MANDATORY DISCLOSURE AS PER AICTE GUIDELINES

1. Name of the Institute:
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH
BLOCK FC, SECTOR III, SALT LAKE CITY, KOLKATA – 700 106
Tel No. (033) 6625 1919 FAX (033) 23376331 Website: www.nitttrkol.ac.in

2. Name and address of the Society:
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH
BLOCK FC, SECTOR III, SALT LAKE CITY, KOLKATA – 700 106
Tel No. (033) 6625 1900 FAX (033) 23376331
E mail director_nitttr_kol@yahoo.com(1

3. Name and address of the Director:
Dr. Phalguni Gupta
NITTTR, KOLKATA, FC campus, Sector IIIl Salt Lake, Kol -106
Tel No. (033) 23370937, Mobile 9433134280, E mail director@nitttrkol.ac.in

4. Name of the Affiliating University:
MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY
Haringhata, Nadia, Pin 741249, West Bengal

5. Governance:
Members of the Board and their brief background: See Annexure **I**
Member of Academic Advisory Body: See Annexure **II**
Frequently of the Board Meeting and Academic Advisory Body: Quarterly
Organizational chart and processes: See Annexure **III**
Nature and Extent of involvement of Faculty and students in academic affairs/improvement: Yes
Mechanism/Norms and Procedure for democratic/good Governance: Yes
Student Feedback on Institutional Governance/Faculty performance: Available
Grievance Redressal mechanism for Faculty, staff and students: See Annexure **II**
Establishment of Anti Ragging Committee: See Annexure **II**
Establishment of Online Grievance Redressal Mechanism: under process
Establishment of Groevance Redressal Committee in the Institution and
Appointment of OMBUDSMAN by the University: See Annexure **II**
Establishment of Internal Complaint Committee: See Annexure **II**
Establishment of Committee for SC/ST: See Annexure
Internal Quality Assurance Cell: Not available

6. Programmes:

Name of the Programmes approved by AICTE
ENGINEERING AND TECHNOLOGY
Course name & Unique Id

1. Manufacturing Technology 1-1454818905
2. Multimedia and Software Systems 1-1454818908
3. Mechatronics 1-1454818910
4. Structural Engineering 1-1454818912

Name of Programmes Accredited by AICTE: Nil
Status of Accreditation of the Courses
No accreditation in respect of any above courses
Total number of courses – 04 (four)
Number of courses for which applied for Accreditation – yet to be apply
Status of Accreditation: preliminary
For each Programme the following details are given

Name	No.of Seats	Duration	Cut off mark/rank of admission During last three years	Fee (1st semester to 4th semester)	Placement Facility	Campus placement in last three years with min/max salary and average salary
Manufacturing Technology	28	02 yrs	Admission through PGET conducted by MAKAUT		Yes	Nil
Mechatronics Engineering	28	02 yrs	Admission through PGET conducted by MAKAUT		Yes	Nil
Multimedia & Software Systems	28	02 yrs	Admission through PGET conducted by MAKAUT		Yes	Nil
Structural Engineering	08	02 yrs	Admission through PGET conducted by MAKAUT		Yes	Nil

Name and duration of programme(s) having Twinning and Collaboration with Foreign University and being run in the same Campus along with status of their AICTE approval.
There is no such programme run by the NITTTR, Kolkata

7. Faculty

Sl. No.	**Stream**	Name of Permanent Faculty	Unique Id
1.	Mechatronics Engineering	Dr. Prasanta Sarkar	1-465973007
		Dr. Soumitra Kumar Mandal	1-466177391
		Dr. Subrata Chattopadhyay	1-466177395
		Dr. Sagarika Pal	1-466177399
		Dr. Urmila Kar	1-3630725242
		Mr. Sukanta Kumar Naskar	1-466225865
2.	Multimedia and Software Systems	Dr. Ranjan Dasgupta	1-465972501
		Dr. Samir Roy	1-465972505
		Mr. Rajeev Chatterjee	1-465972509
		Dr. Indrajit Saha	1-2910799058
		Dr. Kinsuk Giri	1-2910552577
3.	Structural Engineering	Dr. Uday Chand Kumar	1-3356270636
		Dr. Jagat Jyoti Mondal	1-523774585
		Mrs. Mithu Dey	1-523774671
		Dr. Sailendra Kumar Mondal	1-466225869
		Dr. Santanu Bhanja	1-523774637
4.	Manufacturing Technology	Dr. Samiran Mondal	1-465662041
		Dr. Dipankar Bose	1-465581125
		Dr. Subrata Mondal	1-2910799051
		Dr. Arpan Kumar Mondal	1-2910867255
		Dr. Rayapati Subba Rao	1-2910529920
		Mr. Nirmal Kumar Mondal	1-465662045
5.	Education	Dr. Habiba Hussain	1-523774679

There is no Adjunct Faculty at NITTTR, Kolkata

Permanent Faculty, Student Ratio: 23:186

Number of faculty employed and left during the last three years: 03

8. Profile of Director/Faculty

See Annexure **IV**

9. Fees

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA
Block FC, Sector – III, Salt Lake City, Kolkata - 700106

Fee Structure for M.Tech Programme, Session 2018-19/19-20

Sl. No.	Fee Structure	Amount (Rs.)	Remarks
1.	Admission Fee (Non-refundable)*	5,000/-	One time payable during Admission
2.	Caution Money (Refundable after duration of Course)	10,000/-	
			Per Semester
3.	Tuition Fee	25,000/-	
4.	Sports fee	200/-	
5.	Cultural fees	300/-	
6.	Laboratory fee & Library fee	1,000/-	
7.	Development fee	1,500/-	
8.	Medical Insurance Scheme (non-refundable)	2,000/-	Payable with 1st and 3rd semester fees
	Total	**45,000/-**	During Admission

- NB : For 2nd Semester fee Rs. 28,000.00 , 3rd Semester fee Rs. 30, 00.00 and 4th Semester Fees Rs. 28,000.00
- PGET nominated candidates those who have paid the admission fee* directly to MAKAUT, WB, shall not to pay the same but other candidates selected for admission through advertisement shall have to pay the admission fee* at the time of admission.

Sd/-

(Dr. S. K. Mandal)
PG Co-ordinator

Instructions:

Semester Fees should be deposited at the beginning of semester i.e. within 15th January and 15th July every year. However, students unable to deposit the semester fee within the above period may also deposit their semester fee within 25th January and 25th July every year i.e. the extended period. Students who will pay the semester fee beyond the stipulated period but during the extended period shall have to pay an amount of Rs.2, 000.00 extra as late fine in addition to normal semester fee. No semester fee will be collected after the extended period as specified earlier under any circumstances. No separate notice will be served in this regard.

Semester FEE will be paid online. No other mode of payment is acceptable.

All kinds of fees are non-refundable. Only Caution money will be refunded after successful completion of the course or voluntary withdrawal from the course whichever is applicable. Refund of caution money deposit subject to submission of original money receipt

No. of Fee waiver granted with amount and name of the student

There is no such provision.

Number of scholarship offered by the Institution, duration and amount

There is no such provision. Only GATE scholarship allowed which is paid by MHRD

Estimated cost of boarding and lodging in the Hostels

Rs. 5,000.00 per month

10. Admission (No of seats sanctioned with the year of approval 18-19

Sl. No.	Stream	No. of seats
1.	**Manufacturing Technology**	**28**
2.	**Mechatronics Engineering**	**28**
3.	**Multimedia and Software Systems**	**28**
4.	**Structural Engineering**	**08**

No. of students admitted under various categories each year in the last three years

Sl.no.	Year	Stream	Gen	SC	ST	OBC	Minority	Total
1.	2016-17	Manufacturing Tech	11	03	01	05	03	23
2.	2016-17	Structural Engg	05	01	01	02	-	09
3.	2016-17	Multimedia & software Engg	08	-	-	-	01	09
4.	2016-17	Mechatronics	08	-	01	02	02	13
Sl.no.	Year	Stream	Gen	SC	ST	OBC	Minority	Total
1.	2017-18	Manufacturing Tech	11	04	-	02	05	22
2.	2017-18	Structural Engg	04	01	01	02	01	09
3.	2017-18	Multimedia & software Engg	02	-	01	-	-	03
4.	2017-18	Mechatronics	11	4	-	03	01	19
Sl.no.	Year	Stream	Gen	SC	ST	OBC	Minority	Total
1.	2018-19	Manufacturing Tech	07	01	-	01	02	11
2.	2018-19	Structural Engg	05	01	-	00	02	08
3.	2018-19	Multimedia & software Engg	05	-	-	-	-	05
4.	2018-19	Mechatronics	10	-	-	01	01	12

No. of applications received during last two years for admission under Management Quota and no. of admitted.

There is no Management Quota

11. Admission Procedure

Admission based on recommendation of PGET conducted by MAKAUT, WB for filling up the Post graduate seats in Engineering. Residual vacancy if any are being filled by advertisement subject to permission of MAKAUT, WB

In such cases priority is given in such manner

1. GATE + PGET rank

2. GATE

3. PGET QUALIFIED

4. SGPA POINT AT DEGREE LEVEL

Last date of request for applications: 13th August

Last date of submission of application: 13th August

Date for announcing final results: 13th August

Release of admission list: 13th August

Last date for closing admission: 17th August

Starting of Academic Session: 2nd September

The waiting list shall be activated only on the expiry of date of main list: yes

The policy of refund of the fee, in case of withdrawal: see item no. 6 under fees

12. Describe each criteria with respective weightages

GATE score : 25

PGET score : 15

Degree score : 30

Interview score: 30

Minimum level of acceptance: nil

Cut of levels: minimum 40% out of 100

Display of marks scored in Test etc. and in aggregate for all candidates who were admitted

See annexure **V**

13. List of applicants during 2018-19

See Annexure **VI**

14. **Results of Admission under Management seats**

There is no admission under Management quota

15. Information of Infrastructure and other Resources available

No. of class rooms: 10 nos average 40 sqm each

No. of Tutorial rooms: 04 nos average 38 sqm each

No. of Laboratories: 26 nos total 1700 sqm average 65 sqm each

No. of Drawing hall : 01 no. 156 sqm

No. of computer centres and capacity : 01 no 200 sqm

Central Examination facility : 04 rooms capacity – 80 persons each

Barrier Free Built Environment for disabled and elderly persons: Available

Occupancy Certificate: Since it is a Govt. Building under Govt. Building Act 1899 applicable

Fire and Safety Certificate: Initiated

Hostel facility: Available Male -49 and Female -11

Library

Books Volumes: 23782 , Title : 19302

National Journals – nil

International Journals- nil

E library facility: not available

Laboratory and Workshop

List of major Equipment Facilities in each Laboratory/Workshop

List as per annexure **VII**

List of experimental Setup in each Laboratory/Workship

List as per annexure **VII**

Computing Facilities

Internet Bandwidth: 100

Number and configuration of System: i7, window 10, 4 GB RAM, 2 GB graphics card

Total number of system connected by LAN: 250 – 300

Total number of system connected by WAN: 250 – 300

Major software packages available: MATLAB, ABAQAS, ANSYS, ETABS

Special purpose facilities available: WIFI CAMPUS, DATA CENTRE, CAD CAM LABORATORY, WELDING CENTRE

Innovaion Cell: Available

Social Media Cell: Not available

Compliance of the National Academic Depository (NAD), applicable to PGCM Intuitions and University Department: No

List of facilities available

Games and Sports facilities: yes

Extra-curricular Activities: available

Soft Skill Development Facilities: available

Teaching Learning Process

Curricula and syllabus for each of the programmes as approved by the University

See Annexure

Academic calendar of the University: see MAKAUT website

Academic Time Table with the name of the faculty members handling the course

See Annexure VIII

Teaching Load of each Faculty: 18 contact hours per week (approximate)

Internal Continuous Evaluation systems and place: yes

Student's assessment of Faculty, System in place: not available

For each Post Graduate Courses give the following

Please see item no. 6

Curricula and Syllabi: See Annexure **IX**

Laboratory facilities exclusive to the Post Graduate Course: Available in each department

Special Purpose

Software, all design tools in case: available

Academic Calendar and frame work: See Annexure **X**

17. List of Research Projects/Consultancy Works

Not available

18. LoA and subsequent EoA till the current Academic year

See Annexure **XI**

19. Accounted audited statement for the least three years

See Annexure **XII**

20. Best Practices adopted, if any

Ample scope of hands on practice and skill development

Annexure I

1. Name and address of the Society:

National Institute of Technical Teachers' Training and Research, Kolkata
Block-FC, Sector-III, Salt Lake, Klkata-700106, West Bengal
Telephone: 033 6625 1900, 033-2337-0937
Email: director_nitttr_kol@yahoo.com

5. Governance:
Member of the board and their brief background:

CHAIRMAN	Capacity	MEMBERs
Shri Harshavardhan Neotia Chairman AmbujaNeotia Group	2 MHRD Officials	Additional Secretary to the Government of India Ministry of Human Resource Development Dept. of Higher Education, Room No. 122 B-C Shastri Bhawan, New Delhi – 110 115
		Joint Secretary & Financial Adviser IFD, Deptt. of Higher Education Ministry of HRD, Govt. of India Shastri Bhawan, Room No. 120C New Delhi – 110 115
	5 DTEs	Director Department of Technical Education Government of Harayana Bays No: 7-12, Sector-4 Panchkula – 134112
		Director Department of Technical Education Government of Uttar Pradesh Vikas Nagar Kanpur-208 024
		Director Technical Education Government of Manipur Takyel, Imphal, Manipur Manipur-795001
		Director Department of Science & Technology Government of Jharkhand Nepal House, Doranda Ranchi-834002
		Director Department of Technical Education Government of Assam Kahilipara Guwahati-19, Assam
	AICTE Representative	Prof. Ajoy Kumar Roy Ex-Director IIEST Shibpur, P.O.-Botanic Garden Howrah-711 103

	2 Industrial Experts	Prof. Virendra Kumar Tewari Professor, Agricultural and Food Engineering Indian Institute of Technology, Kharagpur Kharagpur-721 302 West Bengal
		Shri Sajjan Bhajanka Chairman of Board and Managing Director Century Plyboards (India) Ltd. Century House P15/1, Taratala Road Kolkata-700 088
	Member Secretary	Director NITTTR, Kolkata Block-FC, Sector-III Salt Lake, Kolkata-700106 West Bengal

Annexure II

National Institute of Technical Teachers' Training & Research, Kolkata

(Under the Ministry of Human Resource Development, Government of India)

Block-FC, Sector-III, Salt Lake, Kolkata-700 106

Ref. No. NITTTR-K/E/5-3/2018-19/757 Date: 23rd July 2018

OFFICE ORDER NO. 149 OF 2018-19

In supersession of all previous orders in this regard, different Committees comprising the following are hereby constituted for 2 years and until further order with immediate effect:

Name of the Committee	Name and Designation of the Members	Nominated as
Budgetary Board	1. Dr. Prasanta Sarkar	Chairman
	2. Head, Mechanical Engineering	Member
	3. Head, Computer Science & Engineering	Member
	4. Head, Electrical Engineering	Member
	5. Head, Civil Engineering	Member
	6. Head, Education and Management	Member
	7. Faculty-in-Charge, Accounts	Member Secretary
Departmental Promotion Committee	1. Dr. Jagat Jyoti Mandal	Chairman
	2. Dr. Soumitra Kumar Mandal	Member
	3. Shri S. M. Ejaz Ahmed	Ext. Member
	4. Dr. Sukanta Kumar Naskar	Member
	5. Sr. Administrative Officer	Member Secretary
Modified Assured Career Progression Scheme Committee	1. Dr. Dipankar Bose	Chairman
	2. Dr. Soumitra Kumar Mandal	Member
	3. Shri Nirmal Kumar Mandal	Member
	4. Sr. Administrative Officer or Nominee	Member Secretary
Staff Quarter Allotment Committee	1. Dr. Urmila Kar	Chairperson
	2. Faculty-in-Charge, Estate	Member
	3. Sr. Administrative Officer or Nominee	Member
Anti-Ragging Committee	1. Dr. Uday Chand Kumar	Chairman
	2. Head, Mechanical Engineering	Member
	3. Head, Computer Science & Engineering	Member
	4. Head, Electrical Engineering	Member
	5. Head, Civil Engineering	Member
	6. Hostel Warden	Member
	7. One Student Representative	Member
	8. PG Coordinator	Member Secretary
Long Leave Committee	1. Head, Electrical Engineering	Chairman
	2. Head, Mechanical Engineering	Member
	3. Head, Computer Science & Engineering	Member
	4. Head, Education and Management	Member
	5. Head, Civil Engineering	Member
	6. Sr. Administrative Officer or Nominee	Member Secretary
Anti-Plagiarism Committee	1. Faculty-in-Charge, Library	Chairman
	2. Head, Computer Science & Engineering	Member
	3. Head, Civil Engineering	Member
	4. Head, Mechanical Engineering	Member
	5. Head, Electrical Engineering	Member
	6. Head, Education & Management	Member
	7. Sr. Administrative Officer or Nominee	Member Secretary
Post Graduate Programme Advisory (PGPA) Committee	1. Dr. Samiran Mandal	Chairman
	2. Head, Mechanical Engineering	Member
	3. Head, Computer Science & Engineering	Member
	4. Head, Electrical Engineering	Member
	5. Head, Civil Engineering	Member
	6. PG Coordinator	Member Secretary

Name of the Committee	Name and Designation of the Members	Nominated as
Library Committee	1. Dr. Samiran Mandal	Chairman
	2. Dr. Rayapati Subba Rao	Member
	3. Dr. Indrajit Saha	Member
	4. Dr. Soumitra Kumar Mandal	Member
	5. Smt. Mithu Dey	Member
	6. Dr. Habiba Hussain	Member Secretary
Standing Technical Evaluation Committee	1. Dr. Soumitra Kumar Mandal	Chairman
	2. Dr. Sukanta Kumar Naskar	Member
	3. Dr. Indrajit Saha	Member
	4. Shri Nirmal Kumar Mandal	Member Secretary
Asset & Log Register Management Committee	1. Faculty-in-Charge, Central Stores	Chairman
	2. Head, Mechanical Engineering	Member
	3. Head, Computer Science & Engineering	Member
	4. Head, Electrical Engineering	Member
	5. Head, Civil Engineering	Member
	6. Head, Education and Management	Member
	7. Faculty-in-Charge, Estate	Member Secretary
Staff Development Committee	1. Dr. Sukanta Kumar Naskar	Chairman
	2. Shri Joydeep Bandopadhyay	Member
	3. Secretary, Staff Council	Member
	4. Sr. Administrative Officer or Nominee	Member Secretary
House Building Advance Committee	1. Dr. Uday Chand Kumar	Chairman
	2. Dr. Samiran Mandal	Member
	3. Faculty-in-Charge, Accounts	Member
	4. Sr. Administrative Officer or Nominee	Member Secretary
Website Management Committee	1. Director	Chairman
	2. Academic Coordinator	Member
	3. Secretary, Academic Council	Member
	4. Head, Computer Science & Engineering	Member
	5. Sr. Administrative Officer or Nominee	Member
	6. Dr. Indrajit Saha	Member Secretary
Institute of Future Learning (IFL)	1. Dr. Dipankar Bose	Chairman
	2. Shri Avijit Kundu	Member
	3. Shri Prasanta Paul	Member
	4. Shri Yogamay Das	Member Secretary
Network Management Committee	1. Dr. Indrajit Saha	Chairman
	2. Shri Rajeev Chatterjee	EX-officio Member
	3. Dr. Kinsuk Giri	Member
	4. Dr. Arpan Kumar Mondal	Member
	5. Shri Utpal Chakraborty	Member
	6. Shri Debashis Shaw	Member
	7. Shri Avijit Kundu	Member Secretary
Internal Complaints Committee	1. Dr. Ranjan Dasgupta	Chairman
	2. Dr. Samiran Mandal	Member
	3. Dr. Habiba Hussain	Member Secretary

(Phalguni Gupta)
Director

Copy for information and necessary action to:

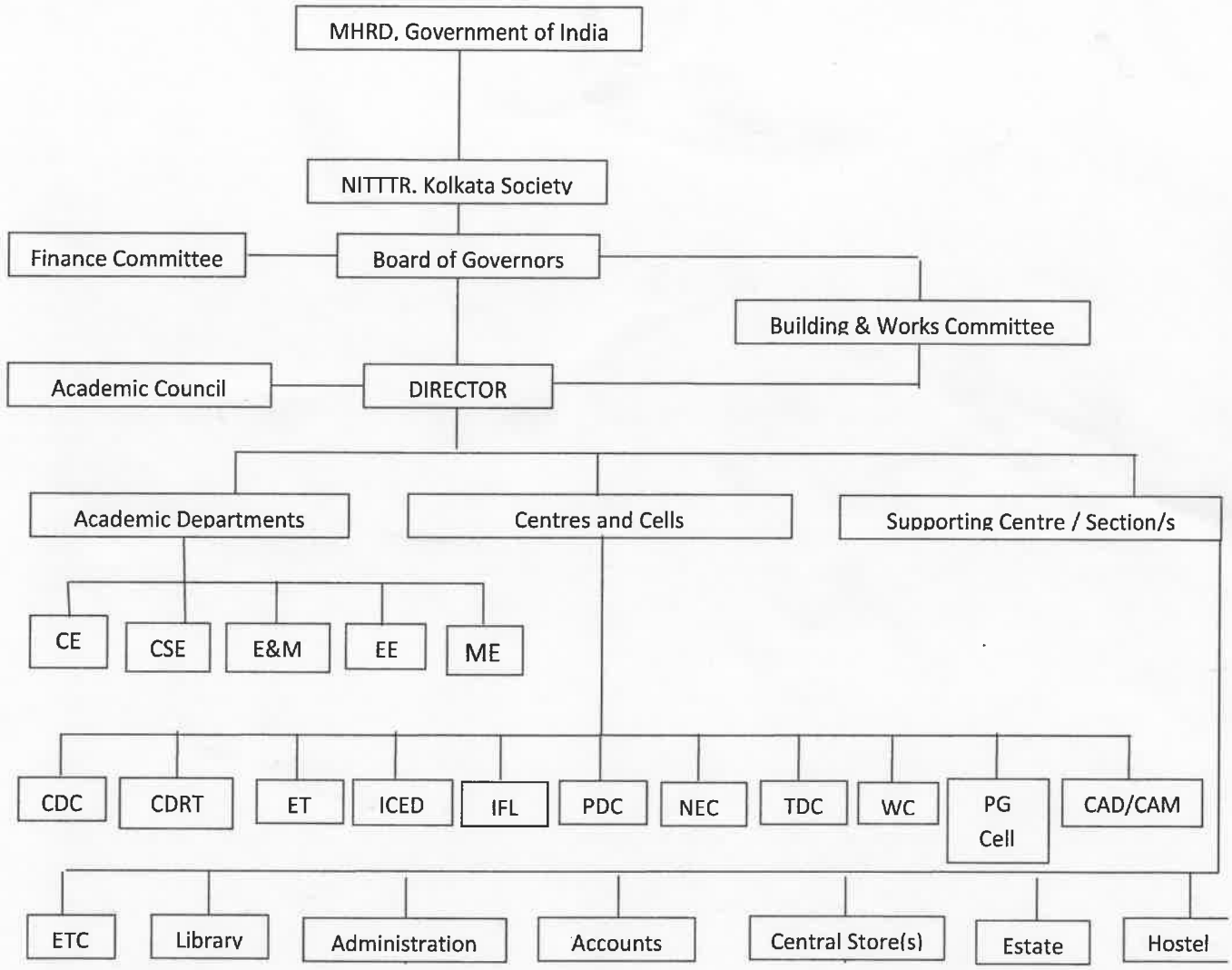
1. All concerned Committee Members as specified above
2. Personal File of all concerned faculty and Staff Members of the Institute
3. FIC, Accounts
4. Director's Secretariat
5. Circulation to all Department and Section

(Sagarika Pal)
Faculty-in-Charge (Administration)

Annexure III

National Institute of Technical Teachers' Training and Research, Kolkata

The organizational structure is given below.



CE-Civil Engineering, CSE-Computer Science & Engineering, E&M-Education and Management, EE-Electrical Engineering, ME-Mechanical Engineering, CDC-Curriculum Development Centre, CDRT-Community Development and Rural Technology, ET-Education Technology, ICED-Industrial Consultancy & Entrepreneurship Development, IFL-Institute of Future Learning, PDC-Product Development Cell, NEC-Non-Conventional Energy Cell, TDC-Technology Development Cell, WC-Welding Centre, CAD/CAM Centre

Annexure-IV

FACULTY UNIQUE ID		TITLE	FIRST NAME	MIDDLE NAME	LAST NAME	DATE OF BIRTH (DD-MON-YY)	EXACT DESIGNATION	PROGRAMME	COURSE	TEACHING FOR PG	DOCTRATE DEGREE	PG DEGREE	UG DEGREE	TEACHING EXPERIENCE	RESEARCH EXPERIENCE	WORK EXPERIENCE	OTHER QUALIFICATION	AREA OF SPECIALIZATION	NO OF PUBLICATIONS IN NATIONAL JOURNAL	NO OF PUBLICATIONS IN NATIONAL CONFERENCE	NO OF PUBLICATIONS IN INTERNATIONAL JOURNAL	NO OF PUBLICATIONS IN INTERNATIONAL CONFERENCE	PATENTS	NO OF PG PROJECT GUIDED	NO OF DOCTRATE STUDENTS GUIDED	NO OF BOOKS PUBLISHED
1-465662041		Dr.	SAMIRAN		MANDAL	22-SEP-56	PROFESSOR	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	Y	Y	M.TECH	B.E.	25	25	5		ROBOTICS	9	0	0	0	0	30	0	0
1-465662045		Mr.	NIRMAL	KUMAR	MANDAL	15-SEP-66	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	Y	N	M.E.	B.E.	20	15	1		MANUFACTURING	1	18	8	18	0	25	0	2
1-465972505		Dr.	SAMIR		ROY	08-JUL-63	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MULTIMEDIA AND SOFTWARE ENGINEERING	Y	Y	M.TECH	B.TECH	25	20	0		COMPUTER SCIENCE	10	8	40	8	0	25	3	1
1-465972509		Mr.	RAJEEV		CHATTERJEE	02-MAY-76	PROFESSOR	ENGINEERING AND TECHNOLOGY	MULTIMEDIA AND SOFTWARE ENGINEERING	Y	N	M. TECH	B.TECH	19	4	0		COMPUTER SCIENCE	1	3	25	3	0	0	0	0
1-466177391		Dr.	SOUMITRA	KUMAR	MANDAL	06-JUL-71	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHATRONICS	Y	Y	M.TECH	B.E.	23	15	0		POWER ELECTRONICS	10	13	10	13	0	29	1	4
1-466225869		Dr.	SAILENDRA	NATH	MANDAL	19-OCT-66	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHATRONICS	Y	Y	M.TECH	B.TECH	22	20	0		CHEMICAL	19	16	19	16	0	1	1	0
1-523774671		Mrs.	MITHU		DEY	03-OCT-79	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	Y	N	M.E	B.C.E	11	3	0		STRUCTURAL ENGG	1	1	0	1	0	4	0	0
1-466177395		Dr.	SUBRATA		CHATTOPADHYAY	05-JUL-65	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHATRONICS	Y	Y	M.TECH	B.TECH	20	11	6		MEASUREMENTS & INSTRUMENTATION	0	30	44	30	0	17	3	0
1-523774679		Dr.	HABIBA		HUSSAIN	20-MAR-74	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	Y	Y	M.SC, M.ED	B.SC, B.ED	13	19	0	EDUCATIONAL MANAGT	EDUCATIONAL PSYCHOLOGY	9	0	7	0	0	0	1	0
1-2910552577		Dr.	KINSUK		GIRI	07-OCT-84	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	SCIENTIFIC COMPUTING	Y	Y	M.SC	B.SC	0.75	8	0	M.SC		10	8	20	8	0	0	0	1
1-2910867255		Mr.	ARPAN	KUMAR	MONDAL	12-NOV-86	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Y	Y	M TECH	B TECH	4	7	0			2	5	12	5	0	12	0	1
1-3630725242		Dr.	URMILA		KAR	02-JAN-61	PROFESSOR	ENGINEERING AND TECHNOLOGY	ELECTRIC POWER SYSTEM	Y	Y	MEE	BE	11	0	0			2	9	8	9	0	0	1	1
1-465973007		Dr.	PRASANTA		SARKAR	02-JAN-59	PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHATRONICS	Y	Y	M.TECH	A.M.I.E.	26	20	10		CONTROL SYSTEM	24	19	24	19	0	32	2	0
1-466177399		Dr.	SAGARIKA		PAL	11-FEB-69	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHATRONICS	Y	Y	M.TECH	B.TECH	21	10	0		INSTRUMENTATION	15	29	4	29	0	53	0	0
1-523774585		Dr.	JAGAT JYOTI		MANDAL	31-MAY-57	PROFESSOR	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	Y	Y	M. TECH	B. TECH [HONS]	33	20	3		SOIL MECHANICS	6	1	8	1	0	10	0	0
1-2910799051		Dr.	SUBRATA		MONDAL	27-FEB-75	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	MATERIAL SCIENCE AND TECHNOLOGY	Y	Y	M ED	B ED	5	10	1			1	46	17	46	2	5	0	0
1-3356270636		Dr.	UDAY	CHAND	KUMAR	12-NOV-58	PROFESSOR	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	Y	Y	M.SC(CIVILENGG	B.TECH	35	10	2			2	4	0	4	0	1	2	0
1-465972501		Dr.	RANJAN		DASGUPTA	31-JUL-60	PROFESSOR	ENGINEERING AND TECHNOLOGY	MULTIMEDIA AND SOFTWARE ENGINEERING	Y	Y	M.TECH	B.TECH	25	22	5		DBMS, GIS, DC & WBE	2	12	50	12	0	45	2	0
1-523774637		Dr.	SANTANU		BHANJA	24-APR-66	PROFESSOR	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	Y	Y	M. TECH	B.C.E	23	25	7		STRUCTURAL ENGG	15	10	25	10	0	30	1	1
1-2910799058		Dr.	INDRAJIT		SAHA	10-OCT-83	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	COMPUTER SCIENCE AND INFORMATION TECHNOLOGY	Y	Y	M TECH	B. TECH	5	7	0	M.TECH		1	20	49	20	0	5	1	0
1-2910529920		Dr.	RAYAPATI		SUBBARAO	10-JUL-74	ASST PROFESSOR	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Y	Y	M TECH	B TECH	10	1.5	2			7	23	33	23	0	15	0	0
1-465581125		Dr.	DIPANKAR		BOSE	18-DEC-60	PROFESSOR	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	Y	Y	M.E.	B.E.	28	23	0		FLUID POWER, RELIABILITY ENGG	10	20	15	20	0	35	2	0
1-466225865		Mr.	SUKANTA		NASKAR	06-JUL-70	ASSOCIATE PROFESSOR	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	Y	N	HRDM	B. PROD.E.	21	6	1		MANAGEMENT	5	5	5	5	0	8	0	0

Annexure V

NATIONAL INSTITUTE OF T ECHNICIAL TEACHERS' TRAINING AND RESEARCH
BLOCK FC, SECTOR III, SALT LAKE CITY
KOLKATA – 700 106

NOTE

In response to this office advertisement No. 06/2018 regarding filling up the vacant seats of M. Tech courses (session 18-19), the following candidates appeared in the walk-in –interview held on 13-8-2018.

