2-0-4-4

General: Importance, significance and scope of engineering graphics, dimensioning, scales, different types of projections, orthographic projections.

Projection of Points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes, shortest distance, intersecting and non-intersecting lines.

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Planes other than reference planes: Perpendicular and oblique planes, their traces, inclinations etc. projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.

Projections of plane figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes). Obtaining true shape of the plane figure by projection.

Projection of solids: Simple cases when solid are placed in different positions, axis, faces and lines lying in the faces of the solid making given angles.

Development of Surfaces: Development of simple objects with or without sectioning.

Machine Drawing:

Basic Concepts: IS drawing conventions, line symbols, Kinds of line, drawing sheet layout, rules of printing, preferred scales.

Projections: Perspective, orthographic, isometric and oblique projections, sketching of orthographic views from pictorial views, precedence of lines.

Shape Description (internal): Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, and conventional practices.

Size Description: Dimensioning, size and location dimensioning, Principles and conventions of dimensioning, dimensioning exercises.

Screwed Fasteners: Introduction, Screw Thread nomenclature, Forms of Screw Threads, Thread series, Multi-start threads, Right hand and left hand threads, Representation of threads, Bolted Joints, Locking arrangements for nuts, foundation bolts.

Computer Graphics: Basic Concepts and use. Methods of constructing objects in computer aided design softwares.

PH 201 PHYSICS II

3-1-3-5

Electrostatics: Background of vector calculus, Quantization and conservation of charge, Coulomb' law (vector form) and superposition principle, concept of electric field lines, flux of E-field, Gauss flux law (Integral and differential form). Simple cases of charge distributions. Energy of charge Distribution, Energy as an integral over the field of uniformly charged spherical surface and volume.

Electric Current: Current Density Vector, Equation of Continuity, Ohm and Joule's Laws(Integral and differential forms).

Magneto statics : Ampere's Law, Biot Savart's Law, Law of Force in magnetic Field on currents and Charged Particles. Magnetic Field due to a Straight Infinite Wire. Magnetic Field due to Circular Loop and Solenoid at Axial points, Variation of Magnetic field with distance along the axis of Helmholtz galvanometer. Vector potential and its Evaluation for Uniform magnetic field and for Straight Infinite Wire. Divergence and curl of **B**. Distant Field due to Loop of Current. Magnetic Moment. Magnetic materials and magnetization. Magnetic Current Field **H**, Curl of **H** and calculation of **H**

Time Varying Fields :

Displacement Current, Curl **H**, Faraday's Law(Integral and Differential forms). Self and Mutual Inductances. Energy of Coupled Circuits and Current Distribution. Energy as an Integral over the Magnetic field. Energy of a Solenoid.4

Electromagnetic Waves in Free-Space

Maxwell equations. Plane Polarized Plane Wave Solution. Characteristics of these Electromagnetic waves. Poyntings Theorem.3

Atomic & Nuclear Physics

X-rays-Characteristic and continuous X-ray spectra, Mosley's law, X-ray absorption X-ray diffraction, Braggs law, Lauer Spots Braggs Spectrometer. Compton effect. 4

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Magnetic Properties of Materials- Ferro, Para, Dia, Antiferro and Ferri Magnetic Materials. Hysteresis curve and their uses. Larmor's Theory and Diamagnetic Susceptibility, Langevins Theory and Curie-Weiss Law. Magnetic Circuits 4

Quantum Concepts- Particle nature of radiation,? Wave nature of Particles. De-Broglie Waves, Davission-Germer experiment, Wave Packets, Phase velocity and group velocity, Heisenberg's Uncertainty Principle and its applications, one-dimensional Schrodinger's wave equation and concept of probabilities, amplitude, application to one-dimensional potential well.

Particle Physics- Classification of elementary Particles

List of Experiments

Minimum ten experiment to be completed out of the following-

1. To determine the specific resistance of wire by Carry-Foster's Bridge.
2. To determine the reduction factor of Helmholtz Galvanometer.
3. To determine the E.C.E. of copper using voltmeter.
4. To convert a galvanometer into a voltmeter of 3 volts.
5. To convert a galvanometer into an ammeter of 200 mill amperes.
6. To determine the variation of magnetic field along the axis of current carrying coil.
7. To determine e/m by magnetic focusing.
8. To Verify Stefan's law.
9. To study the non-Ohmic behavior of the filament of an electric bulb.
10. To compare the illuminating power of two electric bulb by photometer.
11. To find the resistance of a galvanometer using P.O.Box.
12. To find the internal resistance of a cell using P.O.Box.
13. To find the current sensitivity of a galvanometer using P.O.Box.
13. To calibrate a moving coil galvanometer using P.O.Box.
14. To calibrate an ammeter and voltmeter using Potentiometer.

MA-201

Mathematics-II

3-1-0-4

Linear vector spaces, Linear transformation and matrices, Determinants, Linear simultaneous algebraic equations, Special matrices, Quadratic forms, Diagonalisation and canonical forms, First order ODE, IVP/BVP, Existence and uniqueness questions, System of linear equations, Higher order ODE, Solutions of homogeneous and non-homogeneous ODE, Variation of parameters, Undetermined coefficients, Laplace transforms and application to solutions of ODE, Series solutions, Sturm-Liouville problem, Orthogonal polynomials, Fourier series, Fourier integrals, Generalized Fourier series.

CS-201

Computer Programming

2-1-2-4

Writing a Simple Program: Learning the form of a C program, Declaring variables, designing program flow and control, defining and using functions, using standard terminal I/O functions.

Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external.

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Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch.

Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size.

Structures: Purpose and usage of structures, declaring structures, assigning of structures.

Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

Unions: Components in overlapping memory, declaring and using unions .h vs. private .c files, Hiding private variables and functions.

Controlling Devices: Bit access and masking, pointing to hardware structures.

Operating System Interaction: Reading command line arguments, creating and accessing files, file opening modes, formatted disk I/O.

The Standard C Preprocessor: Defining and calling macros, utilizing conditional compilation, passing values to the compiler.

The Standard C Library: Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike? Other Standard C functions.

AM 201 ENGINEERING MECHANICS 3-1-2-5

INTRODUCTION: Idealisation of Mechanics, concept of Rigid Body, External Forces (Body forces & surface forces), Laws of Mechanics.

FORCE SYSTEMS AND EQUILIBRIUM: Introduction to vector, Statically Equivalent Force systems (Planar and Spatial), Free Body Diagram, Equations of equilibrium and their applications to various system of forces.

STRUCTURES AND MACHINES: Plane Trusses, Space Trusses, Method of Joints, Method of Section, Graphical Method, Method of tension coefficients, Frames and Machines.

DISTRIBUTED FORCES AND MOMENT OF INERTIA : Centroid of Composite figures, Area Moment of Inertia, Mass Moment of Inertia, Principle axes and Principle Moment of Inertia.

FRICTION: Introduction of friction, Laws of friction, wedge, screw, belt, rolling friction.

BEAMS: Different support & load conditions, SFD, BMD.

KINEMATICS AND KINETICS OF RIGID BODIES: velocity and acceleration, Rotation of Rigid bodies, Rolling motion, Plane motion of rigid bodies, Effective Forces on a rigid body, D'Alembert's Principle, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum.

THREE DIMENSIONAL DYNAMICS OF RIGID BODIES: Introduction, Kinematics and Kinetics, General Motion.

MA-301 Mathematics-III 3-1-0-4

First order PDE, Complete general and particular solutions, Second order linear PDE, Interior and exterior BVP, Functions of a complex variable, The complex plane, Analytic functions, Elementary functions, Multi-valued functions, Singularities, Complex

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integration, Conformal mapping, Probability theory, Axiomatic definition of probability, Conditional probability, Random variables, Distribution function, Expectation, Moments, Moment generation function, Special types of Probability distributions, Normal approximation to Binomial distribution.

CE- 301 Environment and Ecology

3-1-0-4

Introduction and scope

Conservation of natural resources i.e. forest resource, water resource, mineral resource, energy resource, land resource etc. Role of individual for resource conservation and sustainable development.

Ecosystem and its basic concept, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Examples of ecosystems.

Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity, National and global scenario.

Environmental Pollution, Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust Case studies, Wasteland reclamation, Consumerism and waste products, Environmental Management through Acts.

Human Population and the Environment: Environment and human health, Role of Information Technology in Environment and human health, Case studies

Field Work

Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain

Visit to a local polluted site- Urban/Rural/Industrial/Agricultural

Report submission on field visit

AM 301 Material Science and Engineering

3-1-2-5

Introduction: Structure and properties relationship of Engineering Materials.