Multimedia and Software Systems (session 18-19)

Sl. No.	Name of the Candidate	Category	Marks (out of 100)
1.	Bhushan Awasarmal	Gen	25
2.	ANUPAM MAJUMDER	Gen	70 #

Manufacturing Technology (session 18-19)

Sl. No.	Name of the Candidate	Category	Marks (out of 100)
1.	SRIDIP SARBABIDYA	Gen	70
2.	ABIR CHAI	OBC	60
3.			
4.			

Mechatronics Engineering (session 18-19)

Sl. No.	Name of the Candidate	Category	Marks (out of 100)
1.	RASHMI CHAKRABORTY	Gen	30
2.	SHIVAM ROY CHOWDHURY	Gen	65
3.	ANKIT MITRA	Gen	75
4.	ACHINTA MONDAL	Gen	80
5.	TRINA SINHA	Gen*	55*
6.	SRIDIP PATTANAYAK	Gen	70
7.	MOUMITA MITRA	Gen	60
8.			
9.			
10.			

It may also be noted that no candidate has appeared in the interview against the vacant ST seat against Structural Engineering.

....2/-

Cut-off marks = 40 out of 100

Subject to submission of 7th and 8th Semester grade cards.

* Against vacant OBC seat.

Director – for his kind approval.

13/8

NATIONAL INSTITUTE OF T ECHNICIAL TEACHERS' TRAINING AND RESEARCH
BLOCK FC, SECTOR III, SALT LAKE CITY
KOLKATA – 700 106

List of candidates provisionally selected for admission in M. Tech courses (session 18-19) in respect of vacant seats vide Walk-in-Interview held on 13/08/2018 at NITTTR, FC Campus.

Sl. No..	M. Tech Programme	Name of the candidate	Category
1.	Multimedia and Software Systems	Anupam Majumder*	General

* Subject to submission of 7th and 8th semester grade cards

Sl. No..	M. Tech Programme	Name of the candidate	Category
1.	Manufacturing Technology	Sridip Sarbabidya	General
2.	Manufacturing Technology	Abir Chai	OBC

Sl. No..	M. Tech Programme	Name of the candidate	Category
1.	Mechatronics Engineering	Achinta Mondal	General
2.	Mechatronics Engineering	Ankit Mitra	General
3.	Mechatronics Engineering	Sridip Pattanayak	General
4.	Mechatronics Engineering	Shivam Roychowdhury	General
5.	Mechatronics Engineering	Moumita Mitra	General
6.	Mechatronics Engineering	Trina Sinha	General

Selected candidates should take admission on or before 17/08/2018 4p.m. (except holidays).

(Phalguni Gupta)
Director

DIRECTOR
NATIONAL INSTITUTE OF TECHNICAL
TEACHERS' TRAINING AND RESEARCH
BLOCK-FC, SECTOR-III, SALT LAKE CITY
KOLKATA-700 106

Annexure VI

ATTENDANCE SHEET

Interview for Admission to M. Tech. 2018-19 Academic Year
Date: 13/08/2018

Sl. No.	Name	Discipline	Signature
1.	RASHMI CHAKRABORTY	ME	Rashmi Chakraborty 13.8.18
2.	SRIDIP SARBADHIKARY	MT	Sridip Sarbadhikary 13.08.18
3.	Bhushan Awasarmal	MMS	Bhushan 13.08.18
4.	SHIVAM ROYCHOWDHURY	ME	ShivamRoyChowdhury
5.	ABIR CHAI	MET	Abir Chai.
6	ANUPAM MAJUMDER	~~ESE~~ MMS	Anupam Majumder
7	ANKIT MITRA	ME	
8	ACHINTA MONDAL	~~ME~~ E	Achinta Mondal
9	Trina Sinha	ME	Trina Sinha
10.	SRIDIP PATTANAYAK	M~~E~~.E	Sridip Pattanayak
11.	MOUMITA MITRA	M~~E~~.E	Moumita Mitra

Annexure VII

Equipment for Electrical Engineering Department

I. ADVANCED CONTROL LABORATORY

1. DC Position Control setup
2. AC Position Control setup
3. Linear System Simulator setup
4. Potentiometric Error Detector setup
5. Compensation Design setup
6. Relay control setup
7. Temperature Controller setup
8. Microprocessor based Water Level Controller
9. Comprehensive Control Engineering Trainer
10. Distributed Control System with plants of temperature, pressure, flow & level
11. AC servo Motor Study
12. Synchro Tx/Rx
13. Speed Control of DC Motor
14. Study of P, PI, PID Control System
15. Advanced Control Education Kit MicroLab Box of dSPACE

II. ADVANCED MICROPROCESSOR LABORATORY

1. 8085 / 8086 Microprocessor & Interfacing kit
2. 8051 Micro-controller and interfacing kits
3. Fiber Optic Communication Kits
4. FPGA & Accessories
5. PIC Microcontroller Board
6. Arm 7 Microprocessor Board

III. SENSORS, ACTUARORS AND DATA ACQUITION LABORATORY

1	Displacement Sensor	: LVDT, LVRT, Potentiometric, Capacitive
2	Temperature Sensor	: RTD, Thermocouple, Thermister
3	Force Sensor	: Load cell, Piezoelectric
4	Torque Sensor	: Torque cell
5	Actuator Trainer System	: Electric & Pneumatic Actuators and Sensors
6	Data Acquisition System	
7	Digital Signal Processor Trainer Kit	

Equipment for Electrical Engineering Department

IV. ELECTRICAL MACHINE AND MECHATRONICS LABORATORY

1. DC Motor & Generator: DC Shunt Motor, DC Compound Motor, DC Shunt Generator, DC Compound Generator.
2. AC Motor & Generator: Cylindrical type Synchronous Motor, Slip Ring Induction Motor, Salient Pole Alternator, Cylindrical Type Alternator,
3. Transformer: Single & Three Phase Transformer, Single & Three Phase Auto Transformer
4. Load: Resistive & Inductive Loads
5. Robotics Training System
6. PC based Pneumatic Teaching Set
7. PLC programmable through PC
8. Servo Fundamental Trainer
9. PLC Trainer with Interfaces on Robotic Arm, Bottling Plant and Elevator
10. Complete Online Machine Vision System.
11. Automated Optical Sorting System.
12. Motor Fault Simulator

V. Power System Lab :

1. Transmission Line Trainer
2. Electrical Power Generation Setup
3. Biased Differential Relay Trainer
4. Distance Protection Relay Trainer
5. Feeder Protection Relay Trainer
6. Over/Under Voltage Relay Trainer
7. IDMT Over Current Relay Trainer
8. Under/Over Frequency Relay Trainer
9. Power Factor Control Relay Trainer
10. Double Bus Bar Relay Trainer
11. 120KV Automatic Oil Test Set compact type with Printer
12. Current Transformer Test Set along with CT's of Different Current Ratio
13. Potential Transformer Test Set along with PT's of Different Current Ratio
14. Semi-Automatic Tan Delta & Resistivity Test Set
15. Vector Controlled AC Drives LAB
16. Brushless DC Drives
17. DFIG-Induction Generator Setup
18. DC Network Analyzer
19. Circuit Breaker Analyser along with 11kV Vacuum Circuit Breaker (VCB)

Lab Details

Laboratory	No. of machines	Computing facility & S/W & Servers
Multimedia Lab	30 nos.	Adobe creative cloud
UML Lab	30 nos.	IBM Rational Rose, Rational Rose Server
S/W Engineering Lab	30 nos.	Oracle, Oracle Server

The students use these lab for design & development of different application related to specific laboratories like Multimedia, UML, S/W Engineering and other related issues. As such there is no prefix list experiment but students submit their reports based on the jobs given to them under the supervision of the respective faculty members.

for AICTE web-site
30/05/2019

National Institute of Technical Teachers Training and Research, Kolkata

Major equipment list in Civil Engineering Department - 2019

Structure and Concrete Laboratory

- Universal Testing Machine
- Compression Testing Machine
- Concrete Core Cutting and Grinding Machine
- Rebound Hammer
- USPV
- CAPO
- Pull out Tester
- Concrete Mixture
- Vibrating Table

Earthquake Engineering Laboratory

- Electro-Dynamic Shake Table

Geo-Technical Engineering Laboratory

- Triaxial Apparatus
- Direct shear Apparatus
- Consolidation Apparatus
- Hydraulic Soil Extractor
- Swell Test Apparatus
- Static cone Penetration Test Apparatus
- Standard Penetration Test device
- Automatic Soil Compactor
- Soil Excluder
- Unconfined Compression Tester
- Soil Permeability Apparatus

Highway Engineering Laboratory

- Ductility Apparatus
- Marshal Apparatus
- Benkelman Beam
- Cannon Manning Viscometer

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Survey Laboratory

- Total Stations Both Windows and DOS Based

Environmental Engineering Laboratory

- UV-VIS Spectrophotometer
- Automatic Absorption Spectrophotometer
- Auto Titrator
- Respirable dust sampler

Computational Laboratory

- STAAD PRO
- ANSYS
- ABAQUS
- STRUDDS
- RISA
- ETABS
- AUTOCAD

30/5/19

DEPARTMENT OF MECHANICAL ENGINEERING

List of Major Equipment/facilities in each laboratory

Name of the Laboratory	Name of the Equipment
a) Material Processing Lab	i)Electro Discharge Machine
	ii)Universal Testing Machine
	iii)Vaccum Furnace
	iv)Tool Maker's Microscope
	v)Rockwell Brinell Hardness Tester
	vi) Impact Testing Machine
	Vii) Tool & Cutter Grinder
	viii) Wire reusable CNC wire cut EDM Machine
	ix) wear and friction monitor
	x) Profile projector
	xi) Portable surface roughness tester
b) Machine Tool Lab	i)Lathe
	ii)Shaper
	iii)Milling Machine
	iv)Drilling Machine
	v)Power Hacksaw
	vi) Lathe Tool Dynamometer
c) Robotics Lab	Six Axis Industrial Robot
d) Welding Centre	i) Manual Metal Arc welding motor generator.
	ii) Natural air cooled manual metal arc welding transformer.
	iii) Thyrister based manual metal arc welding rectifier.

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	iv) Inverter based manual metal arc welding rectifier.
	v) Thyrister controlled shielded metal arc welding.
	vi) Submerged arc welding outfit.
	vii) Oxygen pressure regulator, double stage.
	viii) D.A. pressure regulator, double stage.
	ix) Invertor based gas shielded tungsten arc welding outfit.
	x) Hand held electrical angle grinder xi) Spot welding xii) Pulse TIG welding. xiii) TIG Welding Machine xiv) MIG Welding Machine
e) CAD/CAM Lab.	I)CNC Wire cut EDM Machine
	ii)CNC Vertical Machining Centre
	iii) Maxturn Plus CNC 2 Axis Slant Bed Lathe Centre
	iv) CNC Lathe Trainer
	v) Milling Tool Dynamometer for CNC Machine
f) Material Testing and characterization lab.	Portable surface roughness tester

31/5/2019

	Impact testing machine
	Metallurgical Microscope
	Rockwell hardness testing machine
	Universal testing machine
	Polishing machine
g) Metrology and Measurement lab	Mechanical Measurement Equipment(Dial Gauge ,Sine Bar Sprit Level, Universal bevel Protractor, Micrometre, Vernier Caliper, Slip Gauge, Pressure Gauge, Gauge Block)
	Lathe Tool Dynamometer
	Drilling Tool Dynamometer
	Milling Tool Dynamometer
	Tachometer (Contract& Non – Contract)
	Different Sensors (LVD, Load Cell, Temperature Measurement Strain Measurement ,Torque Measurement)
	Infrared Non-Contract Pyrometer
	Universal Multi-channel Data logger
h) Conventional Machining Laboratory & Workshop	Hydraulic Trainer
	Pneumatic Trainer
	Centre Lathe
	Combined Universal Cum Vertical Milling Machine
	Radial Drilling Machine
i) Thermal Engineering Lab	Computerized variable compression Ratio Multi fuel Engine Test Rig.
	Multi cylinder Petrol Engine Test
	Variable compression Ratio Multifuel Engine Test Rig.
	Heat Transfer Equipment
	Stefan Boltzman Apparatus
	Centrifugal Compressor Test Rig.
	Air Blower Test Rig.

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	Two Stage Twin Cylinder Air Compressor
	Multi gas Analyser
	Trainer for Refrigeration & A.C Component
	Vapour Compression Refrigeration test Rig.
j) CAAD Laboratory	Major Software: ANSYS, MATLAB,AUTOCAD, SOLIDWORKS etc.

30/5/2019

DEPARTMENT OF MECHANICAL ENGINEERING

List of Experimental setup in each laboratory

Name of the Laboratory	Name of the Experimental Setup
a) Material Processing Lab	i)TIG Welding Machine.
	Ii) MIG Welding Machine.
	Iii) Electro Discharge Machine.
	IV) Universal Testing Machine.
	v)Vaccum Furnace for powder metallurgical application.
	VI) Tool Maker's Microscope for dimensional measurements.
	Vii) Rockwell Brinell Hardness Tester.
	vii) Impact Testing Machine.
	Viii) Tool & Cutter Grinder for grinding of tool.
	ix) CNC wire cut EDM Machine.
	x) Wear and friction monitor for determination of wear rate.
	xi) Profile projector for finding the profiles of objects.
	xii) Portable surface roughness tester.
b)Machine Tool Lab	i) Lathe with lathe tool Dynamometer for determinations of cutting force.
	Ii) Shaper for generation of flat surface.
	iii)Milling Machine use for machining
	iv) Drilling Machine bench top type.
	V) Power Hacksaw.

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c) Robotics Lab	Six Axis Industrial Robot with pneumatic gripper.
d) Welding Centre	i) Manual Metal Arc welding motor generator.
	ii) Natural air cooled manual metal arc welding transformer.
	iii) Thyrister based manual metal arc welding rectifier.
	iv) Inverter based manual metal arc welding rectifier.
	v) Thyrister controlled shielded metal arc welding.
	vi) Submerged arc welding outfit.
	vii) Oxygen pressure regulator, double stage.
	viii) D.A. pressure regulator, double stage.
	ix) Invertor based gas shielded tungsten arc welding outfit.
	x) Hand held electrical angle grinder xi) Spot welding setup xii) Pulse TIG welding setup.
e) CAD/CAM Lab	i) CNC Wire cut EDM Machine.
	Ii) CNC Vertical Machining Centre with cutting tool dynamometer.
	iii) Maxturn Plus CNC 2 Axis Slant Bed Lathe Centre.
	iv) CNC Lathe Trainer for training in CNC programmes.
	v) Milling Tool Dynamometer for CNC Machine.
f) Material Testing and characterization	Portable surface roughness tester.

20/5/2019

	Impact testing machine.
	Metallurgical Microscope.
	Rockwell hardness testing machine.
	Universal testing machine.
	Polishing machine.
g) Metrology and Measurement lab	Mechanical Measurement Equipment(Dial Gauge ,Sine Bar Sprit Level, Universal bevel Protractor, Micrometre, Vernier Caliper, Slip Gauge, Pressure Gauge, Gauge Block)
	Tachometer (Contract& Non – Contract) for rpm measurement.
	Different Sensors (LVD, Load Cell, Temperature Measurement Strain Measurement, Torque Measurement).
	Infrared Non-Contract Pyrometer
	Universal Multi-channel Data logger
h) Conventional Machining Laboratory & Workshop	Hydraulic Trainer kit.
	Pneumatic Trainer kit.
	Centre Lathe for machining and experiment.
	Combined Universal Cum Vertical Milling Machine.
	Radial Drilling Machine.
i) Thermal Engineering Lab	Computerized variable compression Ratio Multi fuel Engine Test Rig.

30/5/2019

	Multi cylinder Petrol Engine Test.
	Variable compression Ratio Multifuel Engine Test Rig.
	Heat Transfer Equipment.
	Stefan Boltzman Apparatus.
	Centrifugal Compressor Test Rig.
	Air Blower Test Rig.
	Two Stage Twin Cylinder Air Compressor.
	Multi gas Analyser.
	Trainer for Refrigeration & A.C Component.
	Vapour Compression Refrigeration test Rig.
j) CAAD Laboratory	Major Software: ANSYS, MATLAB,AUTOCAD, SOLIDWORKS etc.

30/5/2019

Annexure-VIII

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA

Block-FC, Sector-III, Salt Lake City, Kolkata-700 106

Class Routine for M. Tech 1st Year 1st Semester, Session 2018-19 with Class Room No.

Days	M. Tech Course	10.00 – 11.00	11.00 – 12.00	12.00 – 13.00	14.00 – 15.00	15.00 – 16.00	16.00 – 17.00	17.00 – 18.00
YDANOM	Mechatronics Engineering	ME 105/107 (SKM/SYR)[123]	ME 104 (PS) [123]	ME 101 (KG)[231]	ME 191 (SKM)			
	Manufacturing Technology	MTI 103 (SM1) [121]	MTI 102 (AKM) [121]	MM(ME) 101 (KG)[231]	MTI 191 (AKM & NKM)			
	Multimedia & Software Systems	MMS 193 (RC) [112]		MMS 101 (KG)[231]	MMS 191 (RDG)			
	Structural Engineering	SE 103 (MD) [221]		SE(CE) 101 (KG)[231]	SE 192 (MD)			SE 105C (SB)
YADSEUT	Mechatronics Engineering	ME 103 (SP) [123]		ME 102 (SC/SKN/RSR) [231]	ME 101 (KG)[231]		ME 193 (PS)	
	Manufacturing Technology	MTI 105 (DB) [121]	MTI 103 (AKM)	MTI 101 (SC/SKN/RSR) [231]	MM(ME) 101 (KG)[231]	MTI 103 (SM1)		
	Multimedia & Software Systems	MMS 104 (RC) [112]		MMS 102 (SC/SKN/RSR) [231]	MMS 101 (KG) [231]	MMS 105 (IS)	MMS 103 (RDG)	
	Structural Engineering	SE 104 (JJM) [221]		SE 102 (SC/SKN/RSR) [231]	SE(CE) 101 (KG)[231]		SE 181 (UCK, JJM, SNM, SB, MD)	
AYDESNDEW	Mechatronics Engineering	ME 105/107 (SKM/SYR) [123]	ME104 (PS) [123]		ME 103 (SP) [123]		ME 102 (SC/SKN/RSR) [231]	
	Manufacturing Technology	MTI 105 (DB) [121]	MTI 102 (NKM) [121]		MTI 181 (SM2) [121]		MTI 101 (SC/SKN/RSR) [231]	
	Multimedia & Software Systems		MMS 104 (IS) [112]		MMS 103 (RDG) [112]		MMS 102 (SC/SKN/RSR) [231]	MMS 103 (RDG) [112]
	Structural Engineering	SE 105C (SB) [221]			SE 104 (JJM)		SE 102 (SC/SKN/RSR) [231]	SE 103 (MD)[221]
YDARSUTH	Mechatronics Engineering	ME 103 (SP) [123]	ME 105/107 (SKM/SYR) [123]		ME 102 (SC/SKN/RSR) [231]			
	Manufacturing Technology	MTI 105 (DB) [121]	MTI 102 (NKM) [121]		MTI 101 (SC/SKN/RSR) [231]		Invited Talks, Lectures & Seminars [231]	
	Multimedia & Software Systems	MMS 105 (SR) [112]			MMS 102 (SC/SKN/RSR) [231]			
	Structural Engineering	SE 104 (JJM) [221]	SE 105C (SB) [221]		SE 102 (SC/SKN/RSR) [231]			
AYFRID	Mechatronics Engineering	ME 104 (PS) [123]	ME 101 (KG)[231]		ME 192 (PS)			
	Manufacturing Technology	MTI 103 (SM1) [121]	MM(ME) 101 (KG)[231]		MTI 192 (SM2)			
	Multimedia & Software Systems	MMS 105 (SR) [112]	MMS 101 (KG)[231]		MMS 192 (IS/KG)			
	Structural Engineering	SE 103 (MD) [221]	SE(CE) 101 (KG)[231]		SE 191 (UCK)			

KE ARB

Mechatronics Engineering	PS: Dr. Prasanta Sarkar	SKM: Dr. Soumitra Kumar Mandal	SP: Dr. Sagarika Pal	~~AD : Dr. Anuradha De~~	SYR : Mrs. Sheela Yadav Rai	
Manufacturing Technology	SM1: Dr. Samiran Mandal	DB: Dr. Dipankar Bose	NKM: Mr. Nirmal Kumar Mandal	RSR: Dr. Rayapati Subba Rao	AKM : Dr. Arpan Kumar Mondal	SM2: Dr. Subrata Mondal
Multimedia & Software Systems	RDG: Dr. Ranjan Dasgupta	SR: Dr. Samir Roy	RC: Mr. Rajeev Chatterjee	IS : Dr. Indrajit Saha	KG : Dr. Kinsuk Giri	
Structural Engineering	JJM: Dr. Jagat Jyoti Mandal	SB: Dr. Santanu Bhanja	MD: Ms. Mithu Dey	UCK: Dr. Uday Chand Kumar	SNM : Dr. Sailendra Nath Mondal	
Education & Management	SC: Dr. Sekhar Chakraborty	SKN: Dr. Sukanta Kr. Naskar				
Number within [ ] indicates the Room No. of Class Room						

Director

Kinsuk Giri
FIC, Time Table
9/8/2018

Annexure XI

National Institute of Technical Teachers' Training & Research
Department of Computer Science & Engineering

Revised Curriculum
for
M. Tech in Multimedia & Software Systems

Block-FC, Sector-III, Salt Lake City, Kolkata-700 106

July 2010

M.TECH IN MULTIMEDIA & SOFTWARE SYSTEMS

Revised Curriculum
June, 2010

SEMESTAR-I

Theory

Code	Paper	Contacts periods per week			Total	Credits
MMS101	Advanced Engineering Mathematics	3	1	0	4	4
MMS102	Industrial Management	4	0	0	4	4
MMS103	Software Project & Quality Management	4	0	0	4	4
MMS104	Multimedia Engineering & Application	4	0	0	4	4
	Elective - I	4	0	0	4	4
	Total of Theory				**20**	**20**

Elective-I

Code	Paper
MMS105	Topics on Algorithms
MMS106	Distributed Architecture & Operating Systems
MMS107	Topics on Networking

Practical

Code	Paper	Contacts periods per week			Total	Credits
MMS191	Software Development Lab	0	0	4	4	2
MMS192	Multimedia Lab	0	0	4	4	2
MMS193	Seminar - I	0	2	0	2	1
	Total of Practical				**10**	**5**
Total					**30**	**25**

SEMESTAR-II

Theory

Code	Paper	Contacts periods per week			Total	Credits
MMS201	Object Oriented Software Design	4	0	0	4	4
MMS202	Multimedia Design & E-Learning	4	0	0	4	4
MMS203	Topics on DBMS	4	0	0	4	4
	Elective - II	4	0	0	4	4
	Elective - III	4	0	0	4	4
	Total of Theory				20	20

Elective -II

Code	Paper
MMS204	Intelligent Computing
MMS205	Knowledge Engineering
MMS206	Image Processing

Elective-III

Code	Paper
MMS207	Computer Security
MMS208	Software Reuse & Requirement Engineering
MMS209	Mobile Computing

Practical

Code	Paper	Contacts periods per week			Total	Credits
MMS291	Object Technology Lab	0	0	4	4	2
MMS292	Seminar-II	0	2	0	2	1
MMS293	Comprehensive Exam (Viva-Voce)	-	-	-	-	4
	Total of Practical				6	7
Total					26	27

SEMESTER-III

Sessional

Sl. No.	Code		Contact periods per week				Credits
			L	T	P	Total	
1.	MMS301	Pre-submission Defense of Dissertation					4
2.	MMS302	Dissertation (Progress)				24	18
Total of Semester						24	22

SEMESTER-IV

Sessional

Sl. No.	Code		Contacts periods per week				Credits
			L	T	P	Total	
1.	MMS401	Dissertation (Completion)				24	18
2.	MMS402	Post-submission Defence of Dissertation					6
Total of Semester						24	24

Semester I

Paper: *MMS 101*
Credit: *4*

ADVANCED ENGINEERING MATHEMATICS (3-1-0)

Statistics: Elements of statistics; frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve fitting by least square method; Correlation and Regression; Testing of hypothesis; Basic types of factorial design and Analysis of Variance.

Matrix Operation: Matrix operation; Eigen value and Eigen Vector by iterative methods; Diagonalisation of a square matrix.

Laplace Transform, Fourier Transform; Fourier Integral and their Applications;

Numerical Methods: Interpolation by Polynomials; Error Analysis; Solution of System of linear equation by Gauss-Seidel iterative method; Newton Rapson method; Numerical Integration by Gauss-quadrature; Solution of ordinary differential equation by Rayleigh-Ritz method.

Ordinary Differential Equation: i) 2nd Order homogeneous Equation ii) Euler Cauchy Equation, iii) Non homogenous linear equation. **Partial Differential Equation :** i) Wave equation – one dimension and two dimension, ii) Heat equation – one dimension and two dimension

BOOKS:

1. S.S. Sastry- "Introductory Methods of Numerical Analysis", PHI

2. M.K.Jain, S.R.K. Iyengar, R., K.Jain; - "Numerical Methods for Scientific and Engineering Computation" New Age International Pub.

3. A.M. Goon, M.K.Gupta, B.Dasgupta; - "An Outline of Statistical Theory" Volume I, II, The World Press Private Ltd.

4. Yu.P.Adler, E.V. Markova, Ylu V. Granovsky; -"The Design of Experiments to find Optimal Conditions", MIR, 1975, Moscow

5. Erwin Kreyszig - Advanced Engineering Mathematics, John Wiley & Sons, Inc

6. Stanley Grossman and William R.Derrick- Advanced Engineering Mathematics-.,Harper & Row Publishers

Semester I

Paper: *MMS 102*
Credit: *4*

INDUSTRIAL MANAGEMENT (4-0-0)

1. Classification and Importance of Operations Management:

Operations Management in corporate profitability and competitiveness; Operations strategy; Types and characteristics of manufacturing systems and service systems;

2. Operations Planning and Control:

Forecasting for operations; Inventory planning and control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling;

3. Quality Assurance:

The quality assurance system; choice of process and reliability; control of quality;

4. Maintenance Function:

Preventive maintenance; Overhaul and replacement.

5. Management Information System:

Need and structure of MIS; Data Processing Systems; Data Sources and Management

6. Human Resource Management

Concept and evolution; Manpower planning; recruitment and selection; Motivating personnel; Leadership;

BOOKS:

1. Buffa and Sarin – *Modern Production / Operations Management,* 8th ed., John Wiley & Sons (Asia) Pvt. Ltd.
2. Russell & Taylor – *Operations Management*, Wiley India Pvt. Ltd.
3. Larry Long –*Management Information Systems*, Prentice Hall
4. A.Leon– *Enterprise Resource Planning*, TMH
5. Gupta, C.B. – *Human Resource Management*, Sultan Chand & Sons

Semester I

Paper: *MMS 103*
Credit: *4*

SOFTWARE PROJECT AND QUALITY MANAGEMENT (4-0-0)

Software Quality Issues, Requirement Specification & Design Issues.

Software Project Management - Project Management Techniques and their applications in Software projects. Software Development Plan – associated tasks, milestones and deliverables, project scheduling – tasks, dependencies and conflict resolution. Resource management and allocation, cost estimation – COCOMO model and its derivatives, Risk assessment and its impact, software tools for software project management, configuration management, software risk and reliability, software reuse – impact of object-oriented design and programming.

Requirements Engineering – Requirements analysis and specifications, requirement specification documents, validation process of requirements specifications, use of formal methods, interviewing process and feedback with the customer

Software Quality Management – Software Testing and Verification – white and black box testing, unit testing, integration testing, system testing, test plans, Mathematical methods for software verification, ISO 9001, Capability Maturity Model

BOOKS:

1. Software Engineering Beginners Approach: Pressman, TMH
2. Software Engineering: Jalote, Narosa
3. Fundamentals of Software Engineering - Ghezzi et al, PHI
4. Software Engineering - Sommerville, Addison-Wesley
5. Software Engineering with Abstractions, Berzins & Luqi, Addison-Wesley
6. Software Engineering: Aggarwal & Singh, New Age
7. Software Engineering Concepts: Fairley, MGH

Semester I

Paper: *MMS 104*
Credit: *4*

MULTIMEDIA ENGINEERING AND APPLICATIONS (4-0-0)

Introduction: Overview of multimedia, various types of multimedia information, characteristics, digital representation, hardware and software, accessories, hypertext and hypermedia

Multimedia Technology : Structure - components, platforms, Audio & video technology - basics, digitisation, file format, compression & decompression techniques, image and graphics, storage media, video streaming.

Animation: Definition, types, manipulation technique, rendering, file format, animation software

Graphics: Devices, display technology, pixel, raster, vector, resolution, transformation, solid modelling

Applications: Virtual reality, e-commerce & courseware engineering

BOOKS :

1. Multimedia - An Introduction : John Villamil - Casanova, Louis Molina - Prentice Hall, India
2. Multimedia Handbook : Jessica Keys, Mc Graw Hill Inc., 1994
3. Computer Graphics : Hearn D. & Baker M.P., Prentice Hall (EEE)
4. Multimedia Systems : Buford Koegel John F., Addison Wesley (Pearson Education Asia), 2000
5. Multimedia : Computing, Communications & Applications : Steinmetz Ralf & Nahrstedt Klara, Pearson Education Asia, 2001
6. Video and Image Processing in Multimedia Systems : Borko Furht, Kluwer Academic Publishers
7. Multimedia Systems and Techniques : Borko Furht, Kluwer Academic Publishers
8. Multimedia Systems : John F. Koegel Buford, ACM Press, Addison Wesley
9. Multimedia: Making it Work : Vaughan, Tay (1999), 4th ed. New Delhi, Tata Mcgraw Hill

Semester I

Paper: *MMS 105*
Credit: *4*

Elective - I (4-0-0)

TOPICS ON ALGORITHMS

Review of complexity analysis of algorithms. Models of Computation, Turing Machines Design methods – Divide and Conquer, Greedy method, Dynamic programming, Back tracking, Branch and Bound, Approximation and Probabilistic Algorithms

Graph Algorithms – Breath-First Search, Dept-First Search, Topological Sort, Minimum Spanning Trees, Shortest Path Algorithms – Bellman-Ford Algorithm, Dijkstra's Algorithm

Matrix Operation – Strassen's Algorithm for matrix manipulation, Matrix inversion

Searching, insertion, deletion and other operations with m-way search trees, Binomial Heaps and Fibonacci Heaps.

String Matching algorithms, Convex hull, Traveling Salesman Problem, Data compression techniques – JPEG, MPEG

Theory of NP – Completeness and reducibility, proofs and NP-complete problems

BOOKS:

1. Data Structures and Program Design: Robert L. Kruse, PHI
2. Fundamentals of Data Structures: Horowitz & Sahani, Galgotia Booksource
3. An Introduction to Data Structures with Applications: Tremblay & Sorenson, TMH
4. Introduction to Design & Analysis of Algorithms: Goodman & Hedetniemi, TMH
5. Introduction to Algorithms: Corman et.al., PHI
6. Fundamentals of Computer Algorithms: Horowitz et.al, Galgotia
7. The Design & Analysis of Algorithm: Aho et.al. Pearson Edu
8. Fundamentals of Algorithms: Brassard & Bratley, PHI
9. Fundamentals of Algorithm: Knuth, Narosa

Semester I

Paper: *MMS 106*
Credit: *4*

Elective-I (4-0-0)

DISTRIBUTED ARCHITECTURE & OPERATING SYSTEM

Introduction: Discussion on the limitations on conventional architectures and the remedies; Overview of Parallel Systems, Architecture of Parallel Systems

Characterization of Distributed Systems: Examples of distributed systems; Resource Sharing and the Web; Challenges System Models: Architectural Models; Fundamental Models

Networking and Internetworking: Types of networks; Network Principles; Internet Protocols Inter-process Communication: The API for the Internet Protocols; External Data Representation and Marshalling; Client-Server Communication; Group Communication

Name Services: Name Services and Domain Name System: Directory Services, Peer-to-peer systems: Peer-to-peer middleware; Routing Overlays

Theoretical Foundations: Global Time; Lamport's and Vector Clocks; Global States and Global State Recording Algorithms; Termination Detection

Distributed Mutual Exclusion: Classification and Distributed Mutual Exclusion Algorithms Distributed Deadlock Detection: Preliminaries- System Model, Resource versus Communication Deadlock, A graph Theoretic Model; Distributed Deadlock Handling Strategies; Issues in Deadlock Detection and Resolution; Control Organizations for Distributed Deadlock Detection; Algorithms – Centralized and Distributed; Hierarchical Deadlock Detection Algorithms

Agreement Protocols

BOOKS:

1. Coulouris, Dollimore, ad Kindberg: Distributed Systems – Concepts and Design, Fourth Edition, 2007,Pearson Education.
2. Singhal and Shivaratri: Advanced Concepts in Operating Systems, TMH Edition 2001.
3. Hwang and Xu: Scalable Parallel Computing, TMH International Editions, 2000.
4. Culler, Singh and Gupta: Parallel Computer Architecture, Morgan Kaufmann Publishers, 2002.
5. Hwang and Briggs: Computer Architecture and Parallel Processing, Mcgraw Hill International Editions.

Semester I

Paper: *MMS 107*
Credit: *4*

Elective - I (4-0-0)

TOPICS ON NETWORKING

Layered Architecture, TCP/IP reference model, IP addressing scheme, Ipv6

Routing Algorithms, Congestion control algorithms, flow control, TCP

Internetworking – Bridge, Routers, Gateway

Multiple Channel Data Communication – TDM, FDM, T1, T2 , SONET, ATM, ISDN

Transmission Impairments, Modem, Dial-up, Broadband, Cable Internet

DNS, e-mail, WWW, URL, HTTP, HTML, XML, Mobile & Wireless networks, GSM, Bluetooth

BOOKS:

1. Computer Network : Tanenbaum, PHI
2. Data Communication & Computer Networks: Stalling, PHI
3. Digital & Data Communications: Miller, Jaico
4. Internetwoking with TCP/IP, (Vol I, II & III) : Comer & Stevens
5. Mobile and Wireless Network: Black, PH

Semester II

Paper: *MMS 201*
Credit: *4*

OBJECT ORIENTED SOFTWARE DESIGN (4-0-0)

Object Oriented Modeling – Life Cycle, abstraction, encapsulation, modularity, inheritance, polymorphism, composition, aggregation.

Use cases, classification and identification of objects.

UML Notation: Class diagram, Object diagram, Sequence diagram, Collaboration diagram, Activity diagram, packages, State Transition diagram, UML model, Meta model

Object oriented quality assurance, metrics

Case Studies

BOOKS:

1. Object Oriented Programming: Balaguruswamy, TMH
2. Software Engineering: Pressman, PHI
3. Object Oriented Modeling & Design: Rambaugh et.al. PHI
4. A first course on Database System: Ullman & Widom, PH
5. Inside the Object Model: Papurt, Sigs Book

Semester II

Paper: *MMS 202*
Credit: *4*

MULTIMEDIA DESIGN & E-LEARNING SYSTEMS (4-0-0)

Life Cycles : Concept and requirement analysis, design, creating scripts, flow charts and story board, development of building blocks, integration, testing & evaluation, publishing.

Human Computer Interaction : HCI design, cognitive aspect in multimedia presentation, methodology of dialog design.

Development Tools : Authoring tools and approaches, page based, icon based and time based tools, comparative analysis and selection.

E-learning : Characteristics, opportunities, contemporary trends and practices

LMS : Introduction, features, selection, limitation, SCORM standards

Development Models : introduction, models of course development, types of e-learning courses, wrap around model, integrated model.

Pedagogical Issues : Distributed, problem solving, CSCL, goal based, case based learning

Tools : Various LMS tools, comparative analysis
Evaluating e-learning system : costs, access, quality and speed
Research opportunities in e-learning

BOOKS:

1. Computer Mediated Communication: Rapoport, M., John Wiley & Sons, Inc, New York
2. The Key to Teaching & Learning Online: Salmon & E. Moderating, Kogan Page.
3. Implementing Computer Supported Cooperative Learning : McConnell D., London, UK, Kogan Page
4. Multimedia Communication Systems: Techniques, Standards, and Networks : K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, D. A. Milovanovic, Prentice Hall
5. Distributed Multimedia: Palmer W. Agnew and Anne S. Kellerman, ACM Press, Addison Wesley
6. Multimedia Interface Design: Meera M. Blattner and Roger B. Dannenberg, ACM Press, Addison Wesley
7. Digital Multimedia, Chichester: Chapman, Nigel and Chapman, Jenny (2000), John Wiley
8. Practical Guidelines for creating Instructional Multimedia Applications: Fenrich, Peter (1997), Fort Worth, Dryden Press
9. A Developers' handbook to Interactive Multimedia; A practical guide for educational application: Phillips, Rob (1997), London: Kogan Page
10. Multimedia for Learning: Methods and Development : Alessi, S. M., & Trollips, S. R. (2001), (3rd ed.). Boston, MA: Allyn & Bacon.

Semester II

Paper: *MMS 203*
Credit: *4*

TOPICS ON DBMS (4-0-0)

Query Optimization: Query processing, Transactions Management, dead lock detection and recovery, nested transaction, Concurrency Control, Recovery, Integrity & Security

Distributed Databases – fragmentation, design, transaction management, concurrency control, timestamp

Spatial Database – storage & retrieval of spatial & non-spatial data, quad tree, Address Square, GIS

Statistical Database – security in statistical database, linear queries,

Temporal Database – updating, temporal query, real-time database

Data mining, Data warehousing

BOOKS:

1. Fundamentals of Database System: Elmasri & Navathe, Addison-Wesley
2. An Introduction to Database Systems: Date, Addison-Wesley
3. Principles of Database Systems: Ullman, Galgotia
4. Database Systems Concepts: Korth et. al, MGH
5. A first Course on Database System: Ullman & Widom, PH
6. Introduction to Data Compression: Sayood, Elsevier

Semester II

Paper *MMS 204*
Credit: *4*

Elective-II (4-0-0)

INTELLIGENT COMPUTING

Review of the concepts of computational intelligence, Turing test.
Knowledge representation techniques – First order predicate logic, automatic theorem proving, logic programming, semantic networks.

State space search – exhaustive search – BFS, DFS, bidirectional search, Heuristic search – Hill climbing, A/A* algorithm, constraint satisfaction, mini-max search, AND-OR graph search, AO* algorithm.

Statistical and probabilistic reasoning – Baysian Systems, Certainty factors, Dempster-Shafer theory.

Elements of soft computing – Fuzzy set theory, fuzzy logic, fuzzy rules, fuzzy relations, fuzzy inference systems, Fuzzy controllers.

Artificial Neural Networks – Early neural models – McCullocIh – Pitts neuron, pattern classification and pattern association with ANNs, supervised and unsupervised learning rules, recurrent networks.

Evolutionary Search – Genetic Algorithms (GAs) – Darwinian principle of survival of the fittest, genetic operators, selection, crossover, mutation, genetic parameters, simulated annealing.

BOOKS:

1. Artificial Intelligence – A Modern Approach: S. Russell & P. Norig, Pearson Education
2. Artificial Intelligence; E. Rich & K. Knight, TMH
3. An Introduction to Fuzzy Sets 0 – Analysis & Design; W. Pedryez & F. Gomide, PHI.
4. Fundamentals of Neural Networks – Architechtures, Algorithms, and Applications; L. Frusett; Prentice Hall
5. An Introduction to Genetic Algorithms: M. Mitchell; PHI

Semester II

Paper: *MMS 205*
Credit: *4*

Elective II (4-0-0)

KNOWLEDGE ENGINEERING

Overview: KE cycle, knowledge economy and society, organizational knowledge, individual knowledge, explicit knowledge, tacit knowledge, evolution of knowledge management, development applications of knowledge engineering.

KMS : Create, capture, organize, access and use of knowledge, spiral of knowledge management

Knowledge Networks : Knowledge networking, distributed heterogeneous knowledge networks, knowledge creating organization, mapping and measuring knowledge.

Web-Based Systems : Building knowledge site, knowledge modelling, tools for web based knowledge networking system

Case Studies : IBM, UNESCO, SEARCA K-Net

BOOKS :

1. Information Technology for Knowledge mangement: Borghoff, U. and R. Pareschi, 1997, Journal of Universal Computer Science, Vol.3/No. 8.
2. Enterprise Knowledge Management Modelling and Distributed Knowledge Management Systems: Firestone, Joseph M., 1999.
3. Managing Organizational Knowledge: Perspectives on Business Innovation, Ernst and Young, Issue I.
4. The Fifth Discipline: The Art and Practice of the Learning Organization : Senge, Peter M. 1994, Doubleday/Currency.
5. Electronic Performance Support Systems: Show Me the Knowledge : Wells, Jonathan and Christopher Pravetz, Pricewaterhouse Coopers, 1998.

Semester II

Paper: *MMS 206*
Credit: *4*

Elective II (4-0-0)

IMAGE PROCESSING

Introduction : Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.

Image in the spatial domain : Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

Image Compression: Fundamentals, image compression models, error-free compression, loss predictive coding, image compression standards.

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, basic morphologic algorithms.

Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation.

Object Recognition: Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks.

BOOKS:

Text Book:

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.
2. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
3. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
4. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
5. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
6. Digital Image Processing, William K. Prat, Wily Third Edition
7. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India.

Semester II

Paper: *MMS 207*
Credit: *4*

Elective III (4-0-0)

COMPUTER SECURITY

Private Key Cryptosystems – classical ciphers, DES, Differential and linear cryptoanalysis

Public Key Cryptosystems – RSA, Elliptical Cryptosystems

Digital Signature – Generic signature schemes, RSA signature

Authentication, Intrusion Detection, Digital Money, database Protection, Access Control, Secure sockets

BOOKS:

1. Cryptography and Network Security (Sie), by Forouzan, Tata McGraw-Hill
2. Network security: Current status and future directions, by Christos Douligeris, Dimitrios N. Serpanos, John Wiley and Sons
3. Network security: Private communication in a public world, by Charlie Kaufman, Radia Perlman, Mike Speciner, Prentice Hall PTR
4. Network security fundamentals, by Gert De Laet, Gert Schauwers, Cisco Press, 2005-Computer

Semester II

Paper: *MMS 208*
Credit: *4*

Elective III (4-0-0)

SOFTWARE REUSE AND REQUIREMENT ENGINEERING

Impact of Object-Based and Object-Oriented design and programming, architecture centric, domain specific, library based reuse methodologies - influence on reliability, efficiency and cost.

Requirement analysis and specifications - requirement definitions and requirement specification documents, types of requirement, validation process, software prototyping, use of formal methods.

BOOKS:

1. Software Engineering Beginners Approach: Pressman, TMH
2. Software Engineering: Jalote, Narosa
3. Fundamentals of Software Engineering - Ghezzi et al, PHI
4. Software Engineering - Sommerville, Addison-Wesley
5. Software Engineering with Abstractions, Berzins & Luqi, Addison-Wesley
6. Software Engineering: Aggarwal & Singh, New Age
7. Software Engineering Concepts: Fairley, MGH

Semester II

Paper: *MMS 209*
Credit: *4*

Elective III (4-0-0)

MOBILE COMPUTING

1G, 2G, 3G networks, Cellular concepts, GSM, channel assignments, security

Mobile ad hoc networks – MAC layer, MANET

Energy Analysis – AODV & DSR Routing protocols, location updates, handovers, multicasting & broadcasting

Mobile IP, Mobile, Distributed & Pervasive computing

BOOKS:

1. Wireless Communications Principles & Practice by T. S. Rappaport, PHPTR

2. Mobile Communications by J. Sehiller, Pearson Education

3. Mobile Computing by S. DasBit & B. K. Sikdar, PHI

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COURSE STRUCTURE AND CURRICULUM

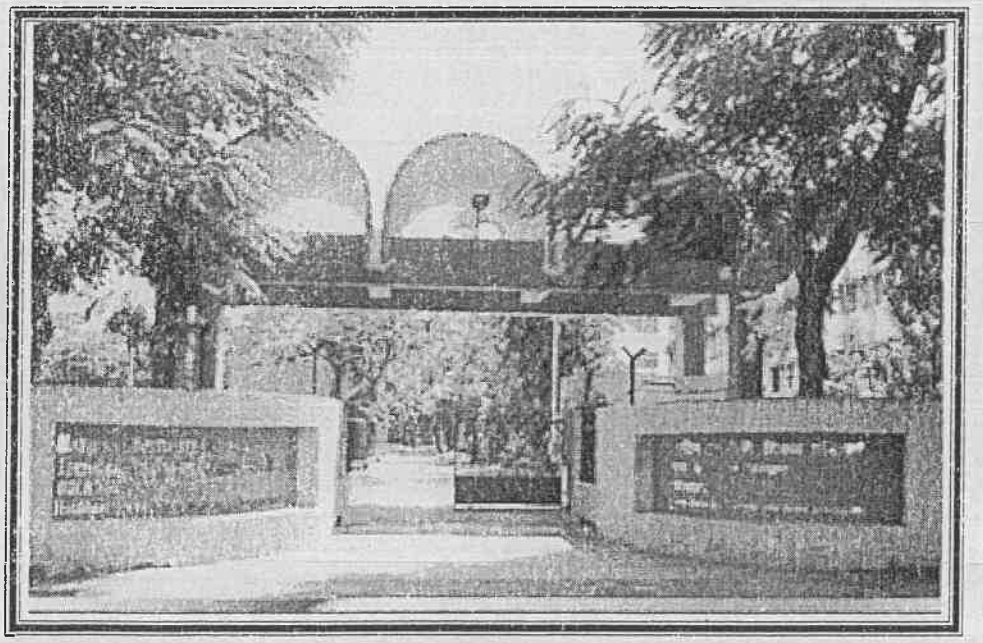
for

M.Tech Course

in

MANUFACTURING TECHNOLOGY

(Approved by AICTE & Affiliated to the West Bengal University of Technology, Kolkata)



National Institute of Technical Teachers' Training and Research, Kolkata

Block-FC, Sector-III, Salt Lake City

Kolkata-700 106

Revised March, 2010

CURRICULUM STRUCUTRE

First Semester

A.THEORY							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MM (ME)101	Advanced Engineering Mathematics	3	1	-	4	4
2.	MTI 101	Industrial Management	4	-	-	4	4
3.	MTI 102	Metal Forming ,Casting & Welding	4	-	-	4	4
4.	MTI 103	Machining Science and Machine Tools	4	-	-	4	4
5.		Elective-I	4	-	-	4	4
		Total of Theory	19	1		20	20

B.LABORATORY / PRACTICAL							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MTI 191	Manufacturing Technology Lab	-	-	4	4	2
2.	MTI 192	Machine Tools and Control Lab	-	-	4	4	2
3.	MTI 181	Seminar –I		2	-	2	1
		Total of Laboratory / Practical				10	5
		Total of Semester				30	25

Elective I: One subject to be chosen, from the following elective group.

CODE	SUBJECTS
MTI 104	Fabrication Technology
MTI 105	Fluid Drives and Controls
MTI 106	Industrial Robotics

Second Semester

A.THEORY							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MTI 201	Quality & Reliability Engineering	4	-	-	4	4
2.	MTI 202	Automated Manufacturing System	4	-	-	4	4
3.	MTI 203	Modern Manufacturing Processes	4	-	-	4	4
4.		Elective –II	4	-	-	4	4
5.		Elective-III	4	-	-	4	4
		Total of Theory				20	20

B.LABORATORY / PRACTICAL							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MTI 281	Seminar –II		2	-	2	1
2.	MTI 291	Flexible Manufacturing System Lab & Robotics Lab		-	4	4	2
3.	MTI 282	Comprehensive Exam (Viva-Voce)			-	-	4
		Total of Laboratory / Practical				6	7
		Total of Semester				26	27

Elective: One subject to be chosen from each of the following two elective groups

Elective – II

CODE	SUBJECTS
MTI 204	CAD/CAM
MTI 205	Computer Control of Machines and Processes
MTI 206	Finite Element Methods in Engg.

Elective – III

CODE	SUBJECTS
MTI 207	Product Design
MTI 208	Materials Handling System
MTI 209	Quantitative Decision Making

Third Semester

A.THEORY							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MTI 381	Pre-submission Defense of Dissertation	-	-	-	-	4
2.	MTI 382	Dissertation (Progress)	-	-	-	24	18
		Total of Semester				24	22

Fourth Semester

A.THEORY							
SL. NO.	CODE	SUBJECTS	CONTACTS (PERIOD / WEEK)				CREDITS
			L	T	P	TOTAL	
1.	MTI 481	Dissertation (Completion)	-	-	-	24	18
2.	MTI 482	Post Submission Defense of Dissertation	-	-	-	-	6
		Total of Semester				24	24

ADVANCED ENGINEERING MATHEMATICS
(Code: MM (ME) 101)

Total Contact Hrs : 52
Lecture : 39
Tutorial : 13

Internal Assessment – 30
Examination – 70
Total Marks: 100

Statistics: Elements of statistics; frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve fitting by least square method; Correlation and Regression; Testing of hypothesis; Basic types of factorial design and Analysis of Variance. **-10**

Matrix Operation: Matrix operation; Eigen value and Eigen Vector by iterative methods; Diagonalisation of a square matrix. **-8**

Laplace Transform, Fourier Transform; Fourier Integral and their Applications; **-6**

Numerical Methods: Interpolation by Polynomials; Error Analysis; Solution of System of linear equation by Gauss-Seidel iterative method; Newton Rapson method; Numerical Integration by Gauss-quadrature; Solution of ordinary differential equation by Rayleigh-Ritz method. **-10**

Ordinary Differential Equation: i) 2nd Order homogeneous Equation ii) Euler Cauchy Equation, iii) Non homogenous linear equation. **Partial Differential Equation :** i) Wave equation – one dimension and two dimension, ii) Heat equation – one dimension and two dimension **-5**

BOOKS:

1. S.S. Sastry- *"Introductory Methods of Numerical Analysis"*, PHI

2. M.K.Jain, S.R.K. Iyengar, R., K.Jain; - *"Numerical Methods for Scientific and Engineering Computation"* New Age International Pub.

3. A.M. Goon, M.K.Gupta, B.Dasgupta; - *"An Outline of Statistical Theory" Volume I, II,* The World Press Private Ltd.

4. Yu.P.Adler, E.V. Markova, Ylu V. Granovsky; -*"The Design of Experiments to find Optimal Conditions"*, MIR, 1975, Moscow

5. Erwin Kreyszig - *Advanced Engineering Mathematics*, John Wiley & Sons, Inc

6. Stanley Grossman and William R.Derrick- *Advanced Engineering Mathematics*-.,Harper & Row Publishers

INDUSTRIAL MANAGEMENT
(Code: MTI 101)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Classification and Importance of Operations Management: 3

Operations Management in corporate profitability and competitiveness; Operations strategy; Types and characteristics of manufacturing systems and service systems;

2. Operations Planning and Control: 25

Forecasting for operations; Inventory planning and control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling;

3. Quality Assurance: 8

The quality assurance system; choice of process and reliability; control of quality;

4. Maintenance Function: 4

Preventive maintenance; Overhaul and replacement.

5. Management Information System: 5

Need and structure of MIS; Data Processing Systems; Data Sources and Management

6. Human Resource Management 7

Concept and evolution; Manpower planning; recruitment and selection; Motivating personnel; Leadership;

REFERENCE

1. Buffa and Sarin – *Modern Production / Operations Management*, 8th ed., John Wiley & Sons (Asia) Pvt. Ltd.
2. Russell & Taylor – *Operations Management*, Wiley India Pvt. Ltd.
3. Larry Long –*Management Information Systems*, Prentice Hall
4. A.Leon– *Enterprise Resource Planning*, TMH
5. Gupta, C.B. – *Human Resource Management*, Sultan Chand & Sons

METAL FORMING, CASTING & WELDING
(Code: MTI 102)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Theory of Plasticity: **5**

Theory of Plastic deformation, Yield criteria, Work of plastic deformation , Theories of Fracture, Ansiotropy in sheet metal, Overview of FEM Applications in Metal Forming Analysis - Formability studies.

2. Theory and Practice of Bulk Forming Processes: **10**

Analysis of Plastic deformation in Forging, Rolling, Extrusion and rod/wire drawing processes-Effects of friction, Calculation of forces, Work done-process parameters, equipment used -Defects-Applications-Recent advances in forging, Rolling, Extrusion and drawing processes-Experimental techniques of evaluation of friction in metal forming, ring compression and double cup extrusion tests.

3. Sheet Metal Forming: **15**

Conventional processes, Forces in circular cup drawing, Redrawing, drawing of tubes from annular sheet dies, Forming limit diagram, Forming with hydrostatic pressure, Explosive forming, electrohydraulic forming, magnetic pulse forming, Principles and process parameters- Advantages -Limitations and Applications.

4. Casting Metallurgy and Design **10**

Heat transfer between metal and mould-Solidification of pure metal and alloys-Shrinkage in cast metals -progressive and directional solidification-Principles of grating and risering, Degasification of the melt-Design considerations in casting-Designing for directional solidification and minimum stresses-casting defects

5. Special Casting Processes: **5**

Shell moulding, Precision investment casting, centrifugal casting, Die casting and Continuous casting.