Structure of Crystalline Solids: Crystal structures and Systems, Unit Cells, Metallic Crystal Structures, Crystallographic directions and Planes, Density Computations.

Characterization of Materials: Crystallography, Reciprocal Lattice, Stereographic projections, Diffraction methods, Electron microscopy, Metallography, Thermal analysis.

Imperfections in Crystals: Point defects, Dislocations, Interfacial Defects, Bulk defects.

Diffusion: Mechanisms; steady state and non steady state Diffusion, factors influencing diffusion.

Multiphase Structures, Phase Transformations: Uniary, Binary, Equilibrium Phase Diagrams, Eutectic, Eutectoid Peritectic and Peritectoid Reactions.

Mechanical Behaviour of Materials: Elastic and Plastic properties, Creep, Fracture, Heat treatment of steels .

Ceramic Materials: Ceramic Structures, Properties.

Electric and Electronic materials: Electrical Conduction, Classification of semiconductor materials, Materials and Technology for integrated circuits, Photonic materials, super conductivity and special super-conducting materials, Ferrites.

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Quartz crystal, Dielectric materials. Piezoelectric and Ferro-electric materials, Electromechanical materials, Mechanism of polarization, Its measurements.

Magnetic Properties for Applications; Diamagnetism, Paramagnetism, ferromagnetism, Antiferromagnetism, Ferrimagnetism, Soft and hard magnetic materials magnetic storage.

Optical properties: Optical properties of Metals and Nonmetals, Luminescence, photoconductivity, Optical Fibers in communications.

List of Experiments

1. Hardness Test,
2. Impact Test
3. Microscopic examination of metals and alloys
4. Effect of surface imperfection
5. Creep Test
6. Study of crystal structures
7. Identification of different materials

ChE-301 Chemical Engineering Thermodynamics 3-1-2-5

Elementary concepts. The first and second laws. Extreme in work and criteria of equilibrium. Thermodynamics properties of pure substances. The ideal gas. Equation of State. Thermodynamic charts. Application of engineering problems. Refrigeration & liquefaction. Thermodynamics of mixtures. Partial molar properties. Chemical potential. Fugacity coefficients. Ideal and non ideal solutions. Activity and activity coefficients, Gibbs-Duhem equations. Excess properties of mixtures. Phase equilibrium and chemical equilibrium.

AM 302 Strength of Materials (3-1-2-5)

INTRODUCTION: Objective of the Course, Engineering Objects, Loads, Material Characteristics, Assumptions, Type of Problems

SIMPLE STRESS & STRAIN: Stress, Strain, Hooke's Law, Elastic Constants, Strain Energy, Statically Indeterminate problems, Thermal Effects, Impact Loading

ANALYSIS OF STRESS & STRAIN (Plane Stress and Plane Strain): Stress at a Point, Variation of Stress, Stress Transformation (2-D), Analysis of Strain, Strain-displacement relations, Strain transformation, Strain Measurements, Constitutive equations

SIMPLE BENDING & SHEAR STRESS: Introduction, Pure Bending, Normal stresses in beams, Combined Bending and Direct Stress, Composite Beams, Shear Stress, Shear Centre, Strain energy in bending.

TORSION: Introduction, Torsion of Circular Shaft, Power Transmitted by a Shaft, Compound Shaft, Tapered Shaft, Strain Energy in Torsion, Combined Bending and Twisting, Torsion of Thin Walled Tubes, Open and Closed Coiled Springs

THIN & THICK CYLINDERS & SPHERES: Introduction, Thin Walled Shells, Thick Shells, Compound Cylindrical Shell

DEFLECTIONS: Introduction, Equation of Elastic Curve, Methods for Determining Deflections (Double Integration, Macaulay's Method, Moment-Area Method, Conjugate-beam method, Castigliano's Theorem)

COLUMNS: Introduction, Euler's Theory for Long Columns, Rankine-Gordon Formula, Empirical Formulae, Eccentrically Loaded Columns.

THEORIES OF FAILURE: Introduction, Different Theories of Failure

List of Experiments

1. Tension test at UTM
2. Compression test at UTM
3. Tensometer (use of strain gauges)
4. Beam Bending
5. Shear Centre
6. Torsion test
7. Closed and Open coiled springs
8. Thin shells
9. Deflection of Beams (evaluations of EI)
10. Column Buckling

ME-302 Industrial Engineering

3-1-0-4

Introduction

Engineering economy and costing

Break-even analysis, financial statements, Elementary cost accounting, Methods of depreciation, Techniques of evaluation of capital investments

Work system design

Taylor's scientific management, Gilbreth's contributions, Methods study, Micro motion study, Principles of motion economy

Productivity concepts and measurements

Job design and Human factors engineering, Ergonomics

Work measurement: Job standards, Time study, PMTS, Work sampling

Job evaluation, merit rating, wage administration, And incentive systems

Statistical quality assurance: Quality costs, Process control charts, Acceptance sampling.

Materials handling system.

Reliability and maintenance

Reliability and maintainability, Probabilistic failure and repair times, System reliability, Preventive maintenance and replacement, Total preventive maintenance,

Intellectual property system

Definition of intellectual property, Important of IPR, TRIPS and its implications, WIPO and global IP structure, and IPS in India, Patent copyright, industrial design and trademark, Meanings, rules, procedures, terms, infringements, and remedies,

Value analysis

Value engineering: value analysis for cost/value, Concurrent engineering

AM-405 Applied Computational Method

3-1-2-5

Linear algebra-Introduction to vector spaces, matrix norms, condition number of a matrix. Solution of linear algebraic equations using iterative methods-Gauss Siedel,

Jacobi and Successive over relaxation methods, Convergence criteria, Special methods for sparse system, linear least square estimation, Rational least square approximation and pseudo linear regression. Nonlinear least square estimation-Necessary and sufficient conditions for unconstrained optimization, steepest descent methods, conjugate gradient and Levenber-Marquardt method, Newton's methods and quasi-Newton method. Polynomial root finding techniques, Newton Raphson and Quasi-Newton methods, Successive substitution and its convergence, Optimization based methods, Homotopy continuation. Ordinary Differential Equation-Initial value problems: Eigen value, Eigen 5algorithms, Accuracy and stability of ODE solvers. Ordinary Differential Equations-Boundary Value Problem: Finite Difference Method, Soothing Method and Finite Element (Galerkin's) method, Function approximation using ortonormal functions, Orthogonal collocation based method. Partial Differential Equations(PDE), Classification of PDE, Finite difference technique, Method of lines, Orthogonal collocation.

AM 404 FLUID MECHANICS

3-1-2-5

Introduction : Fluid and continuum, Physical properties of fluids, Rheology of fluids.

Kinematics of Fluid flow : Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.

Fluid Statics : Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Dynamics of Fluid Flow : Euler's Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, notches weirs, orifice meter, venturimeter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.

Dimensional Analysis and Hydraulic Similitude : Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies.

Laminar and Turbulent Flow : Equation of motion for laminar flow through pipes, Stokes law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, water hammer.

Boundary Layer Analysis : Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

Introduction to compressible flow: Thermodynamic processes, continuity equation, work done in an isothermal process and adiabatic process, sonic velocity, Mach number, Mach Line, Mach angle and Mach cone, properties at a stagnation point, flow through a convergent nozzle and De Laval nozzle, Normal and oblique shocks, Fanno and Rayleigh lines.

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LAB

1. To verify the momentum equation using the experimental set-up on diffusion of submerged air jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter, venturimeter, and bend meter and study the variation of the coefficient of discharge with the Reynolds number.
4. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
5. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
6. To study the variation of friction factor, f for turbulent flow in commercial pipes.
7. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.

ChE-401 Mass Transfer Operation I

3-1-2-5

Diffusion in gases and liquids. Mass balance in simple situation with and without chemical reaction. Theories of mass transfer. Individual and mass transfer coefficients. Mass, heat and momentum transfer analogies. Convective mass transfer. Mass balance in concurrent and countercurrent continuous contact equipments. Concept of operating line. Multistage countercurrent operations. Concept of ideal stage. Stage efficiencies. Design of continuous contact equipments. HUT and NTU concepts. Gas absorptions: Design of plate and packed absorption columns. Non-isothermal absorption. Simultaneous heat and mass transfer. Humidification, Design of cooling towers. Drying of solids. Rate of drying curves. Through circulation drying. Continuous drying. Types of driers.

ChE- 402 Fuel Technology

2-1-0-3

Fuels as source of energy and chemicals. Conventional (commercial and non commercial) and renewable source of energy. Reserves, production, Origin, properties and classification and gasification of coal and biomass. Petroleum and natural gas. Types and properties of gaseous fuels. Combustion calculation. Flame temperature. Velocity of flame propagation.

Limits of inflammability. Combustion and kinetics of coal on grates and in pulverized state. Coal liquefaction. Oil and gas burners.

ChE-404 Chemical Process Calculation

3-1-0-4

Basic concepts; Unit and Dimensions, Steady state and dynamic processes, Lumped and distributed processes, Single and multiphase systems.

Types of variables; intensive and extensive variables, Specific properties, State variables. Types of equation; Mass and Energy conservation, equilibrium relations, Rate laws, Constitutive equation for material behaviour, Correlation for physical and transport properties. Material Balances for Steady state processes; Properties of gases, liquids and solids, equation of state, Phase equilibrium for ideal mixtures, Reaction and

stoichiometry, Non-Reacting single phase systems; Single and multi units without recycle, Systems with recycle, bypass and purge, Non-Reacting multiphase systems; Process involving vaporization and condensation, reacting systems. Energy balance for steady state processes; Specific heat capacity, Enthalpy, Heat of reaction, Thermochemistry, Isothermal systems, Adiabatic systems, Simultaneous material and energy balances. Unsteady state Material and Energy Balances; Reaction rate laws, Transport laws. Introduction to Computer Aided Process Calculations; Degree of Freedom and Specification, Use of Spreadsheets, Tearing and iterative techniques and in flowsheeting.

ChE-501 Mass Transfer Operation-II 3-1-2-5

Molecular diffusion in fluid, mass transfer coefficient, diffusion in solids, interface mass transfer. Mass, heat and momentum transfer analogies. Gas absorption and distillation in packed tower. Design aspects of continuous contact equipment in liquid extraction and adsorption. Simultaneously heat and mass transfer-Humidification, Drying and Crystallization.

ChE 502 Chemical Reaction Engineering-I 3-1-2-5

Chemical kinetics: types of reactions, the rate equation: analysis of simple and complex rate equations: interpretation of rate data in variable volume and constant volume systems, Ideal Reactors: Concept of ideality; development of design expression for batch, tubular, and stirred tank reactors; combined reactor systems; comparisons, advantages and limitations in application. Thermal characteristics of reactors-isothermal, adiabatic and non-adiabatic condition: principles of reactor stability.

HS-501 Principles of management 2-1-0-3

Principles:

1. Definition and concepts of management. Evolution of management thought. Systems approach and decision. Theory approach to management. Forces of decision making.

2. Functions of Management:

Planning: types of plans, major steps in managerial planning strategies MBO.

Organizing: Nature and Purpose. Process of organization. Basic Departmentation.

Coordinating: Supervision. Communication and direction. Leadership. Motivation.

Controlling: nature and purpose. control techniques and information technology.

3. International Management:

Japanese Management vs.U.S. Management. Managerial functions in international business.

Organization Theory:

1. Group dynamics: Defining &classifying Groups. Group processes. Group cohesiveness

2. Conflict Management: Discovery of conflicts Processing of grievances. Conflict resolutions. Conflict and group relations.

3. Stress Management: Nature of stress. Potential sources of stress. Consequences Strategies

4. Management of Change: Recognizing the forces of change

Sh

ChE-503 Instrumentation and Process Control 3-1-2-5

Review of Laplace transforms. Dynamics of process elements: Interacting and non-interacting systems, Open and closed loop systems. Sensors for pressure, flow, temperature and composition. Valve dynamics. Action of various controller modes. Frequency response, stability analysis, process identification. Approximations to complex processes, optimization of control system of response. Advance control techniques. Feed forward control, Ratio control, Cascade Control.

ChE-504 Chemical Technology-I 3-1-2-5

Introduction to chemical technology, Sectors of Chemical Industry, Overview of Indian Chemical Industry, Process flow sheets. Water treatment, Industrial gases, Industrial acids, Chlor-alkali chemicals, Fertilizers, Electro thermal products, Cement, Glass and ceramics, Semiconductor processing. Nuclear materials. Oils and fats, Soaps and detergents, Sugar, Pulp and paper, Petroleum refining, Petrochemicals. Industrial solvents, Polymers, Pharmaceutical products, Fermentation products, Enzyme catalyzed products.

ChE-505 Chemical Process Industries 3-0-0-3

Process economics- Economics feasibility of project using order of magnitude cost estimates. Plant and equipment cost estimation, Product cost estimation, . Cash flows- Time value of money, Investment, costs, Sales, Profit, Taxes, and Depreciation. Profitability Analysis- Rate of return, Payback period, Discounted rate of return, Net present worth, Internal rate of return, Comparing investments alternatives. Conceptual process Synthesis- Systematic hierarchical synthesis of flow sheets, Structural layers of flow sheets. Reactor Network Synthesis- Reactor type and condition for simple reaction system, Use of attainable regional diagrams for complex reaction systems. Separation System Synthesis- Distillation column sequencing for ideal liquid mixtures. Separation system structure for non ideal mixtures using distillation/ residue curves. Heat exchanger Network Synthesis using pinch Technology- Targets for minimum utilities, area, total cost,. Maximum recovery design, Evolutionary synthesis for minimum number of exchangers designs, Supertargetting, Heat and power integration, Integration of heat exchanger network with distillation columns.

ChE-601 Chemical Technology II 3-1-2-5

Raw materials for Industrial organic Products; Unit Processes in organic Industries with Reference to Petrochemicals, Dyes and Dye Intermediate; Study of Processing of natural materials; Oils; Fats, Starch, Paper and Leather; Polymerization Industries, Plastics, Rubber & Fibres, Paints & Surface Coatings.

ChE-602 Chemical Reaction Engineering-II 3-1-2-5

Non-ideal reactors: Residence time distribution; modeling of real systems; Non-ideal Parameters; concepts of mini and micro mixing. Heterogeneous reactors: Kinetics of fluid solids, Non catalytic and catalytic reaction; external transport processes; Diffusion and reaction within porous solids; laboratory reactor analysis of rate data; development of

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design expressions; Kinetics of gas-liquid reaction; slurry reactors. Catalyst: Preparation, testing and characterization.

ChE-603 Heat Transfer Operations-I 3-1-2-5

Modes of heat transfer and basic laws; 3-D heat conduction equation, Steady state conduction with and without heat sources; Extended surfaces; Thermal insulation; 2-Dimensional heat conduction, Unsteady state conduction, Natural and forced convection, Heat transfer coefficient; Concept of film resistance; Overall heat transfer coefficient; Laminar and turbulent thermal boundary layer; Temperature profiles; Analogy between heat and momentum transfer; Empirical correlations.

Heat exchangers; Basic types of Heat exchangers, Overall heat transfer coefficient, Log mean temperature difference; Effectiveness and NTU methods for heat exchanger analysis. Active and passive argumentation techniques; Heat transfer in packed, Fluidized bed and agitated vessels; Nucleate and film boiling; Evaporation, Boiling point rise; Single and multiple effect evaporators; Condensation; Film and drop-wise condensation, condensers and Reboilers.

Radiative heat transfer; Properties of surfaces; Configuration factors; Heat transfer between real surfaces; Electrical circuit network analogy; Radiation shields, furnace calculations.

ChE-604 Process Equipment Design -1 3-1-2-5

Design of pressure vessels (internal and external pressures): Vessels accessories-Nozzles, flanges, openings and reinforcements and supports of vessels. Drawing of simple process equipment like distillation columns, jacketed reaction vessels and reboilers.

ChE-605 New Separation Processes 3-1-0-4

Characterization of separation processes; equilibrium and rate governed separation processes; laboratory and industrial separations processes.

Cascading of separation system; Ideal cascades; polytrophic Enriching; Squared-off cascades; Continuous cascades; Total interstage flow; Sequencing of separation processes.

Membrane separation processes; fundamentals, mechanism and equilibrium relationships; Ultrafiltration; Reverse osmosis; Electro dialysis; Pervaporation; Liquid membrane processes.

Thermal Diffusion; Foam and bubble fractionation processes, adductive crystallization and zone melting, Ultra and Zonal centrifugation.

Chromatographic Techniques; Column Chromatographic; Gas-Liquid Chromatographic, Ion-exchange Chromatographic and Allide fixed bed separation processes; Parametric Pump electrophoresis; Isoelectric Focusing; Clothrade separation;

Desalting by freezing; crystallization, Molecular sieves.

ChE-606 Biochemical Engineering 3-1-0-4

Cell structure and cell types, Chemicals of life (RNA, DNA, enzymes, etc.), Kinetics of Enzyme Reactions, Applied Enzyme Catalysis, Metabolic Stoichiometric and Energetics, Molecular Genetics and Control, Biomass Production, Transport Phenomena in Biosystems, Design and Analysis of Biological Reactors, Fermentors, Downstream Product Recovery and Purification, Interaction of Mixed Microbial Populations, Biological Wastewater Treatment.