6. Advanced Welding Processes **7**

Physics of welding arc, heat flow in welding, theory of heat flow, cooling rate determination, selection of welding parameters based of heat flow analysis, residual stress and distortion, joint design, analysis of fracture and fatigue of welded joints.
High energy density processes- Plasma keyhole welding, laser welding
Welding automation and robotics, advances in welding automation.

BOOKS:

1. Schuler - *Metal Forming Handbook* - Springer Verlag Publication
2. Hosford,WF and Caddell,R.M. - *Metal Forming:Mechanics and Metallurgy* , Prentice Hall, Eaglewood Cliffs,1993
3. Dieter,G.E. - *Mechanical Metallurgy(Revised Edition II)* - McGraw Hill Co,1980
4. Altan .T.- *Metal Forming-Fundamentals and applications-American Society of Metals* , Metals park,1983.
5. Shiro Kobayashi, SOO-IK-oh-ALTAN,T - *Metal Forming and Finite Element Method* , Oxford University Press,
6. *ASM Metals of Hand book on Casting* - Revised Edn,1995
7. Heine loper & rosenthal, *Principels of Metal Casting* , Tata McGraw Hill,1980
8. P.N.Rao- *Manufacturing Technology (Foundry,Forming and Wekding)II Edition"*,Tata McGraw Hill Pub.Co. Ltd,.New Delhi,1998.
9. V.M. Radha Krishnan- *Welding Technology & Design* – New Age International Publishers
10. J.Norish- *Advanced Welding Processes*- Woodhead Publishing Limited

MACHINING SCIENCE & MACHINE TOOLS
(Code: MTI 103)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Geometry of Cutting Tools: **6**

Turning tools interrelations between different systems of rake angles; interrelationships between clearance angles; Milling cutters; Twist drills; Grinding of single point cutting tools.

2. Mechanism of Chip Formation: **5**

Observation methods; Chip formation analysis; Dynamic shear strain; Criticism of single shear plane theory; Effect of cutting variables on chip reduction coefficient; Different types of chips; Chip curl and cross section.

3. Force in Machining: **4**

Merchant's circle diagram for analysis of forces; Velocity relationships; Kronenberg's relationship; Dynamometry.

4. Heat in Metal cutting: **2**

Heat sources; Measurement of cutting temperature.

5. Machinability & Machining Economics: **5**

Machinability and machining efficiency; Machining economics.

6. Cutting Tool Materials: **4**

Failure of cutting tools; Essential properties of cutting tools; Development of tool materials- carbide, HPC, CBN, diamond.

7. Micro Finishing Processes: **3**

8. Transmission of Motions in Machine Tools: **6**

Classes of machine tool motions; Mechanisms; Kinematics structures; Differential mechanisms.

9. Spindle Drive: **5**

Spindle speed range; Layout of spindle speeds in AP and GP; Saw diagrams; Productivity analysis.

10. Machine Tool Gear Boxes: 4

Number of steps & stages; Types of gear boxes; Rules for sliding cluster gear boxes; Speed structure and ray diagram; Calculation of gear teeth in a group transmission.

11. Machine Tools Strength & Rigidity: 3

Principles of design for strength & rigidity; Evaluation of materials by weight; Compliance of machine tools.

12. Machine Tools Automation (Mechanical Control): 5

Basic concepts and operating cycles of automatic machine tools (AMT); cam controlled AMT; Hydraulically operated and controlled AMT, Hydraulic Servosystems; Electromechanical Controls.

BOOKS:

1. Milton C. Shaw- *Metal Cutting Principles* , Oxford University Press
2. N.K.Meheta - *Machine Tools Design*, Tata McGraw -Hill Publishing
3. G.Kuppuswamy - *Principles of Metal Cutting,* Universities Press
4. S.K.Basu&D.K. Pal- *Design of Machine Tools* Oxford & IBH Publishing Co.
5. Edited by N.Acherkan- *Machine Tool Design : 4 vols.* , Mir Publishers, Moscow
6. A.Bhattacharya- *Metal Cutting Theory and Practice*, New Central Book Agency (P) Ltd.

FABRICATION TECHNOLOGY
(Code: MTI 104)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction to Fabrication 2

2. Properties of materials, shapes and standard in metal fabrication. 4

3. Metal cutting methods 10

Shearing, punching, nibbling, sawing, flame cutting, piercing.

4. Metal forming 10

Sheet metal forming, bending, forging, extrusion, drawing, rolling, spinning, pressworking.

5. Joining processes 10

Bolting, riveting, welding – fusion and solid state welding, adhesive bonding, mechanical fastening, soldering, brazing.

6. Surface treatments, micro electronic fabrication 3

7. Inspection and quality assurance 5

8. Composite materials in fabrication 4

Classification of composites, thermosetting, resin used for composites, composite reinforcement, processing of composites, joining of composites.

9. Automation in Fabrication 4

BOOKS:

1. Kenyon Pitman- *Basic Fabrication & Welding*, Pitman Pub. Ltd.
2. F.J.M. Smith- *Basic Fabrication & Welding,* Longman Group Ltd.
3. Hazra & Choudhuri- *Workshop Technology Vol. 1 & 2,* Media Promoters & Publications
4. O.P. Khanna- *Welding Technology,* Dhanpat Rai & Sons
5. P.N.Rao- *Manufacturing Technology,* Tata McGraw Hill
6. DE Garmo et al- *Materials & Processes in Manufacturing* – Wiley

FLUID DRIVES AND CONTROL
(Code: MTI 105)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction to fluid power 1

2. Classification of fluid power 1

3. Energy and power in Hydraulic Systems 2

Application of Pascal's law, Conservation of energy, the continuity equation, hydraulic horse power, Bernonll's equation, energy, power and flow rate in the SI Metric System.

4. The source of hydraulic power: Pumps 6

Pumping theory, pump classification – Gear, vane, piston, pump performance, pump noise, pump selection.

5. Linear Actuator (Hydraulic Cylinder) 4

Overall operating features, cylinder mountings and mechanical linkages, cylinder force, velocity and power, cylinder cushions, mechanics of hydraulic cylinder loadings, telescopic cylinder, design aspects.

6. Rotary Actuator (Hydraulic Motor) 2

Classification: Gear, Vane, Piston; hydraulic motor theoretical torque, power and flow rate, hydraulic motor performance.

7. Valves and other control components in hydraulic systems 5

Direction control valves, pressure control valves, flow control valves, cartridge valves, pressure and temperature switches, hydraulic accumulators, pressure intensifiers, servo valves.

8. Hydraulic Conductors and Fittings 2

Conductor sizing, pressure ratings of conductors, steel pipes, steel tubing, plastic tubing, flexible hoses, quick disconnect couplings, metric size tubing.

9. Hydraulic Circuit Design and Analysis 9

Control of a single acting hydraulic cylinder, control of a double acting hydraulic cylinder, regenerative circuit, pump unloading circuit, pressure intensifier circuit, sequencing circuit, cylinder synchronization circuit, fail-safe circuit, speed control of hydraulic cylinder and hydraulic motor, hydrostatic transmission systems, analysis of hydraulic system with fictional losses, accumulator circuits.

10. Components of Pneumatic Systems **5**

Properties of air, the perfect gas laws, compressors, fluid conditioners, air control valves, pneumatic actuators.

11. Pneumatics: Circuit and Applications **5**

Pneumatic circuit design considerations, air pressure losses in pipelines, simple multicylinder circuits, emergency stop circuits, emergency stop circuits, fail-safe circuits, two-handed control, cascade circuits, cascade circuit design procedure, group selection and stepper circuits.

12. Electrical Controls for Fluid Power Circuits **7**

Electrical components, limit switches, solenoids, control of a cylinder using a single limit switch, reciprocation of a cylinder using pressure or limit switches, dual cylinder sequencing circuits, electrical control of a regenerative circuit, electro hydraulic servo system, application of Programmable Logic Controller (PLCs) in fluid power circuits.

13. Introduction to Fluidics **3**

Principles of fluids logic control, basic fluidic devices, fluid sensors, fluidic control of fluid power systems.

BOOKS:

1. Authony Esposito- *Fluid power with applications,* Prentice Hall International , Inc
2. S.R. Majumdar- *Oil Hydraulics,* Tata Mc Graw Hill
3. S.R. Majumdar- *Pneumatic System: Principles and Maintenance,* Tata Mc Graw Hill
4. D.D. Banks, D.S.Banks- *Industrial Hydraulics,* Prentice Hall
5. A.B.Goodwin- *Power Hydraulics,* B.I. Publications
6. Chris Stacey- *Practical Pneumatics*, Arnold Publications

INDUSTRIAL ROBOTICS
(Code: MTI 106)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction: 6

History of robotics; Definition of robot; Main components of robot: manipulator, sensors, controller, power conversion unit; Robot geometry: types of joints, workspace, number of degrees of freedom; Common configurations used in arms: rectangular, cylindrical, spherical, jointed; Classification of robots according to coordinate system: Cartesian, cylindrical polar, articulated or jointed; Classification of robots according to control method: non-servo, servo; Robot specifications: payload, accuracy, repeatability, resolution, maximum tip speed, reach, stroke;

2. Robot End Effector 5

End effector: definition, gripper, tools; Gripper : main parts, source of power; Types of grippers: mechanical grippers, vacuum cups, magnetic grippers, adhesive grippers, hooks , scoops, ladles; Universal gripper; Robot Tools: spot welding gun, pneumatic impact wrench, pneumatic nut runner, stud-welding head, inert gas welding torch, heating torch, grinder, spray painting gun.

3.Robot Actuators: 5

Definition, Characteristics: power to weight ratio, stiffness, compliance, reduction gears; Conventional actuators: hydraulic actuator, pneumatic actuator, electric motor, direct drive motor, stepper motor; servo motor, Special actuators: magnetostrictive, shape memory, alloy, elestomer, Mc Kibben artificial muscle;

4.Robot Sensors: 7

Definition of Sensor and transducer; Calibration; Basic categories of measuring devices: analog, discrete; Main types of sensors: position, velocity, acceleration, force and pressure, torque, touch and tactile, proximity, sniff, vision, voice recognition.

5.Robot Vision: 6

Definition of digital image, generation of digital image; Robot Vision System: definition, use, functions, components, classification, vision cameras; Techniques of image processing and analysis: Image data reduction, segmentation, feature extraction, object recognition; Application of robot vision system.

6. Robot Kinematics: 9

Definition of Robot kinematics, Tool frame and base frame. World –coordinate system, Direct kinematics, Inverse kinematics, Describing position and generation of a point in space, Derivation of rotational matrix by different methods, Homogenous transformation, Denavit- Hertenberg representation.

7. Robot Programming 5

Definition of robot programming; Different methods of robot programming: teach-pendant programming, key board programming; Programming languages: VALII, AML/2, ARM BASIC

8. Industrial Application of Robots 6

Material Transfer; Machine loading and unloading, Processing operations, Assembly operations, Inspection.

9. Economic Justification of Robots 3

Advantages of applying robots in workspace, Methods of economic justifications for installing a robot: return on investment payback period, equivalent uniform annual cost method, annual cost method; Selection of a robot.

BOOKS:

1. Klafter, Richard D. Chmielewaski, Thomas A. and Negin, Michael (2001) - *Robotic Engineering*, Prentice-Hall of India Pvt. Limited.
2. Groover, Mikell P. Weiss, Mitchell., Nagel, Roger N., Odrey, Nicholas G.(1986) - *Industrial Robotics : Technology, Programming and Applications*, McGraw-Hill International Edition
3. Niku, Saeed B. (2001)- *Introduction to Robotics Analysis, Systems, Applications*, Prentice Hall of India Private Limited, New Delhi
4. Shilling , Robert J. (1990)- *Fundamentals of Robotics : Analysis & Control*, Prentice Hall of India, New Delhi
5. Koren, Yoram (1987)- *Robotics for Engineers*, McGrew-Hill Book Company, Sinagapore
6. Hall, Ernest L. Hall Bettie C. (1985)- *Robotics: A User-Friendly Introduction*, Holt, Rinehart and Winston, Holt-Saunders, Japan
7. Yoshikawa, Tsuneo (1990) *Foundations of Robotics : Analysis and Control*, Prentice Hall of India Private Limited, New Delhi
8. Mason, Matthew T. (2005), *Mechanics of Robotic Manipulation*, Prentice Hall of India Private Limited, New Delhi

QUALITY AND RELAIBILITY ENGINEERING
(Code: MTI 201)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1.Introduction: 3

Evolution of quality control; Quality: Definitions of quality, dimensions of quality of a product, dimensions of quality for service variables, attributes, defect, standard or specification, quality of design, quality of conformance, quality of performance; Quality Control: off-line quality control, statistical process controls, acceptance sampling plan; quality assurance, quality circles, quality improvement.

2. Total Quality Management: 7

Main themes of TQM: customer, process, people; Features of TQM model; Vision and Quality policy; Performance standards; Six sigma quality, Quality function deployment; Benchmarking; Quality auditing; vender selection and certification; Different TQM practices; ISO 9000, Malcolm Baldridge National Quality Award, International Quality Study; leading sages and Quality and their philosophy; W.Edwards Deming, Joseph M. Juran, Kaoru Ishikawa, Taguchi, Philip Crosby, Armand Feigenbaums;

3. Measures of Quality Product and Quality Process 3

Definitions and use of cost of quality, traditional cost of quality, cost elements of cost of quality: prevention cost, appraisal cost, internal failure cost, external failure cost, cost of quality report, limitations of cost of quality, emerging cost of quality model, uses of quality cost information, intangible cost.

4.Continual Improvement: Basic Tools 5

Kaizen, continuous improvement, continual improvement, types of data, population, sample, data summarization, methods of data summarization; tally sheet, frequency distributions, histogram, stem-and-leaf display, bar chart, Pareto chart, Pareto diagram, line graph or run chart, flow chart, cause-and-effect diagram, check sheet, box-plots, scatter diagrams or scatter plots, seven step method for continuous improvement, PDCA cycle.

5.Continual Improvement: Statistical Process Control 8

Seven basic statement tools, different types of variation in the process outputs, definition of control chart, distinction between attributes and variables, control charts for attributes; p-charts, np-charts, c-charts, u charts; control charts for variables.
X-bar chart, R chart, individual chart; out-of control patterns; descriptive statistics and inferential statistics, Probability distribution, random variable, variance and standard deviation, normal distribution, behaviour of samples, Central Limit Theorem.

6.Continual Improvement: Some Advanced Tools 3

Different approaches for problem solving adopted by management, brainstorming: traditional, electronic; Affinity diagram; Process capability: Relative Precision Index, Process Potential Index;
Six Sigma Quality, Taguchi methods: Total loss function, design of experiments, reduction in variation, statistically planned experiments.

7. Defining Reliability 4

Reliability, demand time, one shot items, repeated cycles, time dependent items of specified mission continuously operating items, items in standby.

Basic statistics – The Binomial distribution, the Poisson distribution, the Exponential distribution, the log normal distribution, the weibull distribution.

8. Reliability Parameters 3

Reliability as a function of time, failure rate as a function of time, constant failure rate, mission reliability, mean time to failure (MTTF), MTTF as a function of failure rate, mean time between failures (MTBF), mean down time (MDT), availability, complex system, increasing failure rate, Bath tub curve.

9. Reliability Predictions 3

Condition for the prediction, cycle dependent performance, confidence estimates for success probability, confidence estimates for MTBF & constant failure rate, MTBF estimates, failure rate estimates, effects of environment and stress – accelerated testing.

10. Evaluating Data for Failure Rate Estimation 3

Reliability versus operating time, failure density function versus operating time, failure rate versons operating time, Goodness-of-Fit Tests.

11. Reliability Modeling for System Predictions 3

Systems series and parallel systems, duty cycling, redundancy: K-out-of N redundancy, standby redundancy.

12. Reliability – Modeling of Complex Systems 2

The Markov Model Approach to solve complex system MTBF.

13. Risk Assessment 2

Failure Modes and Effects Analysis (FMEA), Failure Modes Effects and Critically Analysis (FMECA), Fault Free Analysis (FTA), Petrinet modeling.

14. Reliability in Engineering Design 2

Design synthesis, strength load interaction, reliability of the system, design based on reliability terotechnology and trends in design.

15. Maintenance Aspects 3

Types of maintenance, preventive maintenance, spare parts management, use of Material Requirements Planning (MRP) approach for maintenance resources planning and control.

BOOKS:

1. Paul Kales - *Reliability for Technology, Engineering and Management.* – Prentice Hall
2. Bikas Bhadury & S.K.Basu - *Terotechnology : Reliability Engineering and Maintenance Management* – Asian Books Private Limited
3. E. Balguruswamy - *Reliability Engineering* – Tata McGraw Hill Publishing Co-Limited.
4. Amitava Mitra -*Fundamentals of Quality Control and Improvement* – Prentice Hall of India Pvt. Ltd., New Delhi
5. Jill A.Swift, Joel E. Ross and Vincent K.Omachonu -*Principles of Total Quality* – St. Lucie Press Boca
6. William J. Kolarik - *Creating Quality : Concept, Systems, Strategies and Tools* – McGraw-Hill Inc.
7. Donna C.S.Summers - *Quality*– Prentice Hall, International Inc, New Jersey
8. Douglas C.Montgomery- *Introduction to Statistical Quality Control* – John Wiley & Sons Incs, New York
9. Bertrand L.Hansen and Prabhakar M.Ghare - *Quality Control and Application* – Prentice Hall of India Pvt. Ltd., New Delhi
10. Samuel K.Ho - *TQM: An Integrated Approach* – Kogen page India Pvt. Ltd., New Delhi
11. D.J.Smith-*Reliability Engineering* – Pitman
12. L.S.Srinath- Reliability Engineering– East West Press

AUTOMATED MANUFACTURING SYSTEM (AMS)
(Code: MTI 202)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction 2

Developments in manufacturing technology in automation, A hierarchical model of factory automation, Systems requirements and automatic control technology, Classification of NC systems

2. Features of numerically controlled machines 4

Fundamentals of machining, Design considerations of NC machine tools, Methods of improving machine accuracy, Increasing productivity with NC machines, Machining centers, CNC controllers.

3. Fundamentals of NC part programming 6

Preparatory functions, Axis motion commands, Feed and speed commands, Miscellaneous command, , Conventional numerical control, Direct numerical control, Computer numerical control, Computer aided part programming, APT language basics, CAD/CAM based part programming

4. Manufacturing Planning and Control Systems 5

A basic framework for manufacturing and planning, Demand management, Aggregate production planning, Master production schedule, Material requirement planning, MRP lot sizing problem, Capacity planning, Shop floor control

5. Group Technology and Cellular Manufacturing Systems 12

Concept of Group Technology, Design attributes and manufacturing features, GT implementations, Part family formation, Selection of classification and coding system, Benefits of group technology, Concept of cellular manufacturing, Cell formation approaches, Economics of group tooling in cellular manufacturing, Production planning and control in cellular manufacturing

6. Flexible Manufacturing Systems 17

Concept of different types of flexibility, Volume variety relationship for understanding production systems, Key characteristics of various manufacturing systems, Concept of FMS, Basic features of physical components of FMS, Basic features of control components of an FMS, Operational problems in FMS, Layout considerations Sequencing of Robot moves in Robotic cell, FMS benefits

7. Enterprise Integration CIM, Future Trends 6

Introduction to CIM, Network communication, Networks architecture and protocol, Database managements systems, Realizing CIM

BOOKS:

1. Thomas A. Boucher- *' Computer Automation in Manufacturing: An Introduction'*, Chapman and Hall
2. Yoram Koren - *'Computer Control of Manufacturing Systems'*, Macgraw Hill Internationl Book Company
3. Nanua Singh - *'System Approach in Computer Iontegrated Design and Manufacturing'* , John Wiley and Sons, Inc.
4. Narahari and Viswanadham - *" Performance Modelling and Analysis of Automated Manufacturing systems "* Prentice Hall
5. James G.Bralla -*" Handbook of product design for manufacture "*, McGraw Hill Book co.,1986
6. Henry Peck, *" Designing for manufacture "*, Sir issac Pitman & Sons Ltd.,1973.
7. Matousek, *" Engineering Design "*, Blackie & Sons,1956.

MODERN MANUFACTURING PROCESSES
(Code: MTI 203)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction **2**

Various modern manufacturing processes.

2. Mechanical Machining Processes **12**

Abrasive Jet Machining (AJM), Ultrasonic Machining (USM), Abrasive Finishing Processes – Abrasive Flow Finishing (AFF), Magnetic Abrasive Finishing (MAF), Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM).

3. Thermoelectric Machining Processes **15**

Electric Discharge Machining (EDM), Electric Discharge Grinding and Electric Discharge Diamond Grinding, Wire Electric Discharge Machining, Laser Beam Machining (LBM), Plasma Arc Machining (PAM), Electron Beam Machining (EBM).

4. Electrochemical and Chemical Manufacturing Processes **12**

Electrochemical Machining (ECM), Electromechanical Grinding (ECG), Electrochemical Drilling (ECD), Electrochemical Deburring (ECDe), Chemical Machining (ChM)

5. High Velocity Forming Processes **5**

Explosive forming processes, Propellant forming, Electro-Hydraulic forming, Electromagnetic forming, Pneumatic / Mechanical forming.

6. Micro-Machining, MEMS and Nanotechnology **6**

Classification of Micromachining, Various Micromachining Processes- Abrasive micro machining, Ultrasonic micro machining, Micro EDM, Micro ECM, Laser Micromachining.

MEMS (Micro Electro Mechanical Systems)- Development and need of MEMS, overview of MEMS technology with relevant non conventional processes.
Nano materials, Nano tubes and Nano wires, Nanofabrication.

BOOKS:

1. V.K.Jain – *Advanced Machining Processes* , Allied Publishers Pvt. Limited, India
2. P.K.Misra - *Non-conventional Machining*, Narosa Publishers,
3. Pandey & Shan - *Modern Machining Processes*, Tata McGraw Hill
4. Mark Ratner, Daniel Ratner – *A general introduction to the Next Big Idea Nano technology* Pearson Education.
5. G.F.Benedict – *Non-traditional Machining Processes*, Marcel Dekker Inc.,
6. J.A.McGeough, *Advanced Methods of Machining,* Chapman and Hall
7. Amitava Ghosh & Ashok Kumar Mullick– *Manufacturing Science,* West Press PVt. Ltd.
8. Joseph McGeough – *Micromachining of Engineering Materials*, Marcel Dekker
9. Mikell P.Groover – *Fundamental of Modern Manufacturing: Materials, Processes and Syste*, Willey

CAD/CAM
(Code: MTI 204)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. The design process and role of CAD **2**

The design process, Types of design model, Concurrent engineering, Modelling using CAD, A CAD system architecture

2. Techniques for geometric modeling **6**

Representations of curves, Parametric representation of geometry, Bezier curves etc., Techniques for surface modeling, Different types of patches, Techniques for volume modeling , boundary model, Constructive solid geometry etc.

3. Elements of interactive computer graphics **4**

Introduction to computer graphics, Computer graphics hardware, Two dimensional computer graphics, Vector generation, Clippng, Three dimensional computer graphics, Viewing transformation, Techniques for visual realism, Interaction with the syatem and the model.

4. Entity manipulation and the data storage **4**

Manipulation of the model, Introduction to data storage, Data structures for interactive modeling, Object oriented representations, Database considerations

5. Standards for CAD **2**

Graphics and computing standards, Graphics Kernel system, Standards for exchanging images, Data exchange standard, IGES and DXF standards, and Communication standards

6. The design/manufacture interface **16**

The limitations of traditional engineering approaches, Current theme in manufacturing engineering, Group technology, The design for manufacture and assembly, Overview of process planning techniques, The total approach for product development, The system approach, Concurrent engineering, The total quality approach, The techniques of quality engineering, Quality function deployment

7. Introduction to machine control **12**

Fundamentals to numerical control, Data preparation for numerical control, Machining for 3D model, Introduction to Rapid prototyping, Robotic Technology, Cellular manufacturing

8. Production planning and control 4

Introduction too production planning and control, Requirement planning systems, Shop floor control system, Scheduling techniques, Just in time manufacturing

9. Future directions of CAD/CAM 2

Product data management , Product modeling, Assembly and tolerance modeling etc.

BOOKS:

1. Chris McMohan & Jimmi Brown- *" CAD CAM "*, Addison,Wiley-2000.
2. Donatas tijunela & Kirth E- " Manufacturing High Tech Handbook ", Mckee-2000.
3. Narahari and Viswanadham-*"Performance Modelling and Analysis of Automated Manufacturing systems "*-Prentice Hall-1998.

COMPUTER CONTROL OF MACHINES AND PROCESSES
(Code: MTI 205)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction: **5**

Computer in process control, Hierarchical Control, Control Networks, Interfacing, Computer Communication : Transmission, Coding, Types of communication lines, communication hardware; Network Architecture: Open System Inter Connector (OSI), LAN, Manufacturing Automation Protocol (MAP), Databases in Control, Control Hierarchy, Control Computers, Discrete event system and supervisory controller software design : Petri net modeling, mathematical properties of ordinary Petri nets, software specification for a machining cell controller.

2. Numerical Control Machines : **9**

Type of CNC Machines: CNC plasma machines, CNC spring forming machines, CNC laser cutting machines, vertical machining centers, horizontal machining centers, variable axes machining control, CNC Press brakes, CNC Punch press; Point-to-point machines, continuous path machines; machines tool axes, components of CNC machines; NC / CNC controls, CRT displays, drive motors, stepping motors and open-loop systems, servo motors and closed loop system, CNC machine; axes and coordinate systems; absolute and incremental programming, word address programming, part programming, programming procedure, incremental positioning, circular interpolation, tool length offset, tool diameter offset.

3. Robot Technology : **10**

Definition of Robot; robot anatomy; joints and links, common robot configurations; Robot Control Systems; Drive Systems, Types of robot control; Accuracy and Repeatability; End Effectors; Sensors in Robotics; Types of Robot Programming: manual setup, lead through programming, robot programming languages, off-line programming.

4. Automated Material Handling: **7**

Material handling function; Types of material handling equipment; Analysis of Material handling Systems: consideration of material and movement conditions, material handling analysis techniques; Design of the System: effect of plant layout, principles of material handling; Conveyor Systems: types of conveyors, quantitative relationships and analysis of conveyor systems; Automated Guided Vehicle Systems (AGVS): types of AGVS, applications, vehicle guidance and routing, traffic control and safety, system management, quantitative analysis of AGV Systems.

5. Automated Storage Systems: 7

Storage System Performance : Types of materials stored in factory, storage capacity, system throughput, storage transactions, utilization, uptime reliability; Automated Storage / Retrieval Systems (AS/RS); Definition, important categories of automated storage /retrieval system, basic components of an AS /RS, AS/RS controls, special features, applications, quantitative analysis, caruosel storage systems: Configuration and control features, Coruosel storage application, Quantitative analysis; Work-in Process Storage : Interfacing handling and storage with manufacturing : types of interface, positional accuracy, methods of load transfer.

6. Computer Process Control: 8

Definition : Computer – process interface : characteristics of manufacturing process data, process data input / output; Interface hardware : sensors and transducers, analog-to-digital converters, digital-to-analog converters, multiplexers, pulse counters and pulse generators; Computer Process Monitoring, Types of computer process control: preplanned control, direct digital control, supervisory computer control; Programming for computer process control: requirements of control programming, interrupt system, error detection and recovery, diagnostics;

7. Sequence Control and Programmable Controllers: 6

Logic control and sequencing : logic control system, sequencing system; Logic control elements: logical AND, OR, and NOT gates, boolean algebra, hardware for implementing combinational systems; sequencing elements; Timers, Counters; Ladder Logic Diagrams; Programmable Logic Controllers (PLC): Components of PLC, Programming the PLC. How the PLC operates, Additional capabilities of PLC.

BOOKS:

1. Mikell P.Groover – *Automation, Production Systems and Computer – Integrated Manufacturing,* Prentice Hall of India Pvt. Ltd.
2. HMT Limited *Mechatronics,* Tata Mc Graw – Hill Publishing Company Ltd.
3. Jon Stenerson and Kelly Curran– *Computer Numerical Control : Operation and Programming* , Prentice Hall, New Jersey
4. S.Kant.Vajpayee- *Principles of computer – Integrated Manufacturing,* Prentice Hall of India.
5. Thomas O. Boucher- *Computer Automation in Manufacturing: An Introduction.* Chapman & Hall
6. David J.Williams- *Manufacturing Systems: An Introduction to the Technologies:* Halsted Press
7. James V.Valentino and Joseph Goldenberg (2000) – *Introduction to Computer Numerical Control* – Prentice Hall
8. G.E. Thyer (1988) – *Computer Numerical Control of Machine Tools*– Newnes, Butterworth-Heinemann Ltd., Oxford

FINITE ELEMENT METHOD IN ENGINEERING
(Code: MTI 206)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction to Finite Element Procedures 3

Introduction, Physical problems, Mathematical models, Finite element as a part of computer aided design.