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ChE-701 Multiphase System 3-1-0-4

Fundamental concepts of multiphase- gas-liquid, gas-solid, liquid-liquid, and liquid-solid systems. Particle, drop and bubble dynamics. Application of continuity, momentum and energy equations. Hydrodynamics characteristics: holdup, slip, pressure drop and rise/drop velocities. Mass and energy transfer with and without simultaneous chemical reactions. Application to trickle beds, bubble and slurry reactors, cyclones, fluidized beds etc.

ChE-702 Electronic, Polymeric & Ceramic Materials and Processing

3-1-0-4

Atomic structure, semiconductor materials, solar cell, Transistors and Process, Sequence of fabrications, control of microcontamination, Microlithography, Doping, Etching, Oxidation, Chemical Vapour Deposition and Reactor Design, Classification and electrical and mechanical properties of Polymer, Polymer catalysis and Molecular chemistry, Flow behaviour and polymer processing, Polymer bends and composites, Application of Polymers (Exchange Resins etc.), Ceramic raw material and characterization, Ceramic Processing Additives, Ceramic Beneficiation Process, Ceramic Forming Processes(Sol-gel, Casting etc.), Zeolites, Ceramics Drying, Surface Processing and shaping.

ChE-703 PROCESS EQUIPMENT DESIGN-II 3-1-0-4

Design of heat transfer equipment- Shell and tube exchanger, Thermosyphon and kettle reboiler, condenser, plate heat exchanger, evaporator, Heat pipe, Furnace, Boiler. Design of mass Transfer equipment- Tray and packed distillation column, Liquid-liquid extraction column, Supercritical extraction column, Gas absorber, Pressure swing and adsorption, Natural and induced draft cooling towers, Tray drier, Steam tube rotary drier, Crystallizer.

Design of Reactors- Multitubular, packed bed, CSTR, Batch, Fluidized bed, Trickle bed, Slurry, Bubble column, Polymerization, Chemical vapors deposition, Design of fluid flow equipment-Centrifugal, Reciprocation and rotary pumps, Compressors, Liquid, Gas and slurry pipe lines, Thrust nozzle, Storage tank, Thickener, Ventury scrubber.

ChE-601 Process Utilities & Safety 3-1-0-4

Steam: Steam handling, boilers, steam engines, steam turbines, steam condensers, steam trap, pipe size and pressure drop calculation. Water Hammer. Flash tank design. Lagging, selection and thickness of insulator. Expansion and joints, selection of valves and fittings.

Water: Water treatment, storage. Elevation calculations. Storage tank network analysis. Pipe size and pressure drop, Pipeline network analysis. Pipe fittings and valves.

Air: Storage, treatment, dehumidification, air filters, pumps & vacuum pumps, boosters and air and gas leaks, design. Selection of compressors and boilers. Compressor and blower house maintenance. Monitoring of air flow and analysis of blowers. Industrial case studies. Lubrication, oil removal.

Refrigerant: Cooling calculation. Storage of food and perishable goods.

Importance of Process Utilities in Chemical Plants:

Properties of liquid cryogen; Transfer and storage of liquid cryogen; Thermal insulation for low temperature applications: Liquefaction cycles; Commercial Liquefiers and Turbo expanders.

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ChE-704 Environmental Protection & Pollution Control

3-1-0-4

Sources and classification of air pollutants and their effect on man, material, flora and fauna. Effect of metrological conditions on air pollutants. Monitoring of air Principles of design of control equipment. Monitoring of water pollutants and principles of microorganisms with aspect to waste water treatment. COD, BOD and other analytical tests for assessment of waste water. Aerobic and anaerobic treatment methods. Sludge digestion and disposal. Sources, classification, and transportation of solid wastes. Recovery and recycling of solids waste components. Methods of solids waste disposal. Handling and disposal of toxic and hazardous wastes. Effect of noise levels on man and animals. Monitoring of noise and high frequency vibrations. Control techniques of noise.

Departmental Electives

Process Plant Operation and Safety
Chemical Reactor Analysis
Systems Engineering
Mineral Beneficiation
Polymer Engineering
Combustion Engineering
Project Engineering
Clean Coal Technology
Process Modeling and Simulation
Non-conventional Energy and Engineering
Fertilizer Technology
Computer Methods in Chemical Engineering
Energy Conservation in Process Industries
Flow of Complex Mixtures
Storage & Conveying of Materials
Real Time Intelligent Process System
Novel Separation Process
Petroleum Refinery Engineering
Advanced Heat Transfer
Petrochemical Technology
Optimization Techniques in process Design
Process Dynamics and Control
Advanced Mass Transfer

Process Plant Operation and Safety:

Process plants- continuous and batch plants. Procedure for systematic study of plants. Plant and equipment start up and shut downs, operation at steady state. Emergency response strategy for plants and equipments. Plant test runs and rating calculations for various equipment. Plant systems for utilities and auxiliary services. Handling of plant effluent. Safe commissioning of plants
Aspects of engineering safety; Safety in relation to economic and operational aspects. General principles of industrial safety. Hazards due to fire, explosion, toxicity. Chemical hazards. Notified dangerous operation. Engineering control of chemical plant hazards. Industrial plant layout. HAZAN and HAZOP. Plant equipment reliability analysis. Case studies plant accidents.

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Chemical Reactor Analysis

Heterogeneous processes, global and intrinsic rates. Mechanism of catalytic reactions. Engineering properties of catalysts- BET surface area, pore volume, pore size, pore size distribution. Development of rate equations for solids catalyzed fluid phase reactions; Estimation of kinetic parameters.

External mass and heat transfer in catalysts particles. Stability and selectivity, packed bed reactor, slurry reactor; Trickle bed reactors and fluidized bed reactor.

Intra-particle heat and mass transfer- Wheeler's parallel pore model, random pore model of Wakao and Smith. Effective diffusivity isothermal and non isothermal effectiveness factor, deactivation of catalyst.

Ideal and non ideal flow in reactors; Design of fixed bed catalytic reactor- isothermal, adiabatic, non-isothermal programmed reactors: one dimensional and two dimensional approaches.

Reactor stability, control and optimization; Computer Aided reactor design. Transient CSTR analysis, Hot spot equation; Optimization using Lagrange multiplier, Poyntgin's maximum principle.

Systems Engineering

Principle of system analysis; Creation and assessment of alternatives; Structure of systems; Interaction; Degree of freedom; System information flow reversal; Digital encoding of system information flow; Selection of design variables and their structural effects; Decomposition large scale systems through Block Diagram, Signal Flow Graph, and Matrix Algebra; Stability, sensitivity and determinacy of systems; Flow sheet simulation and recycle calculation; Optimization methods for single and multiple variables and techniques of system optimization. Digital simulation in systems analysis and optimization.

Mineral Beneficiation

Exploitable characteristics of minerals. Economics of mineral beneficiation. Power laws. Principles of crushing and grinding. Grindability. Evaluation of particle size. Size distribution curve and their significance. Mechanism of breakage of material. Classification, design and application of crushers and grinders. Industrial screening, classification and performance of screens. Dry and wet classifiers. Thickeners, hydro cyclones, filtration, tabling, jigging, magnetic and electrostatic separation. Surface behaviour and flotation principles. Flotation machines, different flotation and flotation circuit design. Element of hydrometallurgy, microbial leaching etc. Important beneficiation circuits of minerals like chalcopyrites, sphalerite, galena, bauxite etc.

Polymer Engineering

Basic concepts of polymer and polymer chemistry. Classification of polymers. Mechanism and kinetics of polymerization. Polymerization reaction engineering: emulsion polymerization, dispersion polymerization etc. Reactors for polymerization: analysis of polymerization reactions, Reactor design applied to polymer system, Average molecular weight of polymer in different reactor, Control of molecular weight. Rheology of polymeric system. Unit operation in polymer industries. Polymer processing: moulding, calendaring, extrusion etc.

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Combustion Engineering

Mechanism and principle of combustion. Laminar flame propagation-theory and structure of flame. Burning velocity and its determination. Stability, extinction and blow off phenomena. Design of gas burner & interchangeability of gases. Theory of oil droplet combustion. Methods of atomization and spray analysis. Various distribution functions to represents sprays. Spray combustion. Thermodynamics and kinetic of coal combustion process. Design of pulverized fuel furnace and fluidized combustion process.

Project Engineering

Origin of chemical project; Feasibility studies; Techno-economic report; Plant location and site selection; Capital cost estimation; Working capital estimation; profitability indices, Discounted cash flow, Cost-benefit analysis, Sensitivity analysis; Process development, Process selection, Process Design, Utilities, Scale up; Optimization; Project construction, Project scheduling, Network analyses; Project report; Plant and Equipment specification.

Clean Coal Technology

Role of coal in overall energy situation. Recent advances in coal preparation methods including fine coal treatment. Simulation and modeling of coal beneficiation circuits. Thermodynamics and kinetics of coal gasification reactions. Fluidized bed coal gasification processes. Combined cycle power generation. Coal liquefaction processes. Concepts of coal refinery and coalplex. Environmental impact analysis of coal utilization methods such as carbonization, gasifier, etc.

Process Modeling and Simulation

Introduction and fundamentals of process modeling and simulation; industrial usage of process modeling and simulation; Macroscopic mass, energy and momentum balances; incorporation of fluid thermodynamics, chemical equilibrium, reaction kinetics and feed/product property estimation in mathematical models. Simulation of steady state lumped systems including simultaneous solution, modular solution, nested inside outside algorithms, partitioning and tearing with reference to chemical process equipment like reactors; distillation, absorption, extraction columns; evaporators; furnaces; heat exchangers; flash vessels etc. Unsteady state lumped systems and dynamic simulation; commercial steady state and dynamic simulators; Computer algorithm for numerical solution of steady state and unsteady state models; Microscopic balances for steady state and dynamic simulation; process modeling with dispersion; axial mixing; micro mixing; diffusion etc. Computer algorithm for microscopic models; Simulation of process flow sheets and Boolean digraph algorithms; Modeling and simulation of complex industrial systems in petroleum, petrochemicals, polymer, basic chemical industries. Introduction to application of advanced Artificial intelligence based modeling methods using Artificial Neural Networks, Wavelets and induced learning algorithms.

Non-Conventional Energy and Engineering:

Renewable source of energy and their potential. Low temperature application of solar energy – solar hot water, solar drying, solar refrigeration, etc. Theory, performance analysis and testing of liquid flat plate collectors. Solar air heater and their design principles. Concentrating collectors – application and their designs. Thermal energy storage. Solar photovoltaic conversion. Biomass and their characteristics. Physical, thermo-chemical and biological methods of their conversion. Wind their energy and heir electric conversion. Tidal, geothermal and ocean thermal energy conversion systems.

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Fertilizers Technology:

Definition of fertilizers, nutrient requirement of different plant e.g., paddy, wheat, cane etc. Natural way of fixing nitrogen, nitrogen cycle, carbon cycle, different nitrogen fixing plants, bacteria and algae. Role of C/N ratio in their growth of different plants. Organic manure.

Production of ammonia, its feed preparation. Limitation of different material for hydrogen generation. Reforming process and reformer design. Partial oxidation reactor design.

Hydrogen generation from high ash containing coals, design of different hydrogen generation units having high ash coals, Kopper-Totzek suspended bed gasifier design. Removal of impurities from synthesis gas. CO removal and shift reactor design.

CO₂ removal methods. Design of CO₂ Absorbers, NH₃ synthesis loop design. Design consideration for different types NH₃ reactors. Urea production: special features of urea reactor, prilling tower design. Phosphatic fertilizers: different method of production: NPK reactors, production and design of NPK fertilizers. Coating of fertilizers for slow release of nutrients. Cost consideration in fertilizer production.

Computer methods in Chemical Engineering:

Introduction to numerical methods. Linear algebraic equations. Eigen values and eigenvectors of matrices. Non linear algebraic equations. Function evaluation and regression techniques.

Numerical methods of solving ordinary differential equations- Initial and boundary value problems. Numerical solution of partial differential equations. Basic modeling principles and development of models in chemical engineering. Simulation techniques. Dynamic and steady state simulators.

Energy Conservation in Process Industries

Concept of energy accounting, energy auditing and their applications. Energy management principles and their scope. Second law analysis – concept of energy, entropy generation and lost work. Application of the principle to steady flow process, non – flow process and other irreversible process involving momentum, heat and mass transfer. Energy conservation measures through process optimization, product improvement and technology up-gradations – heat pump, cogeneration. Pipeline network and heat exchanger network analysis. Principles of thermo-economics and its application.

Flow of Complex Mixtures

Multiphase flows and their types – flow pattern and flow regime map with and without phase change. One dimensional model for continuity, momentum and energy transfer for different models: Multidimensional and flow regime specific models.

Liquid-solid mixture transport in pipe: flow pattern, accelerating length, velocity profile and pressure drop for turbulent slurry flow.

Gas-solid mixture transport in horizontal and vertical pipe.

Gas-solid fluidization; Phase equilibria and analogy with distillation/ stage-wise separation.

Circulating fluidized bed.

Elutriation; Analogy with chemical reaction kinetics.

Introduction to boiling, condensation and critical two phase flows.

Computational methods for modeling multiphase systems

Storage & Conveying of Materials

Objective of material storage. Characteristics of particulate solids : angle of repose , stress development etc. Considerations in the storage of bulk solids. Flow behavior of bulk solids in bins and through apertures. Mechanical design of bins. Activation of bins. Design principles of open and closed stockpiles . Feeding of materials : Belt feeder , apron feeder rotary feeder , screw feeder , vibratory feeder , reciprocating feeder etc., their design and specific applications in chemical and allied industries . Conveying of materials , mechanism of bulk material conveying . Design features of belt conveyor , elevating conveyor , screw conveyor etc, pipeline transportation of materials : importance and application of pneumatic and hydraulic conveying ; their advantages , disadvantages and limitations , sizing of pipeline transport systems .

Real Time Intelligent Process System:

Introduction and fundamentals of real time systems; conventional control theory versus modern control theory; Limitations of conventional control theory for industrial processes; importance of hierarchical multilevel control; special features of real time chemical process like dead time , interactions, asymmetric dynamics, inverse response, multiple steady states, stability, limit cycles bifurcation and chaos etc. Real time parameter estimation and observer theory; application of real time observer to process systems Model based control- linear and non linear; industrial applications optimal and sub optimal spaces; real time optimization- steady state and dynamic; online optimization algorithms including SOCOLL etc; neighboring optimal control; Intelligent Inferential control; Application of Advanced Artificial intelligence based controllers using Artificial Neural Networks, Fuzzy logic, Wavelet Transforms and induced learning algorithms.

Novel Separation Process:

Rate governed processes: definitions and terminologies; Membrane separation processes, preparation and characterization of membranes. Principles of reverse osmosis, nanofiltration, ultrafiltration, microfiltration. Osmotic controlled filtration, gel layer controlled filtration; Detailed design and modeling: film theory, similarity solution, integral method; Design of membrane/ process modules; Basic principles and modeling of dialysis; Electric field enhanced separation processes: zeta potential, electric double layer; Basic modeling of electric field enhanced filtration. Liquid membrane and its modeling. Basic design of gas separation and pervaporation.

Petroleum Refinery Engineering:

Origin of petroleum crude oil. Evaluation of crude oil- evaluation and characterization of crude oil: TBP and other distillation test. Petroleum products and their properties, specification and their testing different properties like flash point, fire pint , smoke point, aniline point, carbon residue, kinematic viscosity, pour point, freezing point etc. Use of crude book data. Petroleum refinery distillation- pre fractionation and atmospheric distillation of crude. Process design for atmospheric distillation. Stabilization of naphtha. Vacuum distillation of RCO. Reforming of naphtha. Other secondary processes like Vis - breaking, Furfural/Phenol/NMP extraction, Solvent dewaxing, propane deasphalting. Delayed coking process. FCC unit, Hydrotreatment process in refining: hydro - desulfurisation, hydrofinishing, hydrocracking. Production of lube oil base stock. Refinery equipment: furnaces, distillation columns, reactors, pumps, compressors and piping. Environmental impact of refineries.

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Advanced Heat Transfer

General equation of change of energy. Steady and unsteady state conduction in one, two and three dimensional cases. Finite difference method for steady and unsteady conduction. Forced convection heat transfer. Analytical and semi-analytical solutions. Equation for velocity and temperature in vertical and horizontal plane for cylindrical heat transfer, liquid metal heat transfer. Selected calculations. Network method of analysis for radiation exchange. Radiation calculation through gases and vapours. Design of compact heat exchangers. Boiling

Petrochemical Technology

Survey of petrochemical industry; Availability of different feed stocks; Production, purification and separation of feed stocks; chemical from methane; production and utilization of synthesis gas, oxoreactions, etc.; Production of and chemical from acetylene; Naphtha cracking; Chemical from C₂, C₃, C₄ and higher carbon compounds; polymer properties, production and utilization; catalytic reforming of naphtha and isolation of aromatics; Chemical from aromatics; Synthetic fibers, detergent, rubbers and plastics; Petroleum coke; Elements of design of steam reformer, naphtha cracker, catalytic reformer, etc.