2. Vectors, Matrices and Tensors. 4

Introduction, vector spaces, Subspaces, Matrix representation linear transformation. The eigen-problem. The Rayliegh quotient and minimax, characterization of eigenvalues, vectors and matrix norms.

3. Engineering analysis with FEM. 7

Steady state problem, propagation problems. Eigen problems differential formulation, variational problems, weighted residual method, rifz method, finite different differential and energy methods, introduction to language multipliers, and penalty method.

4. Formulation of Finite Element Method 12

Introduction, Formulation of finite element method using the principle of virtual displacement transformation matrices for plane stress analysis, General formulation. Lumping of structure properties and loads. Requirement of monotonic convergence, finite element models.

5. Linear Analysis with FEM 11

General deviation of finite element equilibrium equations, imposition of displacement boundary conditions. Generalized coordinate models for specific problems, Definition of convergence criteria for monotonic convergence, Incompatible displacement must based models, Mixed formulations. Mixed interpolohous, Incompressible analysis.

6. Non-linear analysis with FEM 10

Introduction, Formulation of continuum machines incremental equation of motions the deformation, gradient, strain, and stress tensors, displacement / pressure formulation for large deformations, structural elements contact conditions.

7. Heat transfer, field problems and incompressible fluid flow. 5

Governing heat transfer equations, finite element discretization of heat transfer equations. Analysis of field problems, analysis viscous incompressible fluid flows.

BOOKS:

1. Keneth H.Huebner, Donald L.Dewhirst, Doglas E.Smith, Ted. G.Pyrson- *The Finite Element Method for Engineers,* John Willey and Sons Inc.
2. J.N. Ready- *An Introduction to the Finite Element Methdo,* Mc Graw Hill Publishing Company, New York
3. K.J. Bathe, *Finite Element Procedure, Prentice Hall of India Publishing Company*

PRODUCT DESIGN
(Code: MTI 207)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction **2**

Definition: Product development Process, Product Design; Types of design, engineering design; phases of modern product development process; Reverse engineering and redesign product development process.

2. Product Development Process Tools and Scoping Product Developments **4**

Product development team: definition, composition, team roles, Myer-Briggs type indicator, team structure, team building, team evaluation; Product Development Planning: Steps of planning, basic planning and scheduling tools; S-curves: definition, s-curves and new product development, technology forecasting; Basic method: technical questioning, mission statement; Advanced method: Business case analysis, design drivers;

3. Customer Needs: **5**

Customer satisfaction: Kano diagram, customer populations, types of customer needs, customer need models; Customer needs gathering methods: interviews, questionnaires, focus groups, be the customer need models; Customer Need Gathering Methods: Interviews, questionnaires, focus graphs, be the customer. Grouping the needs: affinity diagram method, customer sort method; determining need importance; interview data method, questionnaire method; cluster analysis method;

4. Establishing Product Function Product Teardown and Experimentation: **8**

Functional Decomposition: product function, sub function, abstraction, constraints; Modeling process: Function Analysis System Technique (FAST), Subtract and Operate procedure; Function structure: phases modeling process; Function structure decomposition; Product Teardown: phases of product teardown process; teardown methods; measurement and experimentation; Post teardown reporting; application of product teardown.

5. Benchmarking and Establishing Engineering Specifications: **6**

Benchmarking: steps of benchmarking, support tools for benchmarking; Setting product specifications: Specification process, fundamental requirements and constraints, specifications sheets, House of Quality, value analysis

6. Product portfolios, Portfolio architecture and Product Architecture: 5

Product portfolio architecture: definition, types, choosing an architecture type; Platform architecture: Modular family platform, functional architecting, steps of platform design method, functional architecting, non-platform based products, platform based products; Product architecture types: integral, modular; Product modularity: type of modularity, cluttering methods, advanced functional method, Architecture-based development teams.

7. Generating Concepts, Concept Selection and Concept Embodiment 5

Concept Generating Process: basic methods, advanced methods, morphological analysis, combining solution principles; Estimating Technical Feasibility, Concept Selection Process, Pugh Concept Selection Chart, Measurement theory, Numerical Concept Scoring; Refining geometry and layout, Systems modeling.

8. Modeling of Product Metrics 3

Model selection by performance specifications, Mathematical modeling, physical prototyping, constructing product models.

9. Design for Manufacture and Environment Assembly 1

Design guidelines, Manufacturing cost Analysis.

10. Design for Environment 2

Environment objectives, Basic design for environmental methods, life cycle assessment, techniques to reduce environmental impacts.

11. Analytical and Numerical Model Solutions 4

Solution definition, Pareto optimality, Spreadsheet search, concept of optimization. Analytical formulations, practical optimization.

12. Physical Prototypes Physical Models and Experimentation 4

Physical models, Prototypes, Types of prototypes, uses of prototypes. Rapid prototyping techniques, Scale, Dimensional analysis, Similitude, Physical prototype design and planning. Design of experiments, Reduced tests, Fractional experiments, Statistical analysis of experiments.

13. Design for Robustness: 3

Quality design theory, Taguchi's method.

BOOKS:

1. Kevin N. Otto and Kristin L.Wood 2001) – *Product Design*, Research Education, Delhi
2. Harry Cather, Richard Morris, Mathew Philip, Chris Rose (2001) – *Design Engineering,* Butterworth Heinemann
3. Nigel Cross – *Engineering Design Methods: Strategies for Product Design* – John Wiley & Sons Ltd., England
4. M.A. Parameswaran - *An Introduction to Design Engineering* – Alpha Science International Ltd., Harrow, U.K.
5. M.A. Annachino – *New Product Development* – Butterworth-Heinemann
6. Anil Mital, Anoop Desai, Anand Subramanium, Aashi Mital – *Product Development: A Structured Approach to Consumer Product Development, Design and Manufacture* – Butterworth-Heinemann
7. George E.Dieter and Linda C.Schmidt – *Engineering Design* – McGraw–Hill International Edition

MATERIALS HANDLING SYSTEM
(Code: MTI 208)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. Introduction to Materials Handling: 4

Definition, scope and importance of Materials Handling; System concept; Classification and characteristics of materials.

2. Principles of Materials Handling : 3

Significance of Materials handling principles; Different principles and suggestions for their application.

3. Unit Load Concept: 3

Advantages and disadvantages; Load unitization processes; Pallets, skids & containers; Packaging for Materials Handling.

4. Classification of Materials Handling Equipment: 1

5. Industrial Vehicles / Trucks: 6

Hand trucks; Power trucks; Forklift trucks and attachments.

6. Conveyors: 12

Belt Conveyors – characteristics, types, components, basic design considerations; Chain Conveyors – characteristics, types, components, aspects of design; Roller Conveyors-characteristics, types, components, aspect of design; Screw conveyors – characteristics, types, components, aspects of design.

7. Pneumatic & Hydraulic Conveyors: 4

8. Hoisting Equipment: 12

Hoists; Winches; Elevators – types and parts of hoisting equipment, design considerations, Cranes : wharf cranes, level buffing system, Derricks.

9. Robotic Handling : 2

Materials handling at workplace; Types of robots; Robotic handling applications; AGV.

10. Auxiliary Equipment: 3

Gates; Feeders; chutes; Positioners; Weighing and control equipment.

11. Organisation, Maintenance & Safety: 2

BOOKS:

1. Apple, J.M - *Material Handling System Design,* John Wiley & Sons
2. Allegri,T.H. *Materials Handling: Principles and Practice,* CBS Publishers & Distributors, N.Delhi
3. Immer- *Materials Handling* , J.R, McGraw Hills
4. Spivakovsky,A and Dyachkov,V- *Conveyors and Related Equipment*, Peace Publishers, Moscow
5. Rudenko N.- *Materials Handling Equipment,* Peace Publishers, Moscow
6. Alexandrov,M.P- *Materials Handling Equipment, Part-I and II,* Mir Publishers, Moscow
7. Ray, T.K.- *Mechanical Handling of Materials,* Asian Books Private Ltd., 2004
8. Ray, S.- *Introduction to Materials Handling,* New Age International Publishers, 2008.

QUANTITATIVE DECISION MAKING
(Code: MTI 209)

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1.Introduction to Operations Research: 2

2. Linear Programming (LP): 10

Introduction; Problem formulations; Mathematics of LP; Simplex procedure; Sensitivity analysis; Computer implementation.

3.Transportation and Assignment Problem: 7

4.Network Analysis: 4

Shortest-route problem; The minimum spanning tree problem; The maximal flow problem.

5. Project Scheduling : 7

Critical path method (CPM); Network construction and determination of critical path; Crashing; Resource smoothing.

6. Non-Linear Programming : 10

Graphical illustrations; Unconstrained optimization-direct search method and steepest descent method; Constrained optimization by lagrange multipliers; Integer linear programming by Branch &Bound technique.

7. Metaheuristics 8

Tabu search, Genetic algorithm.

8. Forecasting Techniques : 4

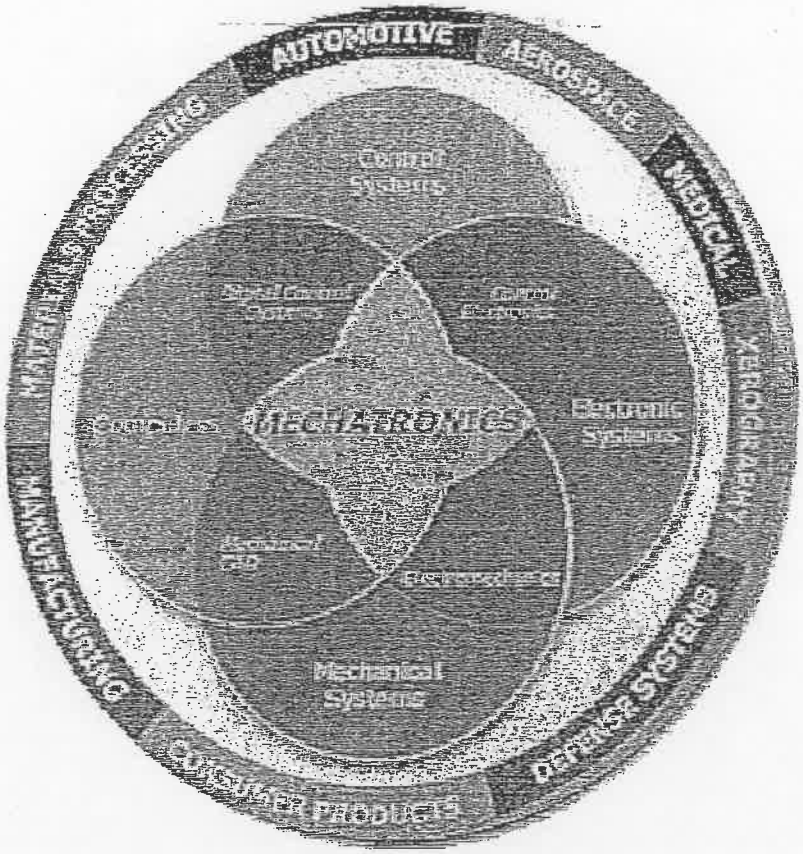
BOOKS:

1. F.S.Hillier, G.J.Lieberman– *Introduction to Operations Research*; The McGraw Hill Companies
2. R.L.Ackoff, M.W.Sasieni; *Fundamental of Operations Research*. John Wilkey & Sons. Inc.
3. Anderson, Sweeney- *An Introduction to Management Science*, Williams; West Publishing Co.
4. I.A.Taha *Operations Research : An Introduction,* Prentice Hall of India.
5. C.K.Mustafi- *Operations Research*, New Age International Publishers
6. S.S.Rao- *Engineering Optimization*, New Age International Publishers

IX(2)

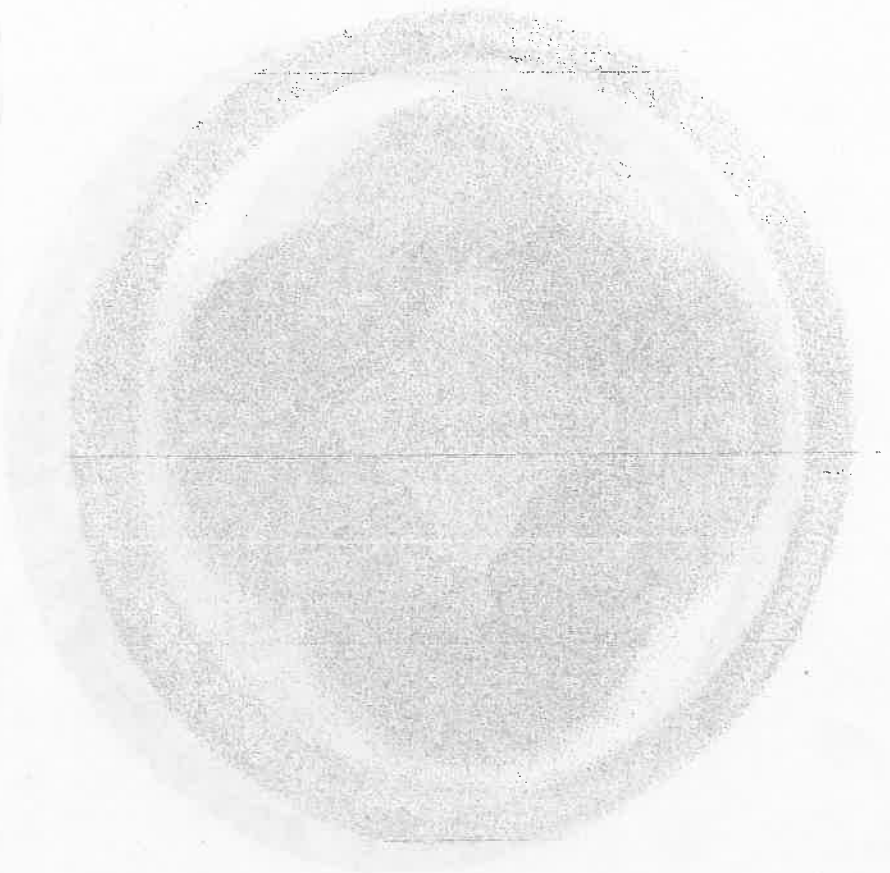
APPROVED BY BOS ON 22.03.2011

4 SEMESTERS M. TECH COURSE ON MECHATRONICS ENGINEERING



Electrical Engineering Department

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA
BLOCK – FC, SECTOR – III, SALT LAKE CITY, KOLKATA – 700 106



COURSE STRUCTURE FOR M. TECH. IN MECHATRONICS ENGINEERING

FIRST SEMISTER

A. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	ME101	Advanced Engineering Mathematics	3	1	0	4	4
2.	ME102	Industrial Management	4	0	0	4	4
3.	ME103	Sensors & Actuators	4	0	0	4	4
4.	ME104	Mechatronic Systems	4	0	0	4	4
5.		Elective - I	4	0	0	4	4
		Total of Theory				20	20

B. LABORATORY / PRACTICAL							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
6.	ME191	Sensors & Signal Conditioning Lab	0	0	4	4	2
7.	ME192	Mechatronic Systems Lab	0	0	4	4	2
8.	ME193	Seminar - I	0	2	0	2	1
		Total of Practical/Laboratory				10	5
		Total of Semester				30	25

Elective – I: One subject to be chosen from the following subjects.

Code	Subjects
ME105	Signal Conditioning and Data Acquisition System
ME106	Wireless Communications
ME107	Advanced Electrical Drives

SECOND SEMESTER

A. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	ME201	Application of Mechatronic Systems	4	0	0	4	4
2.	ME202	Advanced Microprocessor and Microcontrollers	4	0	0	4	4
3.	ME203	Industrial Automation	4	0	0	4	4
4.		Elective – II	4	0	0	4	4
5.		Elective – III	4	0	0	4	4
		Total of Theory				20	20

B. LABORATORY / PRACTICAL							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	ME291	Seminar - II	0	2	0	2	1
2.	ME292	Mechatronics Lab	0	0	4	4	2
	ME293	Comprehensive Exam (Viva-Voce)	0	0	0		4
		Total of Practical/Laboratory				6	7
		Total of Semester				26	27

Elective – II: One subject to be chosen from the following subjects.

Code	Subjects
ME204	Advanced Control System
ME205	Micro Mechatronics Systems
ME206	Digital Signal Processing

Elective – III: One subject to be chosen from the following subjects.

Code	Subjects
ME207	Product Design
ME208	Digital Image Processing & Machine Vision
ME209	VLSI Technology

THIRD SEMESTER

A. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
3.	ME301	Pre-submission Defense of Dissertation	0	0	0	0	4
4.	ME302	Dissertation (Progress)	0	0	0	24	18
		Total of Semester				24	22

FOURTH SEMESTER

B. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	ME401	Dissertation (Completion)	0	0	0	24	18
2.	ME402	Post-submission Defense of Dissertation	0	0	0	0	6
		Total of Semester				24	24

SYLLABUS FOR MECHATRONICS ENGINEERING

FIRST SEMISTER

ME 101 ADVANCED ENGINEERING MATHEMATICS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Statistics* *10L*
Elements of statistics; frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve fitting by least square method; Correlation and Regression; Testing of hypothesis; Basic types of factorial design and Analysis of Variance.

2. *Matrix Operation* *8L*
Matrix operation; Eigen value and Eigen Vector by iterative methods; Diagonalisation of a square matrix.

3. *Laplace Transform, Fourier Transform; Fourier Integral* *6L*
Laplace Transform, Fourier Transform; Fourier Integral and their Applications;

4. *Numerical Methods* *10L*
Interpolation by Polynomials; Error Analysis; Solution of System of linear equation by Gauss-Seidel iterative method; Newton Rapson method; Numerical Integration by Gauss-quadrature; Solution of ordinary differential equation by Rayleigh-Ritz method.

5. *Ordinary Differential Equation* *6L*
i) 2nd Order homogeneous Equation ii) Euler Cauchy Equation, iii) Non homogenous linear equation. Partial Differential Equation : i) Wave equation – one dimension and two dimension, ii) Heat equation – one dimension and two dimension.

ME 102 INDUSTRIAL MANAGEMENT

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Classification and Importance of Operations Management* *3L*
Operations Management in corporate profitability & competitiveness; Operations strategy; Types & characteristics of manufacturing systems & service systems;

2. *Operations Planning and Control:* *7L*
Forecasting for operations; Inventory planning & control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling;

3. *Quality Assurance:* *10L*
The quality assurance system; choice of process and reliability; control of quality.

4. *Maintenance Function:* *6L*
Preventive maintenance; Overhaul and replacement.

5. *Management Information System:* *6L*
Need & structure of MIS; Data Processing Systems; Data Sources & Management.

6. *Management Information System:*
Concept and evolution; Manpower planning; recruitment and selection; Motivating personnel; Leadership.

ME 103 SENSORS AND ACTUATORS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Overview of measurement systems* 2L
Measurement devices; Difference between sensor, transmitter and transducer; Smart device;
Primary measuring element selection and characteristics: Range; Response time; Accuracy; Precision; Sensitivity; Dead band; Dead time; Costs; Installation Problems.
Signal transmission: Types of signal: Pneumatic signal; Hydraulic signal; Electronic Signal. Standard signal ranges: Electronic transmitter adjusted range; Pneumatic transmitter adjusted range; Transmission system dynamics; transmission Lag; Transmitter Gain; Smart transmitters.

2. *Principles of Sensors* 2L
Classification of sensors. Characteristics and calibration of different sensors.

3. *Displacement, position and motion sensors* 4L
Principles of variable resistance, variable inductance, variable reluctance, variable capacitance type sensors. Position and Motion sensors: Limit switches; Proximity sensors: Pneumatic Proximity sensor; Optical Proximity sensor; Inductive Proximity sensor; Capacitive Proximity sensor; Ultrasonic Proximity sensor.
LVDT: construction; Working principle; signal conditioning; use of LVDT. The Tacho-generator: DC tachogenerator; Digital Tachogenerator; Optical type and magnetic type. Synchros and resolver. Encoders: types of encoder; Hall sensors: Working principle; Hall effect gear tooth sensor. Distance sensors.
Light Sensor : Photovoltaic; Photoconductive (Photo resistors).
Accelerometer : Definition; General Construction; Working Principle; Types of Accelerometer; Servo Type; Piezo Resistive Type; Capacitive Type; Variable reluctance type; Errors;
Variable reluctance circuit Geometry; Auto null sensor amplifier; force balance servo sensor.

4. *Force, Torque, Tactile* 5L
Different types of load cells and its application, Piezoelectric transducer, Torque measurement: Tactile sensors : Types, construction and working principle of Tactile sensors. magnetic, Piezoelectric, Photoelectric, capacitive and ultrasonic methods, Manometer, elastic elements.

5. *Strain Gauges* 5L
Working principle; construction; poisson's ratio; Gauge factor, Piezo resistance Co-efficient; strain sensing alloys; characteristics; gauges length, rosettes;
Types of Strain Gauge : Bonded; Unbonded; Metalic; Semiconductor.
Strain Gauge Measurement : Wheatstone bridge measurement; Advantage between full bridge, half bridge and quarter bridge; ppm; disadvantage of bridge circuit; linearity error; lead error. bridge constant; temperature compensation; practical implementation of strain gauge (Installation method).

6. *Pressure sensor* 5L
Few Definition on pressure: static, head. dynamic pressure. Classification of pressure.

Pressure Measurement method : Manometric : U Tube manometer, well type, inclined tube manometer; dead weight; electric strain method.
Mechanical pressure measuring elements: Bourden tube : Types – C Type; Spiral; Helical; Twisted; Bellows; Diaphragm. Design and construction of different types of pressure sensing elements. Application of Diaphragm: Capacitance Type, Reluctance Type, Strain Gauge Type and Inductive Type. Application of Bellows : Differential pressure; Pneumatic Servo mechanism type. Electrical and Piezoelectric pressure transducers, McLeod gage, Pirani gage and Ionisation gage.

7. *Flow sensors* 5L

The flow pioneers; Reynolds numbers; principle of flow measurement.
Types of Flow meter : Differential pressure type; positive displacement type; velocity type; mass meter type.
Differential pressure type : orifices; venturi tubes; flow tubes; flow nozzles; pitot tubes; elbow-tap meters; target meters and variable area meters.
Positive displacement type : Piston; Oval-gear; Nutating disk & Rotary-vane types.
Velocity meters : Turbine; Vortex shedding; Electromagnetic and Sonic designs.
Mass meters : Coriolis and Thermal types.
Head type flow meter, Electromagnetic flow meter, Rotameter, Anemometer, Ultrasonic flow meter.

8. *Temperature sensor* 4L

Mechanical and Resistance type temperature sensors, Thermocouples, Thermistor, Optical pyrometer.

9. *Smart Sensor* 2L

Methods of internal compensation, information coding, integrated sensor principles, present trends.

10. *Sensors in Robotics* 2L

Potentiometers, Synchros and Resolvers, Optical encoders, Tactile and Proximity sensors, Non-contact ranging sensors, Ultrasonic transducers, Opto-electric sensors, Geomagnetic sensors, Gyroscopes.

11. *Actuators* 4L

Definition of Actuators : Example; selection; Types of Actuators; linear; Rotary; Logical and Continuous Actuators.
Pneumatic Hydraulic system: Pneumatic actuator; Electro-Pneumatic actuator; cylinder, rotary actuators, Mechanical actuating system: Hydraulic actuator; Control valves; Construction; Valve coefficient or valve sizing; valve characteristics; types of valves; valve selection.
Electrical actuating systems: Solid-state switches, Solenoids, Voice Coil; Electric Motors; D.C. motors, Classifications; Application; Brass less DC Motor; Working principle and its application; AC motors, Single phase Motor; 3 Phase Motor; Induction Motor; Synchronous Motor; Stepper motors; half stepper; full stepper; linear motor, Piezoelectric actuator.

ME104 MECHATRONIC SYSTEMS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Electrical Systems* 8L

Mathematical modeling of Electro Mechanical Systems, RLC Circuits, active and passive electrical circuits, PMDC Motor, Stepper motor, three phase squirrel cage induction motor, three phase permanent magnet synchronous motor, servo motor.

2. *Mechanical Systems* 10L

Introduction to various systems of units, mathematical modeling of mechanical systems; Newton's laws, moment of inertia, forced response and natural response, rotational systems, spring mass system, free vibration, spring mass damper system, mechanical systems with dry friction, work energy and power, passive elements and active elements an energy method for deriving equations of motion, energy and power transformers.

3. *Fluid and Thermal systems* 6L

Mathematical modeling of liquid level system: Resistance and capacitance of liquid level systems with interaction. Mathematical modeling of pneumatic systems: Resistance and capacitance of pneumatic systems, mathematical modeling of a pneumatic systems, liberalization of non-linear systems. Mathematical modeling of hydraulic systems: Hydraulic circuits, hydraulic servo-meter and mathematical model of hydraulic servo motor dashpots. Mathematical modeling of thermal systems: Thermal resistance and thermal capacitance mathematical modeling of thermal systems.

4. *Design of Mechanical Elements* 12L

The phases of design, Design considerations, codes and standards, optimum design process, design variables, cost functions, design constraints, optimum design. Springs, rolling contact bearing, journal bearing, Spur and helical gear, bevel and worm gears, shafts, axes and spindles, Flexible Mechanical Elements, Belts; timing belts, chain and sprocket, flexible shafts, brakes, clutches, cams, four bar mechanism.

5. *Design of Hydraulic System* 4L

Hydraulic circuit design, Actuator design, selection of pumps, selection of valves, design of control circuits.

ELECTIVE - I

ME 105 SIGNAL CONDITIONING AND DATA ACQUISITION SYSTEM

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Analog Signal Conditioning* 15L

Introduction, Principles of Analog Signal Conditioning, Signal-Level Changing, Linearization, Conversions, Zero adjustment, Span adjustment, Filtering and Impedance Matching, Passive Circuits, Divider Circuit, Bridge Circuits, RC Filters, Operational Amplifiers, Characteristics, Op Amp Circuits in Instrumentation, Voltage Follower, Differential Amplifier, Instrumentation Amplifier, Active Filters, Voltage-to-Current Converter, Current-to-Voltage Converter, Linearization, Special Integrated Circuits (ICs), Industrial Electronics, Silicon-Controlled Rectifier (SCR), TRIAC.

2. *Digital Signal Conditioning* 15L

Review of Digital Fundamentals, Busses and Tri-State Buffers, Converters, Comparators, Digital-to-Analog Converters (DAC), Analog-lo-Digital Converters (ADCs), Sample and Hold, Multiplexer and De-multiplexer, decoder and encoder, Pulse modulations, Digital recorder, Programmable Logic Controller.

3. *Data Acquisition System* 10L

Introduction, Analog and Digital Data Acquisition Systems, Block diagram. Components, CPU, Memory, Input / Output, Sensors, ADC. DAC. Sample and Hold. Multiplexing. De-Multiplexing, Modulation. Display, Recording. Alarm.

Programming, Voltage, Current, Frequency, Temperature, Displacement, Pressure measurement using Data Acquisition System (DAS), Application of Data Acquisition System in Power plant, Process control plant and Automation, Data Logger.

ELECTIVE – I

ME 106 WIRELESS COMMUNICATIONS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Basic issues* *3L*
   Linearity and time invariance, Random processes and noise, Sensitivity, dynamic range and noise floor, Interference

2. *Modulation* *3L*
   Analog modulation, Digital modulation, Detection

3. *Multiple Access Techniques* *5L*
   Mobile RF communications, Multiple Access, Wireless standards.

4. *Transmitter Design and Receiver Design* *5L*
   Transmitter architecture, Transmitter performance tests, Receiver architecture.

5. *Low Noise Amplifiers* *3L*
   Input matching, Stability, Performance tradeoffs.

6. *RF Mixers* *5L*
   Designs of mixers, Performance of mixers, Noise in mixers.

7. *Oscillators* *3L*
   Basic LC oscillators, Voltage controlled oscillators, Design of oscillators, Quadratic signal generation, Single sideband conversion, Phase noise.