Optimization Techniques in process Design

Introduction to optimization and its scope in chemical processes. Analytical method: Objective function, single variable optimization, multivariable optimization without and with constraints. Linear programming: graphical, algebraic, simplex methods, duality. Numerical search methods: one dimensional search, unrestricted, exhaustive search methods, interpolation methods. Multidimensional search methods with and without constraints. Variational method and their applications.

Process Dynamics and Control

Review of dynamics behavior of linear systems and their control system design. Linear process with difficult dynamics. Non-linear process dynamics; phase-plane analysis; multiple steady state and bifurcation behavior; process identification; control design via frequency response analysis; model based control; cascade, feed forward & ratio control; controller design for non-linear systems, introduction to multi variable systems. Interaction analysis and multiple single loop design. Design of multivariable controllers; introduction to sampled data systems; tools of discrete-time systems analysis; dynamic analysis of discrete-time systems; design of digital controllers; introduction to model predictive control; convolution model; model predictive control of MIMO systems.

Advanced Mass Transfer

Multi component distillation; determination of key component at minimum reflux ratio by the method of Shiras etc. al; minimum reflux ratio by Underwood's method; Fenske equation of total reflux and computation of product distribution; flash vaporization of

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feed of the distillation column; rigorous methods for Lewis-Matheson, Theiele-Geddes, bubble point, sum rates methods, Naphthali-Sandholm method.

Azeotropic distillation; stage wise calculation for multi component with multiple feed streams, graphical method of location of feed plates for multiple feeds.

Liquid-liquid extraction; stage wise calculations for multi component with multiple feed streams using reflex and mixed solvents. Liquid-liquid extraction with chemical reaction.

Inter phase mass transfer for multi component fluids in laminar and turbulent flows; interfacial turbulence and Marangoni effects.

Multi component gas absorption: Horton-Franklin method, Edmister method. Mass transfer in gas absorption with and without chemical reaction, model solution by Dankwerts; Brian; Perry and Pigford.



LABORATORIES OF THE DEPARTMENT**1. Simulation Heat & Mass Transfer Lab**

Space required	Approx. 3600 Sq. Ft.	
Name of Equipments		Approx. Cost (in lakhs)
1. Batch Drying Unit		0.80
2. Cooling Tower		0.90
3. Vacuum Crystallizer		0.80
4. Batch Crystallizers		0.80
5. Fluidized Bed Drier		0.50
6. Humidification and Dehumidification		1.20
7. Long Tube Climbing Evaporator		1.10
8. Rotary Drier		1.50
9. Triple Effect Evaporator		3.00
10. Short Tube Evaporator		1.00
11. Tray Drier		0.80
12. Vacuum Drier		1.00
13. Computer Controlled Simulation Heat Transfer Equipments		20.00
	TOTAL	33.40

2. Momentum Transfer/ Material Handling Lab

Space Required: Approx. 4800 Sq.ft.

Name of Equipments	Approx. Cost(in lakh)
1. Flow Through Fluidized Bed	0.60
2. Flow through Helical Coils	0.50
3. Flow through non circular pipes	0.50
4. Joule Thomson Co-Efficient Experiment	0.70
5. Flow through Packed Bed	0.70
6. Laminar Flow Analysis Table	0.50
7. Pressure Drop in Two Phase	1.00
8. Spouted Bed	0.70
9. Three Phase Fluidization	1.00
10. Pulveriser	0.70
11. Ribbon Blender	0.70
12. Sigma Mixer	0.60
13. Vibrating Screen	0.50
14. Basket Centrifuge	0.70
15. Froth Flotation Cell	0.60
16. Drying Oven	0.40
17. Working Model of Belt Conveyor	0.10
18. Working Model of Bucket Conveyor	0.10
19. Working Model of Chain Conveyor	0.10
20. Working Model of Screw Conveyor	0.10
21. Bath Crystallizer	0.80
22. Cyclone Separator	0.70
23. Gear Pump Test Rig	0.60
24. Turbine Pump Test Rig	0.70
25. Variable Speed Reciprocating Pump Test Rig	0.90
26. Compressor and Blower Test Rig	1.00
27. Computer Controlled Momentum Transfer Equipments	20.00

35.5 Lakhs

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3. Mass Transfer Lab

Space Required : 4800 Sq.Ft.

Name of Equipments	Approx. Cost (in lakhs)
1. Absorption in Bubble Column	1.00
2. Absorption in Packed Column	0.90
3. Mass Transfer with Chemical Reaction	0.80
4. Fixed Bed Absorber	0.80
5. Gas Absorption Apparatus	0.90
6. Wetted Wall Column	1.00
7. Batch Plate Rectification Column	0.60
8. Bubble Plate Distillation Column	2.00
9. Distillation Under Vacuum	1.00
10. Equilibrium Flash Distillation	1.10
11. Reactive Distillation	2.00
12. Solid- Liquid Extraction	0.60
13. Liquid- Liquid Extraction	0.80
14. Packed Column Extraction	0.90
15. York- Scheibel Column	1.00
16. Diffusion Co-efficient of CCl_4 in Air	0.50
17. Ion Exchanger	1.00
18. Liquid- Liquid Equilibrium	0.50
19. Mass Transfer in Mechanically Agitated Contractors	0.60
20. Solid- Dissolution	0.50
21. Vapour Liquid Equilibrium	0.60
22. Experimental Set Ups for Performing experiments based on advance Separation techniques	4.00
23. Computerized Distillation Column	12.00
24. Gas Chromatography (Two)	10.00
25. Spectrophometer (Two)	1.50
26. Single distilled water plant (two), pH meter, Conductivity meter, Ion meter, Humidity meter, Temperature and Pressure Probes, Air filter, Laboratory centrifuge, programmable Shaking Incubator, Water bath/ circulators, Hot air oven, Sterilizer Refrigerator, Magnetic Stirrer, vacuum pump (oil free), Flow Meter, Valves, Pipe fitting.	3.00
	<hr/> 49.6 Lakhs

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4. Heat Transfer Lab
Space Required: 3000 Sq.Ft.

Equipments	Approx. cost (in lakhs)
1. Falling Film Evaporator	1.10
2. Steam Jet Ejector	1.40
3. Spirial Heat Exchanger	1.00
4. Tapered Fin Tube Heat Exchanger	1.10
5. Total Glass Heat Exchanger	1.00
6. Thermal Conductivity solids and liquids	0.70
7. Drop Wise/ Film Wise Condensation Apparatus	1.00
8. Emissivity Measurement Apparatus	0.40
9. Heat Transfer in Agitated Vessels	0.80
10. Unsteady State Heat Transfer Unit	1.00
11. Heat Transfer In Forced Convection	0.60
12. Heat Transfer in Natural Convection	0.50
13. Computer Controlled heat Transfer Equipments	20.00
	30.6 Lakhs

5. Process Control Lab
Space Required: 1000 Sq. Ft.

Equipments	Approx. Cost (in lakhs)
1. Computerized Closed Loop Level Control Trainer	1.70
2. Computerized Closed Loop Flow Control Trainer	2.30
3. Computerized Ratio Control System	3.00
4. Computerized Split Range Control System	3.00
5. Computerized Cascade Control System	3.00
6. Computerized pH Control System	3.50
7. Computerized Distributed Control System	3.00
8. Computerized Supervisory Control System	2.50
9. PID Control Trainer	2.00
10. P To I Converter Trainer	1.00
11. I To P Converter Trainer	1.00
12. Programmable Logic Control Trainer	3.00

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13. Multi Process Control Trainer	5.00
14. Data Acquisition System (Two)	4.00
15. Computer Controlled Chemical Process Equipment (Distillation column, Reactor and other)	25.00
16. Two Tank Interacting and Non-Interacting System	0.50
17. Control Valve Characteristics	0.90
18. Calibration of Thermocouple	0.60
19. Hardware and Software for creating facility for Modeling and Simulation of Chemical Process	15.00
	80 Lakhs

6. Computer Lab

Space required: 1000 Sq.ft.

	Approx. cost (in lakhs)
1. Twenty Five P- IV PC	10.00
2. Two Work Stations	6.00
3. One Server	3.00
4. Two Network Printer	2.00
5. Software / Computers Simulation Packages (ASPENPLUS, HYSYS, SPEEDUP, FLUENT, MATHEMATICA, BATCHPRO/SUPERPRO, CHEMSEP, MATLAB, STATISTICA, LABVIEW, PRO-II, FLEXPDE MATHCAD, HTFS, PETRONET etc.)	75.00
6. Twenty Four Hour Power Backup, Regulated Power Supply, W- LAN, Infrastructure	20.00
	116.0

Total: 245.1 lakhs

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(iv) Lab Technicians & Assistant	:	6@100 m ²	600 m ²
(v) Office Staff	:	2@100 m ²	200 m ²
(vi) Lab Mechanic	:	9@80 m ²	720 m ²
(vii) Class IV	:	6@70 m ²	420 m ²
Total	:		4065 m ²
Plinth Area	:	1.25×4065 m ²	5081.25 m ²
Estimated Cost (Rs.)	:	@ Rs. 7000/m ²	355.70 lacs

Total Estimated Cost (A+B+C+D+E) : Rs. 852.35 lacs

Item wise breakup of funds required (Rs. In lacs)	2006-07	2007-08	2008-09	2009-10	Total (In lacs)
Building for Instructional & Administrative area	100.00	100.00	34.25	-	234.25
Hostels for Boys	-	194.25	-	-	194.25
Hostels for Girls	-	-	65.80	-	65.80
Construction of Staff Quarters	-	100.00	150.00	105.70	355.70
Books/TLB Books & Journals	3.00	2.00	4.00	4.00	13.00
Equipment for Laboratories	-	50.00	100.00	95.10	245.10
Total	103.00	446.25	354.05	204.80	1108.10

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BUILDING REQUIREMENT

(A) Instructional Area		
(i) Lecture Room (60 students)	: 2 nos. @ 80 sqm	160 m ² .
(ii) Tutorial Room (30 students)	: 3 nos. @ 30 sqm.	90 m ² .
(iii) Seminar Room	: 1	150 m ² .
(iv) Laboratories	: 6	1820 m ² .
Total Area	:	2200 m ² .
Plinth Area	: 1.25 × 2200	2775 m ² .
Estimated Cost (Rs.)	: @ Rs. 7000/m ²	194.25 lacs
(B) Administrative Area		
(i) Faculty Office	: 16	210 m ²
(ii) Administrative Block	: 1	150 m ²
(iii) Conference Room	: 1	100 m ²
Total	:	460 m ²
Plinth Area	: 1.25 × 460	575 m ²
Estimated Cost (Rs.)	: @ Rs. 7000/m ²	40.25 lacs
(C) Toilet Block		
(i) Boys	:	12 m ²
(ii) Girls	:	12 m ²
Total	:	24 m ²
Plinth Area	: 1.25 × 24	30 m ²
Estimated Cost (Rs.)	: @ Rs. 7000/m ²	2.10 Lacs
(D) Hostels		
(a) Boys (175 Seaters)		
(i) Single seated room	: 115 nos. @ 10 m ²	1150 m ²
(ii) Triple Seated room	: 20 nos. @ 20 m ²	400 m ²
(iii) Kitchen & Dinning Hall	: 01	200 m ²
(iv) Toilets & Bathrooms	: 15 nos @ 18 m ²	270 m ²
(v) Common Hall	: 1	200 m ²
Total	:	2220 m ²
Plinth Area	: 1.25 × 2220	2775 m ²
Estimated Cost (Rs.)	: @ Rs. 7000/m ²	194.25 Lacs
(b) Girls (45 Seaters)		
(i) Single seated room	: 24nos. @ 10 m ²	240 m ²
(ii) Triple Seated room	: 07 nos. @ 20 m ²	140 m ²
(iii) Kitchen & Dinning Hall	: 01	150 m ²
(iv) Toilets & Bathrooms	: 4 nos @ 18 m ²	72 m ²
(v) Common Hall	: 1	150 m ²
Total	:	752 m ²
Plinth Area	: 1.25 × 752	940 m ²
Estimated Cost (Rs.)	: @ Rs. 7000/m ²	65.80 Lacs
(E) Faculty/Staff Residence		
(i) Professor	: 3 @175 m ²	525 m ²
(ii) Reader	: 5@150 m ²	750 m ²
(iii) Lecturer	: 8@125 m ²	1000 m ²

Annexure 7.15

Proposal to start the Bachelor of Technology in Printing and Media Technology Course from 2007-2008

The institute desires to start Bachelor of Technology degree program from academic session 2007-2008 in Printing and Media Technology. The main objective of this proposal is to offer a need-based demand-responsive and development centric B. Tech in a highly cost effective manner. In these days of e-age printing there is an urgent need to produce trained manpower who can cope up with the growing requirements of rapidly changing technological developments in the area of Printing and Media Technology.

NEED FOR DEGREE PROGRAMME:

Printing plays important role in almost all the areas of human activity in the civilized world, viz. education, culture, religion, commerce, industry, administration and mass communication. Presently, the emphasis is on mass literacy and quest for new frontiers of knowledge, which is one of the main thrust areas of our new social development programme in the country. There is, therefore, a genuine urge on the part of the Indian Printing Industry to keep itself in-step with the new spirit through the latest technological innovations, which are fast influencing techniques in the area of pre-press, press and post-press technologies. The high speed has increased efficiency and cost effectiveness, which characterize new strides in Printing Technology. Printing industry is very useful to the country's progress in every field.

Today, about a million people are employed in the Printing Industry in India. There is further scope of expansion due to phenomenal increase in literacy and consumerism. There has been tremendous increase in the number of books, newspapers and magazines published during the last few years in India. The Indian Printing Industry has gone in for technological advancement in a big way to meet the ever-growing demand for printed products in the form of books, magazines, newspapers, printed packages, business and computer stationery, product literature, promotional and publicity materials, etc. The advent of electronic and computer applications in Printing Technology has put the entire printing industry in forefront. The Indian Printing Industry on the whole, has responded very well to the modern challenge posed by the emergence of new technology.

The total expenses required for running the course would be Rs 10.7 crores. However if the Northern Regional Institute of Printing Technology is taken over by MNNIT, Allahabad, the total expenses would be around Rs. 7.33 crores.

Item wise breakup of funds required (Rs. In lacs)	2007-08	2008-09	2009-10	2010-11	
Building for Instructional & Administrative area	32.37	26.23	10.00	-	
Hostels for Boys	-	166.69	-	-	
Hostels for Girls	-	50.58	-	-	
Construction of Laboratories	-	28.00	112.00	28.00	
Construction of Staff Quarters	-	100.00	150.00	101.31	
Books /TLB Books & Journals	3.00	2.00	4.00	4.00	
Equipment for Laboratories	-	20.00	100.00	30.00	
Recurring expenses, salaries of staff, operating grants etc.	5.00	17.40	34.40	45.63	
Total :	40.37	410.90	410.40	208.94	1070.61

APPROXIMATE BUDGET ESTIMATE:

(1)	Faculty Designation	Scale	Number	Annual Expenditure (Rs. in Lacs)
	(a) Professor	16,400-22,400	2	6.91
	(b) Reader	12,000-18,300	4	10.11
	© Lecturers	8,000-13,500	9	<u>15.16</u>
				<u>32.18</u>
(2)	Non Teaching Staff Add 25%			<u>8.05</u>
(3)	Department Operating Grant & other charges			<u>5.00</u>
(4)	Grant for Library (Recurring)			<u>0.40</u>
(A)	<u>Total Recurring expenditure</u> :			<u>45.63</u>
(B)	Non-Recurring : (TLB Books + Furnitures)			3.00
	(Books + Journals)			10.00
	Equipments for laboratories			150.00
	Building			<u>805.18</u>
				<u>968.18</u>

GRAND TOTAL (A+B) = 45.63 lacs + 968.18 lacs = 1013.81 lacs



**LIST OF ADDITIONAL LABORATORIES REQUIRED FOR
B.TECH DEGREE IN PRINTING AND MEDIA TECHNOLOGY**

1. Desk Top Publishing Laboratory
2. Printing Image Generation Laboratory
3. Offset Machine Laboratory
4. Flexography Laboratory
5. Interactive Multimedia Laboratory
6. Screen Printing & Gravure Laboratory
7. Tone and Colour Analysis Laboratory
8. Print Finishing & Converting Laboratory
9. Packaging Laboratory
10. Printing Machine Maintenance Laboratory

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BUILDING REQUIREMENT :

(A) Building for Instructional Area :

(i)	Lecture Room (60 students)	2	@ 80 sqm.	160 sqm.
(ii)	Tutorial Room (30 students) -	3	@ 30 sqm.	90 sqm.
(iii)	Seminar Room	1	-	<u>150 sqm.</u>
				400 sqm.