8. *Frequency synthesis* *3L*
   Phase locked loops, RF synthesizer architecture, Frequency dividers, Spurious responses, Direct Digital Synthesis.

9. *Power Amplifiers* *2L*
   Class A, B, AB, C, D amplifiers, High efficiency power amplifiers, Linearization techniques.

10. *Antennas and Propagation* *3L*
    Electromagnetic radiation, Polarization, Friis equation, Small antenna designs, dipoles, monopoles, patch antennas, Path loss and fading.

11. *Filters* *3L*
    Filter specification and design, Filter types, Filter technologies: LC, crystal, mechanical, SAW, & digital, DSP tradeoffs, software Defined Radio considerations.

12. *System Design Considerations* *2L*
    Packaging, Power, Heat dissipation, Parameter tradeoffs.

ME 107 ADVANCED ELECTRICAL DRIVES

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction to Electrical Drives* 2L
Electrical Drives, Parts of Electrical Drives, Dynamics of Electrical Drives, Components of Load Torques, Classification of Load Torques, Time and Energy-Loss in Transient Operations, Steady State Stability, Load Equalization.

2. *Control of Electrical Drives* 4L
Modes of Operation, Speed Control and Drive Classifications, Closed-Loop Control of Drives, Current-limit control, Closed-loop torque control, Closed-loop speed control, Closed-loop speed control of multi-motor drives, Speed sensing, Current sensing, Phase-locked-loop (PLL) control, Closed loop position control.

3. *DC Motor Drives* 8L
DC Motors and Their Performance, dc servo motors, Starting & Braking, Regenerative braking, Dynamic braking, Plugging, Transient Analysis, Speed Control, Transformer and Uncontrolled Rectifier Control, Controlled Rectifier Fed dc Drives, Single-phase fully-controlled and half-controlled, Three-phase fully-controlled and half-controlled rectifier control of dc motor, Dual-converter control of dc motor.

4. *Induction Motor Drives* 12L
Three-Phase Induction Motors, Analysis and performance, Starting, Soft start using saturable reactor starter, Braking, Transient Analysis, Starting and plugging, Speed Control, Rotor Resistance Control, Static rotor resistance control, Slip Power Recovery, Static Scherbius drive, Static Kramer drive, Variable Speed Constant Frequency Generation, Squirrel-cage induction machine and Cycloconverter scheme, Wound-rotor induction motor and Cycloconverter scheme, Single-Phase Induction Motors: Starting, Breaking, Speed Control, Linear Induction Motor and it's Control, PWM voltage source inverter (VSI) induction motor drives, Load commutated inverter fed synchronous motor drives, CSI squirrel-cage induction motor drive, PWM VSI squirrel-cage induction motor drive, Load commutated inverter (LCI) fed Induction motor drive.

5. *Synchronous Motor* 7L
Synchronous Motors, Starting, Braking, Synchronous Motor Variable Speed Drives, Variable frequency control, Modes of variable frequency control, Variable frequency control of multiple synchronous motors, Self-controlled synchronous motor drive employing load commutated thyristor inverter, Self-controlled synchronous motor drive employing a Cycloconverter, Starting Large Synchronous Machines.

6. *Brushless dc Motor, Stepper Motor & Switched Reluctance Motor Drives* 7L
Brushless dc Motors Unipolar brushless dc motor, Bipolar brushless dc motor, Speed control of brushless dc motors, Important features and applications, Stepper (or Stepping) Motors, Variable reluctance, Permanent magnet important features of stepper motors, Torque versus stepping rate characteristics, Drive circuits for stepper motors, Switched Reluctance Motor

SECOND SEMISTER

ME 201 APPLICATION OF MECHATRONIC SYSTEMS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction* 4L
Definition of robot, classification of robots according to coordinate system and control method, Main components of robots – manipulator, sensors, controller etc, Robot characteristics – payload, reach, repeatability, accuracy, resolution.

2. *Kinematics of Robot* 6L
Homogenous coordinates, Homogeneous transformation matrices, Direct and Inverse Kinematics of robots, Trajectory Planning.

3. *Robot End effecters & Actuators* 6L
Types, mechanical grippers, other types of grippers, Tools as end effecters. Characteristics of actuating systems, Actuating System – Hydraulic devices, pneumatic devices, electric motors, other special actuators.

4. *Sensors and Artificial Intelligence* 6L
Characteristics of Sensors, Position sensors, velocity sensors, acceleration sensors, force and pressure sensors, force and torque sensors, micro switches, touch and slip sensors, non-contact proximity sensors, Robot Vision System, Robot programming Languages – VAL, AML/2, ARM BASIC.

5. *Application of Robots* 4L
Handling, loading, & unloading, Welding, Spray painting, Assembly, Machining, Inspection, Rescue robots, Underwater robots, Parallel robot, and Medical robot.

6. *Mechatronic Elements of Modern CNC Machines* 8L
Machine Structure, Guide ways, Feed drives, Spindle and Spindle bearings, Measuring systems, Controls, software & operator interface, Ganging, Tool Monitoring.

7. *Other Mechatronic Applications* 6L
Electronic Thermostat, Automatic Camera, Air fuel ratio controller in Automobiles, Digital Engine Control, Vehicle Motion Control, Mobile robots etc.

ME 202 ADVANCED MICROPROCESSORS & MICROCONTROLLERS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction to Microprocessor* 4L
8085 Microprocessor Architecture and Its Operations, Memory, Input/Output (I/O), Microcomputer System, Interfacing Devices, Basic Instructions, Programming Techniques with Additional Instructions, Counter and Timing Delays, Stack and Subroutines, Code Conversion, BCD Arithmetic and 16-Bit, Data Operations, Software Development Systems and Assemblers.

2. *8086 Microprocessor Architecture* 8L
8086 CPU Pins and Signals, Operating Modes, Minimum Mode, Maximum Mode, System Interrupt Configurations. Bus Timing Diagrams, Minimum Mode and Maximum Mode.

3. *8086 Assembly Language Instruction and Programming* 10L
Instruction Set, Registers and Flags, General Purpose Registers, Pointer Registers, Index Registers, Segment Registers, Flags Register, How Instructions Affect the Flags Register, Addressing Modes, Program Memory Addressing Modes, Data Memory Addressing Modes, Addressing Mode Byte, Segment Override, Memory Addressing Tables, Instruction Set Mnemonics, Assemblers. Dependent Mnemonics, 8086 Instruction Groups & Programming.

4. *8051 Microcontroller* 10L
8051 Architecture Interfacing, 8051 Instruction Set, 8051 Application,

5. *8085 / 8086 / 8051 Interfacing* 8L
Interfacing Peripherals (I/O'S) & Applications, Parallel Input/Output and Interfacing Applications, Keyboard & display Interface, Interrupts Interfacing Data Converters, Programmable Interface Devices, General Purpose Programmable Peripheral Devices, Serial I/O & Data Communication Microprocessor Applications.

ME 203 INDUSTRIAL AUTOMATION

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction* 4L
Processes; Classification of Control system; Open loop and Close loop system; elements used in feed back control system; control loop study, samples of disturbances, control actions.

2. *Basic control schemes and controllers* 10L
On – off Control; Time proportional control; PI Control; PD Control; PID Control. Controller: Block diagram; Types of controllers; Self operated controllers; Electronic controller; Analog controller; Pneumatic controller; comparison between Pneumatic & Electronic controller; Hydraulic Controller; Programmable Logic Controller (PLC).

3. *Complex Control* 10L
Ratio Control: Objectives; Applications; Implementation methods; Loop Diagram; Furnace Air / fuel ratio control system; Important role of ratio control system; Environmental economical and safety benefits;
Cascade Control : Objectives; key features for cascade control to be successful; advantage of Cascade Control system; Block diagram description; Transfer function. Design of Cascade Control System in shell and tube heat exchanger and Continuous Stirred Tank Reactor (CSTR); Design a 3 level Cascade Control System.
Feed forward Control : Distinguished between feedback; Cascade and feed forward Control System; Objectives : loop diagram; Analysis of combine Feedback and feed forward control in a boiler drum level, CSTR, Shell tube heat exchanger etc., Block Diagram Description; Mathematical Details of the algorithm.
Control Inverse Derivative Control : Objectives and advantages; Design and Analysis of IC based Inverse Derivative Control System; Controller Tuning; Application in DC generator voltage control and pressure control of a vessel; Variable Structure control : Reasons for variable structure; Selective Control; Process example. Overwrite control : Objectives: Loop diagram description. Design and Analysis of overwrite control system of a shell and tube heat exchanger; flow control in a pumping system for a sand water slurry. Split range control : concept; design and analysis of split range control system of a gas

header having two inlets of different expensive gases for purchase and distribution; Characteristic equation; few process examples.

4. *Computer Control* 8L

Direct Digital Control (DDC), Distributed Control Systems (DCS) : Overview of Industrial Control System; ICS operation; ICS key components; SCADA System; DCS System; PLC System : Architecture; Systematic approach in designing a process control system; Input / Output adjustment opto-isolator device; I/O Devices in a PLC; Powering Field Devices in a PLC; PLC input / output types; Sourcing and sinking concept; PLC connections with process control system;.

5. *Adaptive Control* 2L

Standard approaches, Self adaptive, predictive, Self tuning.

6. *Process Control System* 6L

Boiler Control Steel Plant Instrumentation / Control System, control in Paper Industry, Distributive Column : Variables to be controlled; materials balances diagram; steady state materials balances; pressure control; level control; selection of appropriate distillation column strategy; composition control, Belt Conveyor Control.

ELECTIVE – II

ME 204 ADVANCED CONTROL SYSTEM

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Review of classical control technique :* 6L

Mathematical models of Physical systems , performance specification, root locus analysis and design, frequency domain analysis & Design.

2. *Digital Control System :* 12L

Types of signals, Sampling Process, Sample – and – hold, Analog to Digital converter, Digital to analog converters, quantization and quantization error, Linear difference equation, pulse response z-transform, inverse Z transform, Z – transform Techniques.

3. *Modern Control* 12L

Concepts of states, State variable and state models linear continuous time and discrete time, state space models, similarity transformation, transform function to state space representation, controllability and stabilizability, absorbability and detectability canonical decomposition, polo assignment by state feedback. Observers, continuing state feedback with an observer.

4. *Non-Linear Control System* 10L

Introduction, Common physical non-linear ties. The phase – plane method, singular points, Stability of non-linear system, Construction of phase – trajectories, System analysis by phase plane method. The describing function method, Derivation of describing function, Stability analysis by describing function method, Jump resonance, Liapunov's stability criterion, Popov's stability criterion.

ELECTIVE – II

ME 205 MICRO MECHATRONIC SYSTEMS

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Micro-Mechatronics* *10L*
Introduction, Micro-Mechatronics elements, Microprocessor, Micro-sensor, Micro actuator, Interface, Energy, Materials, Machining, Micro physics, Applications of Micro Mechatronics.

2. *Micro – Sensors* *10L*
Introduction, Micro-sensor measurement principle, Micro-sensor fabrication techniques, modeling, Micro pressure sensors, Micro accelerometer, sensors, Micro thermal sensors, Micro floor sensors, Micro chemical sensors, Micro optical sensors, Micro sensor for humidity and displacement, application of micro sensors.

3. *Micro actuators* *8L*
Introduction, classification of micro actuators, electromagnetic, electro static, piezo electric, optical micro – actuators.

4. *Case study of Micro Mechatronics systems* *12L*
Testing of transportation Bridge surface materials, Transducer Calibration system, Strain Gauge Weighting system, Solenoid force, Displacement Calibration System, Rotary Optical Encoder, Thermal Cycle Fatigue of a Ceramic Plate, pH control, Temperature control system, Skip control of a CD Player.

ELECTIVE – II

ME 206 DIGITAL SIGNAL PROCESSING

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction* *5L*
Introduction to signals and systems and representation of signals in time domain, Linear time invariant systems, impulse response and convolution sum. z transform and its properties, Inverse z-transform, Difference equation.

2. *Linear Shift Invariant system and realization structure* *5L*
Review of the Theory of LSI System, Discrete Time Fourier Transform (DTFT), Frequency Response of LSI system; Frequency response of First Order systems; Frequency Response of Second Order Systems, Realization Structures.

3. *Discrete And Fast Fourier Transforms* *10L*
Discrete Convolutions – Circular and Linear, Sectioned Convolutions, Discrete Fourier Transform and its Properties, Relation between Z-Transform and DFT. Introduction to Radix 2 FFT (Fast Fourier Transform). Properties of Radix 2 DIT algorithms, Decimation in Frequency Radix- 2 FFT. Comoutation of Inverse DFT Through FFT.

4. *Finite impulse Response (FIR) Filters* 8L
Magnitude and Phase Response of FIR Filters, Linear Phase Response of FIR Filters, Linear Phase Response of Filters, Design of FIR Filters – Windowing (Fourier Series) Method, Design of FIR Filters Frequency Sampling Method.

5. *Infinite impulse response (IIR) Filtres* 7L
General Considerations, Design of Butterworth Filters, Design of Chebyshew Filters, Conversion of Analog of Digital Filters, Bilinear Transform Method.

6. *Programming & Application* 5L
Popular architectures and overview of programming Application of DSP, Speech and Audio Signal Processing, Radar Signal Processing.

ELECTIVE – III

ME 207 PRODUCT DESIGN

Total Contact Hrs: 52

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction* 2L
Definition: Product development Process, Product Design; Types of design, engineering design; phases of modern product development process; Reverse engineering and redesign product development process.

2. *Product Development Process Tools & Scoping Product Developments* 4L
Product development team: definition, composition, team roles, Myer-Briggs type indicator, team structure, team building, team evaluation, Product Development Planning: Steps of planning, basic planning and scheduling tools; S-curves: definition, s-curves and new product development, technology forecasting; Basic method: technical questioning, mission statement; Advanced method: Business case analysis, design drivers;

3. *Customer Needs :* 5L
Customer satisfaction: Kano diagram, customer populations, types of customer needs, customer need models; Customer needs gathering methods: interviews, questionnaires, focus groups, be the customer need models; Customer Need Gathering Methods: Interviews, questionnaires, focus graphs, be the customer. Grouping the needs: affinity diagram method, customer sort method; determining need importance; interview data method, questionnaire method; cluster analysis method;

4. *Establishing Product Function Product Teardown & Experimentation:* 8L
Functional Decomposition: product function, sub function, abstraction, constraints; Modeling process: Function Analysis System Technique (FAST), Subtract and Operate procedure; Function structure: phases modeling process; Function structure decomposition; Product Teardown: phases of product teardown process; teardown methods; measurement and experimentation; Post teardown reporting; application of product teardown.

5. *Benchmarking & Establishing Engineering Specifications:* 6L
Benchmarking: steps of benchmarking, support tools for benchmarking; Setting product specifications: Specification process, fundamental requirements & constraints, specifications sheets, House of Quality, value analysis.

6. *Product portfolios, Portfolio architecture & Product Architecture:* 5L
Product portfolio architecture: definition, types, choosing an architecture type;

Platform architecture: Modular family platform, functional architecting, steps of platform design method, functional architecting, non-platform based products, platform based products; Product architecture types: integral, modular; Product modularity: type of modularity, cluttering methods, advanced functional method, Architecture-based development teams.

7. *Generating Concepts, Concept Selection and Concept Embodiment* 5L
Concept Generating Process: basic methods, advanced methods, morphological analysis, combining solution principles; Estimating Technical Feasibility, Concept Selection Process, Pugh Concept Selection Chart, Measurement theory, Numerical Concept Scoring; Refining geometry and layout, Systems modeling.

8. *Modeling of Product Metrics* 3L
Model selection by performance specifications, Mathematical modeling, physical prototyping, constructing product models.

9. *Design for Manufacture and Environment Assembly* 1L
Design guidelines, Manufacturing cost Analysis.

10. *Design for Environment* 2L
Environment objectives, Basic design for environmental methods, life cycle assessment, techniques to reduce environmental impacts.

11. *Analytical and Numerical Model Solutions* 4L
Solution definition, Pareto optimality, Spreadsheet search, concept of optimization, Analytical formulations, practical optimization

12. *Physical Prototypes Physical Models and Experimentation* 4L
Physical models, Prototypes, Types of prototypes, uses of prototypes. Rapid prototyping techniques, Scale, Dimensional analysis, Similitude, Physical prototype design and planning. Design of experiments, Reduced tests, Fractional experiments, Statistical analysis of experiments.

13. *Design for Robustness:* 3L
Quality design theory, Taguchi's method.

ME 208 DIGITAL IMAGE PROCESSING & MACHINE VISION

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction* 4L
Digital image representation; fundamental steps in image processing; elements of digital image processing systems: image acquisition, storage, processing and display.

2. *Digital Image Fundamentals* 6L
Structure of the human eye; image formation; brightness adaptation and discrimination; a simple image model; uniform and non-uniform sampling and quantization; some basic relationships between pixels; neighbors of a pixel; connectivity; Labeling. Distance measures; imaging geometry.

3. *Image Enhancement in the spatial domain* 4L
Basic gray level transformations-histogram processing-Enhancement using arithmetic/logic operations-Basics of spatial filtering-comparison between smoothing and sharpening spatial filters.

4. *Image Enhancement in the frequency domain* 4L

1D Fourier transform-2D Fourier transform and its Inverse-Smoothing & sharpening frequency domain filters (Ideal, Butterworth, Gaussian)-homomorphic filtering.

5. *Image compression* 4L

Fundamentals-Image compression, Error-free compression: Huffman coding, block coding, constant area coding, variable length coding; bit-plane coding; lossless predictive coding.

6. *Machine Vision* 12L

Introduction, definition, human visual system. Active vision system, increasing of machine vision. Machine vision components, hardware's and algorithms, image function and characteristics, image formation & image sensing frequency space analysis, Fourier transform, convolution algorithms, image gaussion, image enhancement, image analysis and segmentation data reduction, feature extraction, edge detection, image recognition and decisions, m/c learning, image processing, machine vision edges detection, application in the area such as inspection part identification, industrial robot control, mobile robot application. Industrial MVs in production and services, structure of industrial m/c vision, generic standards, rules of thumb, image formation, illumination, optics, interfacing machine vision system. Vision system calibration.

7. *2D & 3D vision* 6L

Competing technologies, principle, CCD, Videcon and other cameras, data capture. Triangulation geometry, resolution, passive and active 3-D stereo imaging, data processing.

ME 209 VLSI TECHNOLOGY

Total Contact Hrs: 40

Internal Assessment – 30
Examination – 70
Total Marks: 100

1. *Introduction to VLSI Design* 10L

Moore's Law, Design Levels of Abstraction, Logic to transistor Level Translation, Survey of Silicon Semiconductor Technology, Bipolar, CMOS, Bi-CMOS, Ga-As Technology.

2. *CMOS Fabrication and Processing Technology* 8L

Crystal Growth; Water Preparation; Oxidation; Diffusion, Ion Implantation NMOS, CMOS technologies; Layout Design Rules.

3. *Circuit Characterization and Performance Estimation* 14L

Introduction – Review of MOS Transistor Theory, Transistor Physics – Accumulation, Depletion, Inversion, Threshold Voltage; V-I Characteristics; Body Effect, Noise Margin; Latch-up; Resistance; Switching Characteristics Power Consumption; Yield; Scaling of MOS Transistor Dimensions.

4. *Current Trends of VLSI system-on-a-chip*

Hardware/Software Co-simulation 8L

TX 3

Course Structure & Curriculum

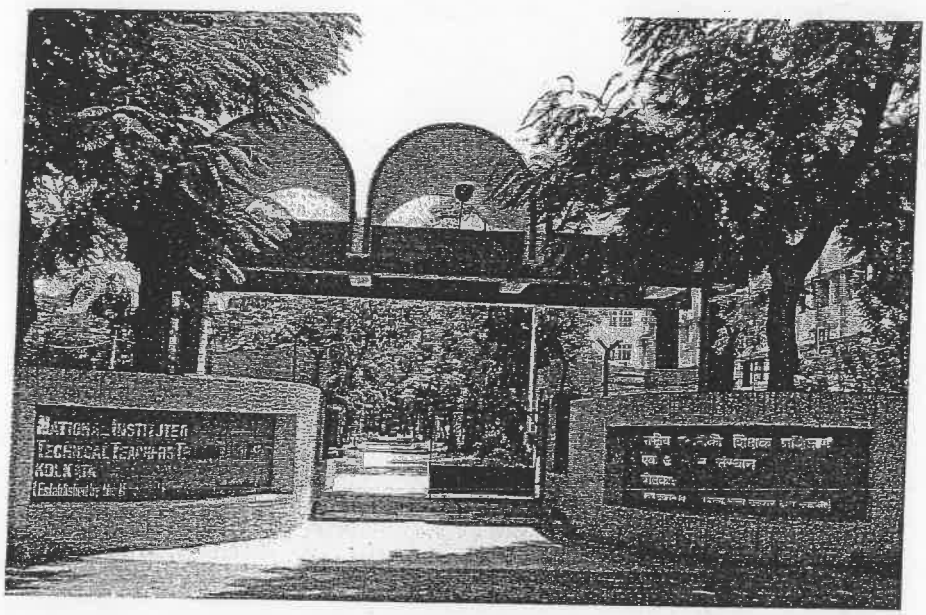
For

M. Tech Course

in

STRUCTURAL ENGINEERING

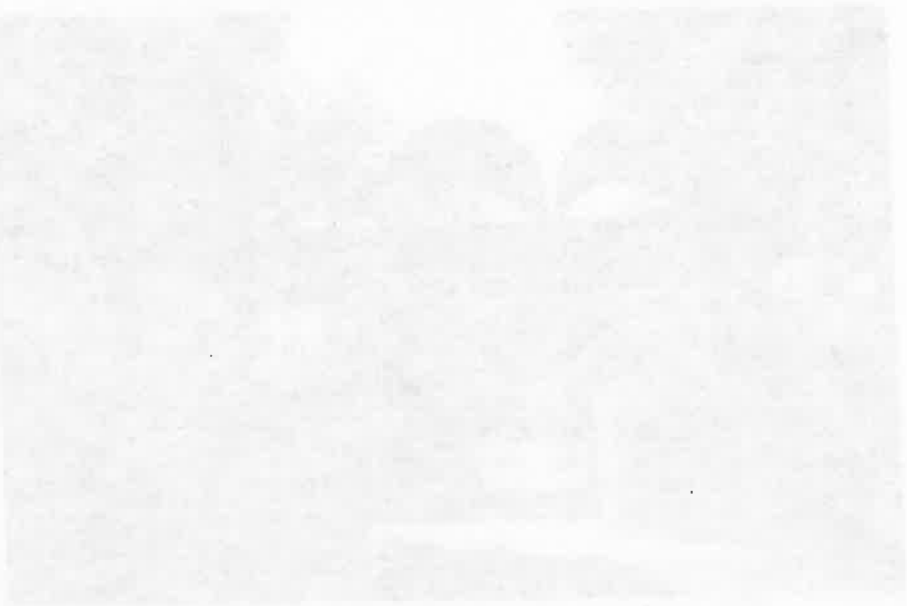
(APPROVED BY
AICTE & WEST BENGAL UNIVERSITY OF TECHNOLOGY, KOLKATA)



NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA

Block – FC, Sector – III, Salt Lake City, Kolkata - 700106

August 2012



THIRD SEMESTER

A. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	SE381	Pre-submission Defense of Dissertation	0	0	0	0	4
2.	SE382	Dissertation (Progress)	0	0	0	24	18
		Total of Semester				24	22

FOURTH SEMESTER

B. THEORY							
Sl. No.	Code	Subjects	Contacts (Period / Week)				Credits
			L	T	P	Total	
1.	SE481	Dissertation (Completion)	0	0	0	24	18
2.	SE482	Post-submission Defense of Dissertation	0	0	0	0	6
		Total of Semester				24	24

Total Credit Point: 98

ADVANCED ENGINEERING MATHEMATICS
(CODE: SE (CE) 101)

TOTAL CONTACT HOURS	: 52	INTERNAL ASSESSMENT	: 30
LECTURE	: 39	EXAMINATION	: 70
TUTORIAL	: 13	TOTAL MARKS	: 100

Statistic: Elements of statistic, frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve fitting by least square method; Correlation and Regression, Testing of Hypothesis; Basic type of factorial design and Analysis of Variance. 10

Matrix operation: Matrix operation Eigen value and Eigen vector by iterative methods. Diagonalisation and square matrix. 8

Laplace transform, Fourier transform Fourier integral and their applications. 6

Numerical method: Interpolation by Polynomial, Error analysis, Solution of system of linear equation by Gauss Seidal iterative method, Newton Rapson method Numerical Integration by Gauss quadrature, Solution of ordinary differential equation by Rayligh-Ritz method. 10

Ordinary Differential Equation: i) 2nd order homogeneous equation ii) Euler Cauchys equation iii) non homogeneous linear equation. **Partial differential equation:** i) wave equation – one and two dimension, ii) heat equation- one dimension and two dimension. 5

REFERENCE BOOK:

1) Introductory Methods of Numerical Analysis by S. S. Sastry (PHI)
2) Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Lyengar, R. K. Jain (New Age)
3) An Outline of Statistical Theory, Vol. I, II by A. M. Goon, M. K. Gupta, B. Dasgupta (The World Press Pvt. Ltd.)
4) The Design of Experiments to Find Optimal Conditions by Yu. P. Adler, E. V. Markova, Ylu V. Granovsky (MIR, 1975, Moscow)
5) Advanced Engineering Mathematics by Erwin Kreyszig (John Wiley & Sons, Inc)
6) Advanced Engineering Mathematics by Stanley Grossman & William R. Derrick (Harper & Row Publishers).

INDUSTRIAL MANAGEMENT
(CODE: SE 102)

TOTAL CONTACT HOURS : 52

INTERNAL ASSESSMENT : 30
EXAMINATION : 70
TOTAL MARKS : 100

Classification and Importance of Operations Management:
Operations Management in corporate profitability & competitiveness; Operations strategy; Types & characteristics of manufacturing systems & service systems. 3

Operations Planning and Control:
Forecasting for operations; Inventory planning & control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling; 25

Quality Assurance:
The quality assurance system; choice of process and reliability; control of quality. 8

Maintenance Function:
Preventive maintenance; Overhaul and replacement. 4

Management Information System:
Need & structure of MIS; Data Processing Systems; Data Sources & Management. 5

Human resource management:
Concept and evolution; Manpower planning; recruitment and selection; Motivating personnel; Leadership 7

REFERENCE BOOK:

1) Modern Production / Operations Management by Buffa & Sarin, 8th Ed., John Wiley
2) Operations Management by Russell & Taylor (Wiley India Pvt. Ltd.)
3) Management Information Systems by Larry Long (Prentice Hall)
4) Enterprise Resource Planning by A. Leon (TMH)
5) Human Resource Management by C. B. Gupta (Sultan Chand).

ADVANCED STRUCTURAL ANALYSIS
(CODE: SE 103)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Matrix Algebra - methods for matrix inversion and solution of simultaneous equations - band and sparse matrix techniques-stiffness and flexibility matrices of structural elements - various co-ordinate system and their transformation and synthesis-matrix formulation of force and displacement methods - member approach. Finite element concept in Engineering Analysis - Displacement model shape functions and element properties. Analysis of plane stress/strain - axi-symmetric stress analysis. Weighted residual methods and variational formulation of Finite Element Analysis. Isoparametric element -- Numerical integration - assemblage of elements. Solution techniques - Finite element programming - use of package programmes.

REFERENCE BOOK:

1) Numerical Methods for Engineers by Chopra
2) Finite element procedure-- K.J.Bathe
3) matrix analysis of frame structure-- wever/gere
4) Structural analysis - A matrix approach by G.S.Pandit and Gupta
5) Numerical Methods for Engineers by Steven C. Chapra, Raymond P. Canale

SOIL STRUCTURE INTERACTION
(CODE: SE 104)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

General soil-structure interaction problems: Contact pressures and soil-structure interaction for shallow foundations, concept of sub grade modulus, effects/parameters influencing subgrade modulus. Soil behaviour, Foundation behaviour, Interface behaviour, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models

Beam on Elastic Foundation: Soil Models: Infinite beam, Two parameters, Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.

Plate on Elastic Medium: Thin and thick plates, Analysis of finite plates, Numerical analysis of finite plates, simple solutions.