Plinth Area : $1.25 \times 400 = 500.0 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 35.00 lacs

(B) Building for Administrative Area :

(i)	Faculty Room	-	16	210 m ²
(ii)	Administrative Block	-	01	<u>150 m²</u>
				360 m ²

Plinth Area : $1.25 \times 360 = 450 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 31.50 lacs

(C) Toilet Block :

	For Boys	-		12 m ²
	For Girls	-		<u>12 m²</u>
				24 m ²

Plinth Area : $1.25 \times 24 = 30 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 2.10 lacs = Rs. 2.10 lacs

(D) Hostels :

(a) For Boys : (175 Seaters)

(i)	Single seated room	-	115 rooms	@ 9 m ² /room	1035 m ²
(ii)	Triple seated room	-	20 rooms	@ 20 m ² /room	400 m ²
(iii)	Kitchen & Dinning Hall	-	01		200 m ²
(iv)	Toilets & Bathrooms	-	15 x 18		<u>270 m²</u>
					1905 m ²

Plinth Area : $1.25 \times 1905 = 2381.25 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 16668750 = Rs. 166.69 lacs

(b) For Girls : (45 students)

(i)	Single seated room	-	24 rooms	@ 9 m ² /room	216 m ²
(ii)	Triple seated room	-	07 rooms	@ 20 m ² /room	140 m ²
(iii)	Kitchen & Dinning Hall	-	01		150 m ²
(iv)	Toilets & Bathrooms	-	4 x 18		<u>72 m²</u>
					578 m ²

Plinth Area : $1.25 \times 578 = 722.50 \text{ m}^2$

Cost @ Rs. 7000/m² = Rs. 5057500 = Rs. 50.58 lacs

(E) Labs :

- (i) Desk Top Publishing
 - (ii) Printing Image Generation
-

- (iii) Offset Machine
- (iv) Digital Systems & Microprocessors
- (v) Flexography
- (vi) Interactive multimedia
- (vii) Screen Printing & Gravure
- (viii) Tone & Colour Analysis
- (ix) Print Finishing & Converting
- (x) Packaging Lab.
- (xi) Quality Control
- (xii) Printing M/C Maintenance

Plinth Area : $12 \times 200 = 2400 \text{sqm.}$
 Cost @ Rs. 7000/m²

=

Rs. 168.00 lacs

(F) Staff Colony :

(i) Professor Type Quarters	2 x 175 m ²	350 m ²
(ii) Reader Type Quarters	4 x 150 m ²	600 m ²
(iii) Lecturers Type Quarters	9 x 125 m ²	1125 m ²
(iv) Technicians & Assistant @ 2 per dept	6 x 100	600 m ²
(v) Office Staff (Clerk/Typist)	2 x 100	200 m ²
(vi) Mechanics @ 3 per dept.	9 x 80	720 m ²
(vii) Class IVth	6 x 70	420 m ²
		<u>4015 m²</u>

Plinth Area : $1.25 \times 4015 = 5018.75 \text{ m}^2$
 Cost @ Rs.7000/m² = Rs.35131250

351.31 lacs

TOTAL COST OF BUILDING :

(A) Building for Instructional area	=	Rs. 35.00 lacs
(B) Building for Administrative area	=	Rs. 31.50 lacs
(C) Toilet Block	=	Rs. 2.10 lacs
(D) Hostels – For Boys (175 seat)	=	Rs. 166.69 lacs
- For Girls (45 seat)	=	Rs. 50.58 lacs
(E) Labs	=	Rs. 168.00 lacs
(F) Staff Colony	=	Rs. 351.31 lacs

Rs. 805.18 lacs

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B.TECH. IN PRINTING & MEDIA TECHNOLOGY

(1) Teaching Staff :

	<u>Scale</u>	<u>No.of post reqd.</u>	<u>Annual Expenditure (in Rs.)</u>
(i) Professor	16400-22400	2	28,782x12x2 = 6.91 lacs
(ii) Reader	12000-18300	4	21,060x12x4 = 10.11 lacs
(iii) Lecturer	8000-13500	9	14,040x12x9 = <u>15.16 lacs</u>
			<u>32.18 lacs</u>

(2) Non-Teaching Staff :

Add 25 %

8.05 lacs

(3) Department Operating Grant & Other Charges :

5.0 lacs

(4) Grant for Library (Recurring)

0.40 lacs

(A) Total Recurring Expenditure =

45.63 lacs

(B) NON-Recurring :

(i) TLB Books + Furniture	=	3.00 lacs
(ii) Books + Journals	=	10.00 lacs
(ii) Equipments for Laboratories	=	150.00 lacs
(iv) Building	=	805.18 lacs

Total :

968.18 lacs

Grand Total (A + B) = Rs. 45.63 + 968.18 lacs = Rs.1013.81 lacs



STRUCTURE OF B.TECH. IN PRINTING & MEDIA TECHNOLOGY

SEMESTER – I

Sl. No.	Subject	L	T	P	Cr
PH-101	Physics-I	3	1	3	5
MA-101	Mathematics-I	3	1	0	4
CS-101	Introduction to Engg. Profession	2	0	2	3
EX-101	Electrical & Electronics Engg.	4	0	2	5
HS-101/ CH-101	English Language and Composition/ Chemistry	2 3	1 1	1 2	3 5
ME-101/ MC-101	Introduction to Manufacturing Processes/ Engineering Graphics	2 2	0 0	2 4	3 4
		16/17	3/3	10/13	23/26

SEMESTER – II

Sl. No.	Subject	L	T	P	Cr
PH-201	Physics-II	3	1	2	5
MA-201	Mathematics-II	3	1	0	4
CS-201	Computer Programming	2	1	2	4
HS-201/ CH-201	English Language and Composition/ Chemistry	2 3	1 1	1 2	3 5
AM-201	Engineering Mechanics	3	1	2	5
ME-201/ MC-201	Introduction to Manufacturing Processes/ Engineering Graphics	2 2	0 0	2 4	3 4
		15/16	5/5	9/12	24/27

SEMESTER –III

Sl. No.	Subject	L	T	P	Cr
MA-301	Mathematics-III	3	1	0	4
PM-301	Offset Machinery – I	3	1	2	5
PM-302	Printing Material Science	3	1	-	4
PM-303	Paper & Ink	3	1	-	4
PM-304	Electronic Composition & DTP	3	-	2	4
ME-302	Industrial Engineering	3	1	0	4
		18	5	4	25

SEMESTER -IV

Sl. No.	Subject	L	T	P	Cr
EE- 401	Electrical Drives & Controls	3	-	2	4
PM-400	Theory of Machines	3	1	2	5
PM-401	Reprographic Engineering	3	1	0	4
PM-402	Design & Planning for Media Production	3	1	0	4
PM-403	Offset Machinery-II	3	1	2	5
ME-404	Production and Operations Management	2	1	0	3
		17	5	6	25

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SEMESTER -V

Sl. No.	Subject	L	T	P	Cr
EX-501	Digital Systems & Micro Processors	3	1	2	5
PM-501	Screen Printing & Graveure	3	1	2	5
ME-501	Machine Design	3	1	2	5
PM-502	Flexography	3	-	2	4
PM-503	Non Impart Printing	3	1	0	4
PM-504	Printing Image Generation	3	-	2	4
		18	4	10	27

SEMESTER - VI

Sl. No.	Subject	L	T	P	Cr
CS- 601	Comp.Graphics & Image Processing	3	1	2	5
PM-601	Packaging Technology	3	1	2	5
PM-602	Instrumentation & Control for GAI	3	1	2	5
PM- 603	Tone & Colour Analysis	3	-	2	4
PM-604	Print Finishing & Converting	3	1	-	4
PM-605	Interactive Multimedia	3	-	2	4
		18	4	10	27

SEMESTER -VII

Sl. No	Subject	L	T	P	Cr
PM- 701	Web Publishing & Marketing	3	1	2	5
OE-701	Open Elective-I	3	1	-	4
PM-702	Professional Elective-I	3	1	-	4
PM-703	Professional Elective-II	3	1	-	4
PM-704	Project	-	-	16	8
		12	4	18	25

SEMESTER-VIII

Sl.No.	Subject	L	T	P	Cr
PM- 801	Maintenance Engineering	3	1	2	5
OE- 801	Open. Elective-II	3	1	-	4
PM-803	Professional Elective-III	3	1	-	4
PM-804	Professional Elective-IV	3	1	-	4
PM-805	Project	-	-	16	8
		12	4	18	25

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List of Professional Electives

Group - 1

1. Computer Aided Publishing
2. Advertising Theory & Practice
3. CAD/CAM in Printing

Group - 2

1. Total Quality Management in GAI
2. Print Management Costing & Estimating
3. Production Planning & Control

Group - 3

1. Media Ethics & Managing Media Elements
2. Planning & Print Estimating
3. On Demand Printing

Group - 4

1. Printing Plant Layout Facility Design
2. Publishing Science
3. News Paper Technology
4. Electronic Paper

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