Elastic Analysis of Pile: Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap.

Laterally Loaded Pile: Load deflection prediction for laterally loaded piles, Sub-grade reaction and elastic analysis, Interaction analysis.

REFERENCE BOOK:

1) Selva durai, A. P. S, Elastic Analysis of Soil-Foundation Interaction , Elsevier,1979.
2) Poulos, H. G., and Davis, E. H.,Pile Foundation Analysis and Design, John Wiley,1980.
3) Scott, R. F., Foundation Analysis, Prentice Hall, 1981.
4) Structure Soil Interaction - State of Art Report, Institution of Structural Engineers, 1978.
5) ACI 336. (1988), Suggested Analysis and Design Procedures for combined footings and Mats, American Concrete Institute, 1988.

ELECTIVE – I (SE 105)

BRIDGE ENGINEERING
(CODE: SE 105A)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Introduction, historical review, Engineering and aesthetic requirements in bridge design, Introduction to bridge codes. Economic evaluation of a bridge project. Site investigation and planning;. Factors affecting scour and its evaluation. Bridge foundations - open, pile, well and caisson. Piers, abutments and approach structures; Superstructure - analysis and design of right, skew and curved slabs. Girder bridges - types, load distribution, design. Introduction to long span bridges - cantilever, arch, cable stayed and suspension bridges.

REFERENCE BOOK:

1) Principle & Practice of Bridge Engineering by S.P. Bindra- Dhanpat Rai
2) Bridge Engineering by Demetrios E. Tonias, Jim J. Zhao
3) Design of Bridge Structures – Jagadish & Jayaram – Prentice Hall
4) Bridge Engineering by S. Ponnuswamy (Manohar Publishers & Distributor)

STRUCTURAL OPTIMIZATION
(CODE: SE 105B)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Classical methods – theory of layout – Differential calculus – simultaneous modes of failure – Fully stressed design – optimality criterial methods.

Mathematical programming and computer techniques – linear programming – Revised simplex method, non-linear programming fundamentals – Methods for one dimensional minimization – Direct search and gradient methods for unconstrained problems – use of penalty functions and sequential L.P. for constrained optimisation problems – Geometric programming and dynamic programming – application to structural engineering problem.

REFERENCE BOOK:

1) Engineering Optimization : Theory and Practice by Rao, Singireshel S.
2) Advances In Structural Optimization by J. Herskovits (Springer-Verlag New York, LLC)
3) Elements Of Structural Optimization by Raphael T. Haftka (Springer-Verlag New York, LLC)
4) Topology Optimization: Theory, methods and Applications Springer, 2003 by M. P. Bendsoe, O. Signmund

REPAIR AND REHABILITATION OF STRUCTURES
(CODE: SE 105C)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Appraisal of damage and deterioration of structures by non-destructive and other techniques; Cause of deterioration; Environmental aspects and earthquake effects; Repair and strengthening of superstructure - structural components, load bearing wall, panel walls; Strengthening of foundation; Grouting; Grout material, guniting, shotcreting, under pinning; Repair of steel structures - bridge, building, towers etc., monuments and historical structures. Prevention of water leakage in structures; Under-water repair; Durability of repairing material; Case histories

REFERENCE BOOK:

1) Testing of Concrete in Structure by Bungey (Surrey University Press)
2) Non Destructive Testing by Malhotra & Carino (CRC Press)
3) Corrosion of Steel in Concrete by Broomfield John P. (Taylor & Francis)

STRUCTURAL LABORATORY I
(CODE: SE 191)

CONTACT HOURS			
L: 0	T: 0	P: 3	
TOTAL CONTACT HOURS		: 36	

INTERNAL ASSESSMENT	: 40
EXAMINATION	: 60
TOTAL MARKS	: 100

Important physical tests on cement and aggregates, Physical tests on reinforcement, Destructive and non-destructive tests on concrete.

CAD LAB
(CODE: SE 192)

CONTACT HOURS			INTERNAL ASSESSMENT	: 40
L: 0	T: 0	P: 3	EXAMINATION	: 60
TOTAL CONTACT HOURS		: 52	TOTAL MARKS	: 100

Introduction and important features of a software dealing with analysis and design of structures.

ADVANCED STRUCTURAL DESIGN
(CODE: SE 201)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Flat slab, Grid slab, Deep beam, Shear wall, Frame shear wall interaction, Cylindrical shell, Structures for handing materials like silo and bunkers, Liquid retaining structures, Pile and Pile cap.

Design provisions as envisaged in various Indian Standards.

REFERENCE BOOK:

1) Design of Reinforce Concrete Structures A. K. Gupta
2) Limit State Design of RCC A.K. Jain
3) Limit State Design of RCC Structure by Pillai & Menon

STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING
(CODE: SE 202)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Introduction – Single and multi-degree freedom systems, undamped and damped systems, numerical integration scheme, modal analysis for undamped and damped systems. Vibration of continuous elastic media – Beam, Plates.

Characteristics of earthquake, Earthquake response of structures, Concept of earthquake resistant design. Codal provision for design of buildings, design of liquid storage tanks, liquefaction, non-engineered construction, special topics.

REFERENCE BOOK:

1) Structural dynamics theory and computation by Paz Mario
2) Seismic analysis of the Structure b y T.K.Dutta
3) Introduction to Structural Dynamics by John M. Biggs (McGraw Hill)
4) Dynamics of Structures by Jagmohan L. Humar (A. A. Balkema Publisher)

THEORY OF ELASTICITY AND PLASTICITY
(CODE: SE 203)

CONTACT HOURS			
L: 3	T: 1	P: 0	
TOTAL CONTACT HOURS	: 52		

INTERNAL ASSESSMENT	: 30
EXAMINATION	: 70
TOTAL MARKS	: 100

Elasticity: Introduction to tensor analysis; three dimensional stress and strain analysis. Two dimensional problems in cartesian, polar and curvilinear co-ordinates, bending of a beam, thick cylinder under pressure, complex variable, harmonic and bi-harmonic functions. Torsion of rectangular bars including hollow sections, bending problems. Energy principles, variational methods and numerical methods.

Plasticity: basic concepts and yield criteria. Equations of plasticity, elasto-plastic analysis of torsion and bending problems, torsion of a bar of oval section (Sokoloskey's method), problems of spherical and axial symmetry, slip lines and plastic flow, strain hardening.

REFERENCE BOOK:

1) Theory of Plasticity by Chakraborty
2) Theory of Elasticity by Timoshenko S.P. and Goodier
3) Theory of Elasticity and Plasticity by Timoshenko S.P. and Woinowsky-Kreiger
4) Plasticity Theory by Jacob Lubliner
5) Theory of Elasticity and Plasticity by Harold Malcolm Westergaard (HUP)

ELECTIVE – II (SE 204)

ADVANCED FOUNDATION ENGINEERING
(CODE: SE 204A)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Bearing capacity: Bearing capacity of shallow foundation in layered soils, Footings on slopes, Foundation with uplift or tension forces.
Settlements: Settlement Analysis of shallow foundations in sand, clay, and layered deposits, Reliability of settlement calculations, Structural tolerances.
Design of rectangular footings, combined footings and mat foundations.
Deep foundations: Pile foundations under vertical and lateral loads, Negative skin friction of piles; Uplift capacity of piles and anchors, Well foundations.
Foundations on expansive soils; Introduction to soil dynamics and machine foundation

REFERENCE BOOK:

1) Foundation Analysis & Design By J.E. Bowels (Mc Graw Hill)
2) Principles of Foundation Engg. By B.M. Das (PWS Publishing
3) Pile Foundation- Analysis & Design Poulus & Davis
4) Constructional methods in Foundation Engineering Koener
5) Foundation design and construction by Tomlinson .M.J.
6) Raft foundation design and analysis with practical approach by Gupta .s.c

ELECTIVE – III (SE 205)

ENVIRONMENTAL IMPACT ASSESSMENT
(CODE: SE 205A)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Legal Aspects of EIA, Objectives of EIA, General Methodology of EIA, Base line Studies, Screening, Scoping, Public Consultation, Data Collection, Environmental Impact Analysis, Mitigation and Impact Management, Case Studies, Environmental Audit.

REFERENCE BOOK:

1) Environmental Impact Assessment by Bartwal R. R. (New Age)
2) Introduction to Environmental Impact Assessment by John Glasson, Riki Therivel, Andrew Chadwick (Taylors & Francis)
3) Environmental Impact Assessment Practice & Participation by Fevin Stuart Hanna (OUP)
4) Methods of Environmental Impact Assessment by Peter Morris (Taylor & Francis)
5) Environmental Impact Assessment by Alan Gilpin (CUP)

ADVANCED CONCRETE TECHNOLOGY
(CODE: SE 205B)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Microstructural aspects of cement paste; Models of hydrated Portland cement gel; Mechanism, application and specification of chemical admixtures, mineral admixtures and other cement replacement materials; Special cementitious systems, viz., phosphate cement, magnesium oxychloride cement, regulated set cement, high alumina cement etc.; concrete-environment interaction; Marine concrete; Resistance of concrete to Fire and influence of temperature; Extreme weather concreting; Properties and mix proportioning of flyash concrete, silica fume concrete, fibre reinforced concrete, sprayed concrete, high performance concrete, self compacting concrete and geopolymer concrete.

REFERENCE BOOK:

1) Design of Concrete Mixes by Krishna Raju
2) Concrete Microstructure, Properties and Material by P.kumar Mehta &Paulo J. M. Monteiro
3) Concrete Technology by M.S. Shetty (S. Chand)
4) Properties of Concrete by A. M. Neviel
5) Concrete Technology by Shanta Kumar, Neviel & Brookes
6) Progress in Cement and Concrete in Series by S. N. Ghosh

CONSTRUCTION TECHNOLOGY & MANAGEMENT
(CODE: SE 205C)

CONTACT HOURS	INTERNAL ASSESSMENT : 30
L: 3 T: 1 P: 0	EXAMINATION : 70
TOTAL CONTACT HOURS : 52	TOTAL MARKS : 100

Different Construction techniques – equipments used – new technologies; Network scheduling CPM, PERT, Planning & Scheduling of activity Networks; Scheduling with limited resource, Resource Planning, Resource Allocation, Project Schedule Compression, Project Scheduling, Estimation of Project Cost, Monitoring Project Progress, Project Appraisal & Selection, Recent Trends in Project Management.

REFERENCE BOOK:

1) Construction and project management for Engineer – Krishnamurthy
2) Urban Construction Project Management (McGraw-Hill Construction Series) by Richard Lambeck, John Eschemuller
3) Construction Management Fundamentals By: Kraig Knutson, Clifford J. Schexnayder, Christine M. Fiori, Richard Mayo
4) Construction Method and Management by Stephens W. Nunnally (Prentice Hall)

THEORY OF ELASTIC STABILITY AND BEHAVIOUR OF METAL STRUCTURE
(CODE: SE 205D)

CONTACT HOURS			INTERNAL ASSESSMENT	: 30
L: 3	T: 1	P: 0	EXAMINATION	: 70
TOTAL CONTACT HOURS	: 52		TOTAL MARKS	: 100

Introduction; Fundamental principles and models for elastic stability, stability of column; classification of dynamical systems, linear and nonlinear eigen value problems. Stability of plates, frames, beams and arches Lateral buckling of beams, combined bending and axial force, combined bending and torsion. Buckling of thin elements Torsional buckling of thin walled structures and open sections Column-strength curves. Buckling and post-buckling strength of plate elements with special references to the codal provisions. Behaviour of light gauge steel structures.

REFERENCE BOOK:

1) Fundamental of Structural Stability by Simitses
2) Stability Analysis and Design of Structures, New Delhi by Gambhir M.L
3) Stability of structure by Banzant
4) Structural Stabilty of steel- Concepts and Applications for structural engineers- Galambos Theodore V
5) Advanced Design in Structural Steel – Lothers – Prentice – Hall
6) Design of Steel Structure by S. K. Duggal (McGraw Hill)
7) Design of Steel Structure by N. Subramanian

STRUCTURAL LABORATORY II
(CODE: SE 292)

CONTACT HOURS			
L: 0	T: 0	P: 3	INTERNAL ASSESSMENT : 40
TOTAL CONTACT HOURS : 52			EXAMINATION : 60
			TOTAL MARKS : 100

Analysis and design of a multistoried building using software, Preparation of detailed drawings of different structural elements including ductility detailing.

1 X 4

Annexure-X

Sl. No	Event	Month
	Preparation of time table of M. tech classes	01st to 05th January
	AICTE approval process on line a) Collection of data from Admin/Accounts/ Estate/Library/Hostel and concern departments (Dec 20 to Dec 31) b) Uploading data in AICTE website and verification of data (02-15 January) c) Submission of EOA (January 16-30) online	January 02-30
	M. Tech students' attendance finalization	(1st to 12th January)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th January)
	Collection of fees	January 01 -15 January 16- 25 (with late fine)
	Examination 1st semester	Written and Practical (last week of December to 10th Jan
	Examination 3rd semester	Seminar and dissertation (1-10 January)
	Submission of Internal marks	Theory, practical (Jan 10 to 20)
	Submission of Examination marks	Seminar and Dissertation (20-30 January)
	Collection of answer scripts 1st semester	Jan 20-25
	Deficiency Report generation of EOA	31st jan to 05th Feb
	Preparation of hard copy of EOA	06th Feb to 08th Feb
	Notarial work related to EOA	06th to 10th Feb
	Submission of EOA document to University	06th Feb -12th February
	EOA submission to AICTE	12th to 15th February
	Evaluation of answer scripts 1st semester	Jan 25 to Feb 10
	Submission of Examination marks	Theory Feb 11-15
	M. Tech students' attendance finalization	(1st to 12th February)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th February)
	Collection of Data from concerned departments related to AISHE	Feb 12th to Feb 20th
	Uploading, Scrutiny and verification of data AISHE	Feb 21st to 25th
	Final Submission	Feb 26th to 28th
	M. Tech students' attendance finalization	(1st to 12th March)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th March)
	Summation of total Fee collection 1st and 3rd	15th to 20th March
	Paper setter approval from University	March 20th to 25th
	Examination Form fill up	Mar 26th to April 10th
	M. Tech students' attendance finalization	(1st to 12th April)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th April)
	Examination Form fill up (with fine)	April 10th to April 17th
	Submission of Examination Fee to University	April 18th to 20th
	Submission of question paper to University	April 20th to April 25th
	Acquiring of EOA from AICTE	April 21st to May 10th

	Acquiring affiliation from University	May 01st to 15th
	M. Tech students' attendance finalization	(1st to 12th May)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th May)
	Forwarding of information to University reg. PGET	15th to 30th May
	Requisition of answer scripts (Theory and Practical)	1st May to 15th May
	Collection of Admit cards	01st May to 10th May
	Distribution of Admit cards	11th May to 15th May
	Examination	16th May to 15th June
	Submission of Internal marks 2nd semester	Theory, practical (June 10 to 20)
	Submission of Examination marks 2nd semester	Seminar (June 20 to 30)
	Collection of answer scripts 2nd semester	June 20-25
	M. Tech students' attendance finalization	(1st June to 12th June)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th June to 14th June)
	Approval of examiners for dissertation examination	June 1st to June 15th
	Preparatory work with bank for online fee collection	June 18th to June 22nd
	Evaluation of answer scripts 1st semester	June 25 to July 10th
	Submission of Examination marks	Theory July 11-15
	M. Tech students' attendance finalization	(1st to 12th July)
	M. Tech students' scholarship status forwarding (GATE, SC/ST, Minority and others)	(13th to 14th July)
	Dissertation Examination	June 30 to July 31
	Collection of fees	July 01 -15 July 16- 25 (with late fine)
	Submission of dissertation marks	Upto July 31st
	M. Tech admission through PGET	Aug 1st to 20th
	Preparation of time table of M. tech classes	01st to 05th August
	Advertisement for filling M. Tech vacant seats 1st attempt	22nd to 31st August
	Admission through Interview	01st to 3rd September
	Advertisement for filling M. Tech vacant seats 2nd attempt	05th to 10th September
	Admission through Interview	11th to 15th September
	AICTE REGISTRATION OF STUDENTs	16th to 18th September
	Process for MAKAUT Registration	19th to 26th September
	Preparation of GATE qualified students lists	27th to 30th September
	Distribution of mark sheets	01st to 10th October
	Distribution of Certificates	
	Verification of grade cards and certificates for passed out students	11th to 20th October
	Claim of PGET admission fee from MAKAUT	21st Oct to 30th Oct
	Collection of Migration of M. Tech students	19th to 31st Oct
	Submission of Migration certificates to MAKAUT	01st to 10th Nov
	Collection of Registration cards and distribution	11th to 15th November
	Examination form fill up and collection of exam fee	01th to 15th November
	Submission of exam fee to MAKAUT	16th to 20th November
	Collection and distribution of admit cards after processing	21st to 05th December

	Conducting 1st semester examination	10th to 24th December
	Collection of caution money refund applications and processing	24th to 31st December

ANNEXURE-A

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

PROF. K. SUBRAMANIAN,
ADVISER (PGE&R)

F.No.: XVIII-AIBPG/APP/ET/2002
Date : 08.08.2002

Secretary,
Department of Technical Education & Trg.,
Govt. of West Bengal
Bikash Bhavan, 6th Floor, East Block
Salt Lake City,
Kolkatta – 700 091

Sub: AICTE approval to **TECHNICAL TEACHERS TRAINING INSTITUTE, BLOCK – FC, SECTOR-III, SALT LAKE, , KOLKATA – 700 016** for the conduct of P.G. Course.

Sir,

I am directed to state that based on the recommendation of the Expert Committee, the Evaluation Committee constituted by the Council and the subsequent decision by the All India Board of Post Graduate Education in Engineering & Technology, All India Council for Technical Education (AICTE) is pleased to accord approval to **TECHNICAL TEACHERS TRAINING INSTITUTE, BLOCK –FC, SECTOR-III, SALT LAKE, , KOLKATA – 700 016** for the academic year 2002-03, for the PG Course(s) as per intake given below:

COURSE(S)	APPROVED INTAKE (General Category +Sponsored+ SC/ST)	LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
MANUFACTURING TECHNOLOGY	18 (10+5+3)	M.TECH	2 Years	2002-04

The approval has been accorded subject to fulfillment of general conditions as per norms and standards prescribed by AICTE and also specific conditions (if any, given)

Contd\2 ..

The council may inspect/visit the institution any time it may deem fit to assess if the Norms & Standards as stipulated by AICTE are fulfilled and/or to verify the progress/compliance.

The admission will be made in accordance with the AICTE guidelines given as Annexure – I to this letter.

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.

12.8.2002

(K. SUBRAMANIAN)
ADVISER

Copy to :-

6. **The Director/Principal,**
   TECHNICAL TEACHERS TRAINING INSTITUTE,
   BLOCK –FC, SECTOR-III,
   SALT LAKE, , KOLKATA – 700 016

7. The Registrar, Concerned University

8. **The Regional Officer,**
   ERO, AICTE
   College of Leather Technology Campus
   LB Block, Sector – III,
   Salt Lake City
   Kolkatta – 700 091

   B.K. Kw, Tosh : Ph: 2335-9516 / 7459 ✓

9. Guard File (AICTE)
10. Office Copy

ANNEXURE-B

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F.No:441/MS-21/E&T(PG)/95
Date: 11.11.2003

To

SECRETARY, DEPT OF TECH.
EDUCATION & TRG
GOVT. OF WEST BENGAL
BIKASH BHAVAN,
6TH FLOOR, EAST BLOCK SALT LAKE CITY,
CALCUTTA - 700091

Subject: **Extension of Approval, to TECHNICAL TEARCHERS TRAINING INSTITUTE, BLOCK FC, SECTOR – III, SALT LAKE, KOLKATTA – 700 016 for conduct of PG programmes.**

Sir,

I am directed to state that the All India Council for Technical Education (AICTE), is pleased to accord extension of approval to **TECHNICAL TEARCHERS TRAINING INSTITUTE, BLOCK FC, SECTOR – III, SALT LAKE, KOLKATTA – 700 016** for the PG course(s) and intake capacity as given below.

COURSE(S)	APPROVED INTAKE	LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
MANUFACTURING TECHNOLOGY	18	M.E.	2 Years	2003-05
TOTAL	18.			

The approval has been accorded subject to fulfillment of general conditions as per norms and standards prescribed by AICTE and also specific conditions (if any, given).

The council may inspect/visit the institution any time it may deem fit to assess if the Norms & Standards as stipulated by AICTE are fulfilled and/or to verify the progress/compliance.

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.

(K. SUBRAMANIAN)
ADVISER

Copy to :-

1. The Director/Principal
TECHNICAL TEARCHERS TRAINING INSTITUTE,
BLOCK FC, SECTOR – III,
SALT LAKE,
KOLKATTA – 700 016
2. concerned Regional Office
3. Guard File (AICTE)
4. Office Copy

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली - 110002
Indira Gandhi Sports Complex, I.P. Estate, New Delhi -110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वेबसाइट / Website : www.aicte.ernet.in

ANNEXURE-A

Copy to: HOD's: ME, Appl, Comp. Sc. & Engg. E.E. Appls. M. Chakraborty 26/7/05

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

Date : 22.07.2005

To
The Principal Secretary ,
Department of Higher Education,
Govt of West Bengal,
Bikas Bhawan,
Salt lake City,, Kolkata- 700091.- 834002

Sub: Extension of approval to NATIONAL INSTIITUTE OF TECH TEACHER TRAINING & RESEARCH, BLOCK – FRC, SECTOR –III, KOLKATA- 700106 for the year 2005-06-reg.

Sir/ Madam,

As you are aware, **All India Council for Technical Education** has been mandated under the AICTE Act, 1987 to ensure **maintenance of norms and standards** with regard to technical education in the country. In exercise of this mandate, the Council insists on fulfillment of the minimum requirements prescribed for imparting technical education by the institution so that **quality** is not compromised and stakeholders are satisfied. The Council also undertakes **Annual Inspection** of the institutions and conveys deficiencies to them for **rectification.**

It has been observed however that notwithstanding the Council's **repeated advice** to comply with minimum norms and standards, many institutions continue to be **complacent** about taking steps to remedy the deficiencies.

In case of **Government/Government aided institutions/Universities departments,** the Council has been specially **supportive** and **sympathetic** on account of the fact that Government institutions provide technical education at a reasonable cost besides transparent admissions. It is however a matter of regret that many such institutions suffer from critical deficiencies of faculty and other requirements. Feed back of students with regard to quality of education imparted by some institutions has evoked grave concern. The Expert Committees, following holistic appraisal during inspections, have also pointed out severe shortages in key areas evoking serious concern.

Your institution, on appraisal, has been found to be suffering from several deficiencies which are listed in **Annexure-A** for your perusal. Non-availability of faculty is the most serious one.

The deficiencies, particularly with reference to faculty, are of grave concern to the Council. Inspite of this, it has been decided that approval in respect of your institution for the year 2005-06 as indicated below, be given with the hope that you shall take urgent steps to rectify deficiencies, particularly shortage of faculty. The Council shall monitor progress in this regard carefully and shall be constrained to put your institution in **no admission/reduced intake category** for the year 2006-07 in case of noncompliance. The approved course(s) along with recommended intake for the year 2005-06 in respect of **NATIONAL INSTIITUTE OF TECH TEACHER TRAINING & RESEARCH, BLOCK – FRC, SECTOR –III, KOLKATA- 700106** is as under:-

COURSE (S)	APPROVED INTAKE 2004-05	APPROVED INTAKE 2005-06
MANUFACTURING TECHNOLOGY(M.TECH)	18	18
MULTIMEDIA & SOFTWARE SYSTEMS (M.TECH)	0	18
MECHATRONICS ENGINEERING (M.ETCH)	0	18
TOTAL	18	54

The Council has decided to undertake inspection at any time after **August end, 2005.** A compliance report in respect of rectification of deficiencies listed in **Annexure-A** must be sent to the Council with a copy to concerned Regional Office by **31st August, 2005.** In the absence, extension of approval for year 2006-07 may not be considered.

एआईसीटीई ... क्षेत्रीय कार्यालय
National ... Chetna
क्रम सं० 1450
दिनांक 27/07/05
Date.....

Yours faithfully

(Dr. P. Venkateswara Rao)
Adviser (UG/ PG)

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi -110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

Copy to :

1. The Principal,
NATIONAL INSTIITUTE OF TECH TEACHER TRAINING & RESEARCH,
BLOCK – FRC, SECTOR –III,
KOLKATA- 700106

2. The Regional officer, Eastern Regional Office, AICTE, College of Leather Technology Campus, Salt Lake City, Sector-III, Kolkata- 700098.

3. Director of Technical Education, Govt of West Bengal, Bikash Bhawan, 10th Floor, East Block, salt Lake City, Kolkata-700091.

4. The Registrar, Vidyasagar University, Midnapore
(He is requested to complete the process of affiliation for facilitating admissions).

Guard File.

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
NEW DELHI

ANNEXURE-'A'

NAME OF THE INSTITUTION	PROGRAMME
NATIONAL INSTITUTE OF TECH TEACHERS TRNG & RESH BLOCK-FRC , SEC-III KOKATA- 700106	M.TECH

DEFICIENCIES: -

Faculty:

- Faculty is the soul of an institution and in the absence thereof an institution cannot impart quality education. The shortfall existing in this critical parameter irrespective of the cadre ratio is as follows :
    - Shortfall of faculty in Manufacturing Tech. is 60% .

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 441/MS-21/ET&T(PG)/95 Date: 3/08/2006

To.

The Principal Secretary,
Department of Higher Education,Govt of West Bengal,
Bikas Bhawan, Salt lake City,
Kolkata- 700091.

Sub: Extension of approval to NATIONAL INSTITUTE OF TECHNICAL TEARCHERS TRAINING & RESEARCH, BLOCK –FC, SECTOR – III, SALT LAKE, KOLKATA-700016 for the academic year 2006-07.

Sir,

As per the Regulations notified by the Council vide F.No. 37-3/Legal/2004 dated 28th November 2005 and norms, standards, procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee / Expert Committee, I am directed to convey the extension of approval of the Council to NATIONAL INSTITUTE OF TECHNICAL TEARCHERS TRAINING & RESEARCH, BLOCK –FC, SECTOR – III, SALT LAKE, KOLKATA-700016 for conduct of the following courses with the intake indicated below:

Name of the Course(s)	Existing Intake	Revised Intake	Period of approval
MANUFACTURING TECHNOLOGY (M.TECH)	18	18	2006-2007
MULTIMEDIA & SOFTWARE SYSTEMS (M.TECH)	18	18	
MECHATRONICS ENGG.(M.TECH)	18	18	
Total	54	54	

The above approval is subject to rectification of the following observations / deficiencies / specific conditions by 31st August 2006.

Faculty :

- Infrastructural facilities in terms of faculty, cadre ratio, lab/workshop facilities, Built –up area to be provided as per AICTE norms.

→ Prof. P. Sarkar,

In-charge 11/8

1410 08/08/06

Contd.. 2/-

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi -110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

Note: The mandatory disclosure in prescribed format if not hosted on the website should be hosted by 31st August, 2006, failing which action would be initiated as per the rules and regulations of the AICTE including No Admission / Withdrawal of approval.

The institution is required to submit two copies of the Compliance Report, indicating the rectification of deficiencies along with mandatory disclosure and details of faculty recruited for each course in the prescribed format (available at AICTE Website www.aicte.ernet.in) to the concerned Regional Office latest by 31st August 2006 for consideration of approval beyond the session 2006-07.

The Compliance Report must be accompanied with a processing fee of Rs. 40,000/- in the form of demand draft in the favour of Member Secretary, AICTE, payable at New Delhi. In the absence of processing fee the Compliance Report will not be entertained. Following the Compliance report, the Council would verify the status in respect of rectification of deficiencies through surprise random inspection without any prior notice.

The above approval if granted after rectification of deficiencies would be subject to the fulfillment of the following general conditions:

1 That the management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. (a) That the admission shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE.

(b) That the admissions shall be made in accordance with the regulations notified by the Council from time to time.

(c) That the curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.

(d) That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

(e) **That no excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

(g) **That the institutions shall not have any collaborative arrangements with any Indian and/ or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

(g) **That the Institution shall not conduct any course(s) in the field of technical education in the same premises/ campus and / or in the name of the Institution without prior permission/ approval of AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

(h) **The institution shall not conduct any non-technical course(s) in the same premises/ campus under any circumstances. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

contd.. 3/-

3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.

4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.

5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.

6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.

(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

(c) That it shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place

(d) That a compliance report in the prescribed format along with mandatory disclosures on fulfillment of the above conditions, shall be submitted each year by the Institution within the time limit prescribed by the Council from time to time **i.e. 31st August 2006 for the current year**.

(e) That if Technical Institution fails to disclose the information or suppress and/ or misrepresent the information, appropriate action could be initiated including withdrawal of AICTE approval.

8 That all the laboratories, workshops etc. shall be equipped as per the syllabi of the concerned affiliated University and shall be in operational condition before making admissions.

9 That a library shall be established with adequate number of titles, books, journals (both Indian & Foreign) etc as per AICTE norms.

10 That a computer center with adequate number of terminals, Printers etc. shall be established as per AICTE norms.

11 AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

12 That the AICTE may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc.

13 That the Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid form the Central or State Government.

14 That the Management shall strictly follow further conditions as may be specified by the Council from time to time

contd.. 4/-

15 In the event of non-compliance by the NATIONAL INSTITUTE OF TECHNICAL TEARCHERS TRAINING & RESEARCH, BLOCK –FC, SECTOR – III, SALT LAKE, KOLKATA-700016 with regard to guidelines, norms and conditions prescribed from time to time the Council shall be free to take measures for withdrawal of its approval or recognition, without consideration of any related issues and that all liabilities arising out of such withdrawal would solely be that of NATIONAL INSTITUTE OF TECHNICAL TEARCHERS TRAINING & RESEARCH, BLOCK –FC, SECTOR – III, SALT LAKE, KOLKATA-700016 .

Yours faithfully,

(Harish C. Rai)
Adviser- UG/PG (E&T)

Copy to:

1 The Principal,
NATIONAL INSTITUTE OF TECHNICAL TEARCHERS TRAINING & RESEARCH,
BLOCK –FC, SECTOR – III, SALT LAKE,
KOLKATA-700016

2. The Regional officer ,
Eastern Regional Office, AICTE,
College of Leather Technology
Campus, Salt Lake City, Sector-III,
Kolkata- 700098.

3. Director of Technical Education ,
Govt of West Bengal, Bikash Bhawan,
10th Floor, East Block, Salt Lake City,
Kolkata- 700091.

4. The Registrar, WEST BENGAL UNIVERSITY OF TECH
(He is requested to complete the process of affiliation for facilitating admissions).

5. Guard File (UG/PG).

ANNEXURE-B

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 06/02/WB/ENGG/2005/008 Date: 14.05.2007

To,

The Principal Secretary,
Department of Higher Education,
Govt of West Bengal,
Bikas Bhawan,
Salt lake City,, Kolkata- 700091.

Sub: Extension of approval to **NATIONAL INSTITUTE OF TECHNICAL TEACHER'S TRAINING AND RESEARCH, KOLKATA , BLOCK –FC, SECOTR III, SALT LAKE CITY KOLKATA -700106** for *the academic year 2007-08*

Sir,

As per the Regulations notified by the Council vide F.No. 37-3/Legal/2004 dated 14th September 2006 and norms, standards, procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee / Expert Committee, I am directed to convey the extension of approval of the Council to **NATIONAL INSTITUTE OF TECHNICAL TEACHER'S TRAINING AND RESEARCH, KOLKATA , BLOCK –FC, SECOTR III, SALT LAKE CITY KOLKATA -700106** for conduct of the following courses with the intake indicated below:

Name of the Course(s)	Existing Intake	Revised Intake	Period of approval
MANUFACTURING TECHNOLOGY(M.TECH)	18	18	2007-09
MECHATRONICS ENGG. (M.TECH)	18	18	
MULTIMEDIA & SOFTWARE SYSTEMS (M.TECH)	18	18	
Total	54	54	

The above approval is subject to rectification of the following observations / deficiencies / specific conditions by 31st August 2007.

- **Faculty :**

  - Faculty with proper cadre ratio, requisite qualifications and experience to be appointed in all the disciplines as per AICTE norms.
  - AICTE pay scales to be implemented for all faculty members.
  - Infrastruaral facilities in terms of built – up area, faculty . equpmetns, Books , Compu'ers etc to be provided as per AICTE norms.

595

Distribution:
1) HOD - ME
2) HOD - EE
3) HOD - CSE
4) Dr. S. Chattopadhyay
5) Dir. Instt - AICTE file

21/05/07

(54-w)

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली – 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi -110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वैबसाइट / Website : www.aicte.ernet.in

24/5

1532 (D)

: The mandatory disclosure in prescribed format is required to be hosted on the website as per directions in the TE website falling which, action would be initiated as per the rules and regulations of the AICTE including No mission / Withdrawal of approval.

he institution is required to submit two copies of the Compliance Report, indicating the rectification of deficiencies along with mandatory disclosure and details of faculty recruited for each course in the prescribed format (available at AICTE Website www.aicte.emet.in) to the concerned Regional Office latest by 31st August 2007 for consideration of approval beyond the session 2007-08.

The Compliance Report must be accompanied with a processing fee of Rs. 40,000/- in the form of demand draft in the favour of Member Secretary, AICTE, payable at New Delhi. In the absence of processing fee the Compliance Report will not be entertained. Following the Compliance report, the Council would verify the status in respect of rectification of deficiencies through surprise random inspection without any prior notice.

The above approval if granted after rectification of deficiencies would be subject to the fulfillment of the following general conditions:

1 That the management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. (a) That the admission shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE.

(b) That the admissions shall be made in accordance with the regulations notified by the Council from time to time.

(c) That the curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.

(d) That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

(e) **That no excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the institution**

(f) **That the institutions shall not have any collaborative arrangements with any Indian and/ or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

(g) **That the Institution shall not conduct any course(s) in the field of technical education in the same premises/ campus and / or in the name of the Institution without prior permission/ approval of AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

(h) **The institution shall not conduct any non-technical course(s) in the same premises/ campus under any circumstances. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution**

3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.

contd.. 3/-

4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.

5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.

6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.

(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

(c) That it shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.

(d) That a compliance report in the prescribed format along with mandatory disclosures on fulfillment of the above conditions, shall be submitted each year by the Institution within the time limit prescribed by the Council from time to time **i.e. 31st August 2007 for the current year.**

(e) That if Technical Institution fails to disclose the information or suppress and/ or misrepresent the information, appropriate action could be initiated including withdrawal of AICTE approval.

8 That all the laboratories, workshops etc. shall be equipped as per the syllabi of the concerned affiliated University and shall be in operational condition before making admissions.

9 That a library shall be established with adequate number of titles, books, journals (both Indian & Foreign) etc as per AICTE norms.

10 That a computer center with adequate number of terminals, Printers etc. shall be established as per AICTE norms.

11 AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

12 That the AICTE may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc

13 That the Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid form the Central or State Government.

14 That the Management shall strictly follow further conditions as may be specified by the Council from time to time.

contd 4/

15. In the event of non-compliance by the **NATIONAL INSTITUTE OF TECHNICAL TEACHER'S TRAINING AND RESEARCH, KOLKATA , BLOCK –FC, SECOTR III, SALT LAKE CITY KOLKATA -700106** with regard to guidelines, norms and conditions prescribed from time to time the Council shall be free to take measures for withdrawal of its approval or recognition, without consideration of any related issues and that all liabilities arising out of such withdrawal would solely be that of **NATIONAL INSTITUTE OF TECHNICAL TEACHER'S TRAINING AND RESEARCH, KOLKATA , BLOCK –FC, SECOTR III, SALT LAKE CITY KOLKATA -700106**

Yours faithfully,

(Harish C. Rai)
Adviser- UG/PG (E&T)

Copy to:

1. Director of Technical Education ,
   Govt of West Bengal, Bikash Bhawan,
   10th Floor, East Block, salt Lake City, Kolkata- 700091.

2 The Registrar, WEST BENGAL UNIVERSITY OF TECH
~~(He is requested to complete the process of affiliation for facilitating admissions).~~

3 The Regional officer ,
Eastern Regional Office,
AICTE, College of Leather Technology Campus,
Salt Lake City, Sector-III, Kolkata- 700098.

4 The Principal,
NATIONAL INSTITUTE OF TECHNICAL TEACHER'S TRAINING AND RESEARCH, KOLKATA , BLOCK –FC, SECOTR III, SALT LAKE CITY KOLKATA -700106

(Relevant AICTE regulations / notifications / guidelines pertaining to Admission, Fees and Tuitions Fees waiver schemes are also annexed).

5 Guard File (UG/PG).

ANNEXURE-B

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

(भारत सरकार का सांविधिक निकाय) (A statutory body of the Govt. of India)

F. No. Date: 2 MAY, 2008

To,

The Principal Secretary, Department of Higher Education,
Govt. of West Bengal, Bikas Bhawan,
Salt Lake City, Kolkata -700091

Sub: Extension of approval to **NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLATA, BLOCK -FC, SECTOR III SALT LAKE CITY, KOLKATA - 700106**

Sir,

As per the Regulations notified by the Council vide F.No. 37-3/Legal/2006dated **14th September 2006** and norms, standards, procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee / Expert Committee, I am directed to convey the extension of approval of the Council to **NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLATA, BLOCK -FC, SECTOR III SALT LAKE CITY, KOLKATA - 700106** for conduct of the following courses with the intake indicated below:

Name of the Course(s)	Existing Intake	Revised Intake	Period of approval
MANUFACTURING TECHNOLOGY (M.TECH)	18	18	2008-10*
MECHATRONICS ENGG. (M.TECH)	18	18	
MULTIMEDIA & SOFTWARE SYSTEMS (M.TECH)	18	18	
Total	**54**	**54**	

*** The Compliance Report along with requisite processing fee is required to be submitted every year by 31st August irrespective of the period of approval.**

The above approval is subject to rectification of the following observations / deficiencies / specific conditions by 31st August 2008.

- **Faculty :**

- Faculty with proper cadre ratio, requisite qualifications and experience to be appointed in all the disciplines as per AICTE norms.
- AICTE pay scales to be implemented for all faculty members.
- At least one Ph.D & 2 PG qualified faculty to be made available for each PG programme .

- **Others :**

- Infrastructural facilities in terms of Built up Area/equipments /machinery, faculty, library etc to made available as per AICTE norms/syllabus.

circulate to HODS.
with copy to my reply dtd. 3/6/08 to AICTE.

1. CSE.
2. EE
3. ME.

10/6.

Note: The mandatory disclosure in prescribed format is required to be hosted on the website as per directions in the AICTE website failing which, action would be initiated as per the rules and regulations of the AICTE including No Admission / Withdrawal of approval.

The institution is required to submit two copies of the Compliance Report, indicating the rectification of deficiencies along with mandatory disclosure and details of faculty recruited for each course in the prescribed format (available at AICTE Website www.aicte.ernet.in) to the concerned Regional Office latest by 31st August 2008 for consideration of approval beyond the session 2008-09. **It may be noted that all the institutions are required to submit the compliance Report alongwith requisite processing fee by 31st August every year irrespective of the period of approval .**

The Compliance Report must be accompanied with a processing fee of Rs. 40,000/- in the form of demand draft in the favour of Member Secretary, AICTE, payable at New Delhi. In the absence of processing fee the Compliance Report will not be entertained. Following the Compliance report, the Council would verify the status in respect of rectification of deficiencies through surprise random inspection without any prior notice.

The above approval if granted after rectification of deficiencies would be subject to the fulfillment of the following general conditions:

1 That the management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. (a) That the admission shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE.

(b) That the admissions shall be made in accordance with the regulations notified by the Council from time to time.

(c) That the curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.

(d) That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

(e) That no excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(f) That the institutions shall not have any collaborative arrangements with any Indian and/ or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(g) That the Institution shall not conduct any course(s) in the field of technical education in the same premises/ campus and / or in the name of the Institution without prior permission/ approval of AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

(h) The institution shall not conduct any non-technical course(s) in the same premises/ campus under any circumstances. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.

4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.

5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.

contd.. 3/-

6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.

(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

(c) That it shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.

(d) That a compliance report in the prescribed format along with mandatory disclosures on fulfillment of the above conditions, shall be submitted each year by the Institution within the time limit prescribed by the Council from time to time **i.e. 31st August 2008 for the current year.**

(e) That if Technical Institution fails to disclose the information or suppress and/ or misrepresent the information, appropriate action could be initiated including withdrawal of AICTE approval.

8 That all the laboratories, workshops etc. shall be equipped as per the syllabi of the concerned affiliated University and shall be in operational condition before making admissions.

9 That a library shall be established with adequate number of titles, books, journals (both Indian & Foreign) etc as per AICTE norms.

10 That a computer center with adequate number of terminals, Printers etc. shall be established as per AICTE norms.

11 AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

12 That the AICTE may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc.

13 That the Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid form the Central or State Government.

14 That in the event of student/candidate withdrawing before the starting of the course, the wait listed candidates should be given admission against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (Rupees one thousand only) shall be refunded and returned by the Institution/University to the student/candidate withdrawing from the programme. It would not be permissible for Institutions and Universities to retain the School/Institution Leaving Certificate in original to force retention of admitted students (See Public Notice aicte/DPG/03(01)/2008)

15 The Institute shall take appropriate measures for prevention of ragging in any form, in the light of directions of Supreme Court of India in Writ Petition No. © 656/1998. Incase of failure to prevent the instances of ragging by the Institutions, the Council shall take appropriate action including withdrawal of approval .

16 That the Management shall strictly follow further conditions as may be specified by the Council from time to time.

17. In the event of non-compliance by the **NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLATA, BLOCK -FC, SECTOR III SALT LAKE CITY, KOLKATA - 700106** with regard to guidelines, norms and conditions prescribed from time to time the Council shall be free to take measures for withdrawal of its approval or recognition, without consideration of any related issues and that all liabilities arising out of such withdrawal would solely be that of **NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLATA, BLOCK - FC, SECTOR III SALT LAKE CITY, KOLKATA - 700106**

Yours faithfully,

(Harish C. Rai)
Adviser- UG/PG (E&T)

Copy to:

1. Director of Technical Education ,
   Govt of West Bengal, Bikash Bhawan,
   10th Floor, East Block, salt Lake City, Kolkata- 700091.

2. The Registrar,
   (He is requested to complete the process of affiliation for facilitating admissions).

3. The Regional officer ,
   Eastern Regional Office,
   AICTE, College of Leather Technology Campus,
   Salt Lake City, Sector-III, Kolkata- 700098.

4. The Principal,
   NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLATA, BLOCK -FC, SECTOR III SALT LAKE CITY, KOLKATA - 700106

   (Relevant AICTE regulations / notifications / guidelines pertaining to Admission, Fees and Tuitions Fees waiver schemes are also annexed).

5. Guard File (UG/PG).

राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान, कोलकाता
National Institute of Technical Teachers Training & Research, Kolkata
Diary No. 756
Date 02/06/18

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

(भारत सरकार का एक सांविधिक निकाए) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 441/MS-21/ET&T(PG)/95
Date: 29.09.2008

REVISED ORDER

To,

The Principal Secretary, Department of Higher Education,
Govt. of West Bengal, Bikas Bhawan,
Salt Lake City, Kolkata -700091

Sub: AICTE approval to **NATIONAL INSTITTUE OF TECHNICAL TEACHERS TRAINING AND RESEARCH, BLOCK – FC, SECTOR III, SALT LAKE CITY , KOLKTA -700106** for the academic year 2008-09.

Ref: Letter of even no dated May 2, 2008

Sir,

This is in continuation to Council's letter referred above, I am directed to convey that based on the request received from the institution, for grant of additional intake with respect to implementation of OBC quota policy , the revised intake in respect of **NATIONAL INSTITTUE OF TECHNICAL TEACHERS TRAINING AND RESEARCH, BLOCK – FC, SECTOR III, SALT LAKE CITY , KOLKTA - 700106** for the academic session 2008-09 is as under:

Name of the Course(s)	Existing Intake	Revised Intake
MANUFACTURING TECHNOLOGY (M.TECH)	18	18+10*
MECHATRONICS ENGG. (M.TECH)	18	18+10*
MULTIMEDIA & SOFTWARE SYSTEMS (M.TECH)	18	18+10*
Total	54	84

Note: *10 additional seats are sanctioned for implementation of OBC quota policy as per Gazette Notification of Government of India for admission in Central Educational Institutes.

Please note that all other terms & conditions mentioned in the Council's letter referred above will remain unchanged.

Yours faithfully,

(Harish C. Rai)
Adviser- UG/PG (E&T)

Copy to:

1. Director of Technical Education ,
   Govt of West Bengal, Bikash Bhawan,
   10th Floor, East Block, salt Lake City, Kolkata- 700091.

2. The Registrar, WEST BENGAL UNIVERSITY OF TECH

3. The Regional officer ,
   Eastern Regional Office,
   AICTE, College of Leather Technology Campus,
   Salt Lake City, Sector-III, Kolkata- 700098.

4. The Principal,
   NATIONAL INSTITTUE OF TECHNICAL TEACHERS TRAINING AND RESEARCH, BLOCK – FC, SECTOR III, SALT LAKE CITY , KOLKTA -700106

5. Guard File (UG/PG).

Circulation :

1. HOD – ME
2. HOD – EE
3. HOD – CSE
4. Dr. S. Chattopadhyay.
5. AICTE file.

15.10.08

राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान, कोलकाता
National Institute of Technical Teachers Training & Research, Kolkata
Dy No. 2360
Date 16/10/08

Dr. S. Chattopadhyay
pl. do immediately

WEST BENGAL UNIVERSITY OF TECHNOLOGY

28/7/09

BF-142, Salt Lake City,
Kolkata – 700 064
Fax : (033) 2334-1032
Tel. No. : (033) 2334-1014/1021/1025/1028/1031

No. **160** (AICTE) / IC / Affiliation / 2009

Date : 30th June 2009

The affiliation is hereby accorded for the academic year 2009 – 2010 under Section 5(4) of the West Bengal University of Technology Act, 2000 (West Bengal Act XV of 2000) to

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA, BLOCK – FC, SECTOR III, SALT LAKE CITY, KOLKATA – 700106

for conducting the following course(s) with the intake indicated below :

Course(s)	Intake for 2009 – 2010
1. M.TECH (MANUFACTURING TECHNOLOGY)	18
2. M.TECH (MECHATRONICS ENGG.)	18
3. M.TECH (MULTIMEDIA & SOFTWARE SYSTEMS)	18

The above affiliation is issued subject to fulfillment of the following terms and conditions :

1. That the College / Institute should rectify the observations / deficiencies / specific conditions stipulated by the AICTE in its letter of approval / extension of approval under F.No. AICTE/E&T/ENGG/APPROVED/2009-10 dated 30/06/2009.

2. **Fees chargeable by the Institute for the students will be at par with that of the State Govt. Engineering Colleges / Institutes.**

3. That the sponsoring Society / Trust shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the WBUT and AICTE from time to time and for meeting recurring expenditure.

4. That the admission and conduct of courses shall be made in accordance with the regulations notified by the State Govt., WBUT and AICTE from time to time.

5. That the curriculum of the course, the procedure for evaluation/assessment of students and infrastructure in the classes, laboratories & library shall be in accordance with the norms prescribed by the WBUT and AICTE.

6. That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) of after intake capacity of seats without the prior approval of the WBUT and AICTE.

7. That no excess admission shall be made by the Institution over and above the approval intake under any circumstances. In case any excess admission is reported to / founded by the WBUT, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

8. That the Institution shall not conduct any course(s) in the field of technical education in the same premises / campus and / or in the name of the Institution without prior permission / approval of WBUT and AICTE. In case any violation is reported to / founded by the WBUT, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

9. That the Institution shall not conduct any non-technical course(s) in the same premises / campus under any circumstances. In case any violation is found by the WBUT, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

10. That the Institution shall operate only from the approved location, and that the Institution shall not open any off campus study centres / extension centres directly or in collaboration with any other Institution / University /

Organisation for the purpose of imparting technical education without obtaining prior approval from the WBUT and AICTE.

11. That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the WBUT.

12. That the Institution shall furnish requisite returns & reports as desired by WBUT in order to ensure proper maintenance of administrative & academic standards

13. That the Director / Principal and the teaching staff, Technical Assistants and other staff shall be selected according to procedures, qualifications and experience prescribed by the WBUT / AICTE / UGC from time to time and pay scales and other allowances & benefits shall be as per the norms prescribed by the Govt. of W.B. / UGC / AICTE from time to time.

14. That if the Institution fails to disclose the information or suppress and/or misrepresent the information, appropriate action could be initiated including withdrawal of WBUT affiliation.

15. WBUT may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards. Deficiencies / Shortcomings if any (in respect of built-up area requirement, instructional area requirement, laboratories requirement, computer requirement, library requirement, full-time faculty members requirement and other desirable requirements etc. in accordance with the AICTE / WBUT norms) as were/will be pointed out shall have to be removed within a reasonable time to be prescribed by WBUT failing which penal action including withdrawal of affiliation shall be initiated against the Institution.

16. That the WBUT may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc. Adverse findings will lead appropriate penal action including withdrawal of affiliation.

17. The Institute shall take appropriate measures for prevention of ragging in any form, in the light of directions of Supreme Court of India in Writ Petition No. © 656/1998 and norms as stipulated by the UGC.

18. The Institution shall remain bound by the norms, rules and regulations formulated by the University in respect of the conditions of affiliation, course & fee structure, syllabi content and academic regulations governing the conduct of the course(s) and shall pay fees / charges to be fixed by the University in respect of inspection, affiliation, registration of students, examination fees, etc. including any subsequent changes therein introduced by the University from time to time.
    In the event of closure of the institution, the Organizing Society / Trust will not close Institution till the last batch of students admitted in the academic programmes complete the total duration of their respective academic programmes (i.e. 2 years, 3 years, 4 years etc. as the case may be).

19. The University will have no financial liability whatsoever for conducting the course(s).

Any infringment / contravention / non-compliance of the conditions mentioned above lead to withdrawal of affiliation. All liabilities arising out of such withdrawal would solely to that of organizing Trust / Society. After completion of the academic year (2009 – 2010), the Institute will seek renewal of affiliation course-wise for the year (2010 – 2011).

Checked & Verified

(Amar Kanti Ghosh)

Inspector of Colleges

Copy forwarded for information and necessary action to :

1. The Principal / Director, **NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, KOLKATA, BLOCK – FC, SECTOR III, SALT LAKE CITY, KOLKATA – 700106** *with a request to remit the Application Fee/Inspection Fee/Affiliation Fee within 15 days from the date of issuance of this letter.*
2. The Principal Secretary, HED, Govt. of W.B., Bikash Bhavan, Salt Lake, Kolkata – 700 091.
3. The Director of Technical Education, W. B., Bikash Bhavan, Salt Lake, Kolkata – 700 091.
4. The Regional Officer, Eastern Regional Office, AICTE, Block LB, Sector III, Salt Lake, Kolkata - 98.
5. The Vice Chancellor's Unit.
6. The Registrar's Unit – *Application Fee/Inspection Fee/Affiliation Fee is yet to be received.*
7. The Registrar's Unit (BOS Section)– *Application Fee/Inspection Fee/Affiliation Fee is yet to be received.*
8. The Controller of Examinations' Unit– *Application Fee/Inspection Fee/Affiliation Fee is yet to be received.*
9. The Finance Officer's Unit– *Application Fee/Inspection Fee/Affiliation Fee is yet to be received.*
10. The Inspector of Colleges' Unit– *Application Fee/Inspection Fee/Affiliation Fee is yet to be received.*
11. Guard File.
12. College File.

Inspector of Colleges

107

All India Council for Technical Education
(A Statutory Body under Ministry of HRD, Govt. of India)
Nelson Mandela Marg, Vasant Kunj, New Delhi-110 070
Phone: 26131576, 26131577, FAX: 26131582, Website: www.aicte-india.org

No. : Eastern Region/WEST BENGAL-2-BLANK/2010/EOA

August 23, 2010

To,
Secretary (Technical education) Govt. of West Bengal, Bikash Bhawan,
Room No. 602, 6th Floor Salt Lake, Kolkata-700091

Sub. : Extension of approval for the academic year 2010-11.

Sir,

In terms of the Regulations notified by the Council vide F. No. 37-3/Legal/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to :

NITTTR, KOLKATA, WEST BENGAL

for conduct of the following courses with the intake indicated below in the academic year 2010-11:

Sr. No.	Program	Level	Shift	Course	Intake 2009-10	Intake 2010-11
1	Engg. / Tech.	PG	First Shift	MULTIMEDIA AND SW	28	28
2	Engg. / Tech.	PG	First Shift	MECHATRONICS	28	28
3	Engg. / Tech.	PG	First Shift	MFG TECH	28	28

The above mentioned approval is subject to the condition that :

NITTTR, KOLKATA, WEST BENGAL

shall follow and adhere to the regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal and hard copy to Regional Office.

Anti Ragging :- The approval is subject to the institutions strictly complying with all the provisions made under the Anti ragging regulation notified by council vide F.No. 37/Legal/AICTE/2009 dated 1-7-2009 failing which, it will be liable to any action defined under clause 9(4) of this regulation.

Yours faithfully,

Dr. S. G. Bhirud
Director

Copy to :

1. The Regional Office, Eastern Region, ~~West Bengal~~ Kolkata
2. The Director of Technical Education, Govt. of ~~Delhi~~ W.Bengal
3. Guard File (AICTE)
4. The Registrar, Affiliating University
5. The Principal / Director,
   NITTTR, KOLKATA, WEST BENGAL

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
Govt. College of Engg. & Leather Technology Campus
LB BLOCK
SECTOR-III
Salt Lake City
Govt. of India
KOLKATA-98

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Eastern/1-462631611/2011/EOA Date: 01-09-2011

To,
The Secretary (Technical education)
Govt. of West Bengal,
Bikash Bhawan, Room No. 602,
6th Floor Salt Lake, Kolkata-700091

Sub: Extension of approval for the academic year 2011-12.
Ref : Application of the Institution for Extension of Approval for the Year 2011-12

Sir/Madam,

In terms of the Regulations notified by the Council vide F.No. 37-3/Legal/2011 dated 10/12/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to

Regional Office	Eastern	Application Id	1-462631611
		Permanent Id	
Name of the Institute	NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA	Institute Address	BLOCK - FC, SECTOR - III, SALTLAKE CITY,KOLKATA,NORTH 24 PARGANAS,West Bengal,700106
Name of the Society/Trust	NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA	Society/Trust Address	BLOCK - FC, SECTOR - III, SALT LAKE CITY,KOLKATA,KOLKATA,West Bengal,700106
Institute Type	Government		

to conduct following courses with the intake indicated below for the academic year 2011-12

Application Id: 1-462631611			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	MANUFACTURING TECHNOLOGY	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	MULTIMEDIA AND SOFTWARE ENGINEERING	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No

Note: This is a Computer generated Extension of Approval Letter. No signature is required. Date of printing: 15-09-2011

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)
7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-462631611			Course		Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level		Full/Part Time						
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	MECHATRONICS	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POST GRADUATE	STRUCTURAL ENGINEERING	FULL TIME	West Bengal University of Technology, Kolkata	0	18	No	No	No

The above mentioned approval is subject to the condition that NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal
2. **The Director Of Technical Education,**
   West Bengal
3. **The Registrar,**
   West Bengal University of Technology, Kolkata
4. **The Principal / Director,**

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA
BLOCK - FC, SECTOR - III, SALTLAKE CITY,
KOLKATA,NORTH 24 PARGANAS,
West Bengal,700106

5. **The Secretary / Chairman,**
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA
BLOCK - FC, SECTOR - III, SALT LAKE CITY,
KOLKATA,KOLKATA,
West Bengal,700106

6. **Guard File(AICTE)**

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Eastern/1-755949362/2012/EOA

Date: 10 May 2012

To,
The Secretary (Technical education)
Govt. of West Bengal,
Bikash Bhawan, Room No. 602,
6th Floor Salt Lake, Kolkata-700091

Sub: Extension of approval for the academic year 2012-13

Ref: Application of the Institution for Extension of approval for the academic year 2012-13

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2010 notified by the Council vide notification number F-No.37-3/Legal/2010 dated 10/12/2010 and amendment vide notification number F-No.37-3/Legal/2011 dated 30/09/2011 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	Eastern	Application Id	1-755949362
		Permanent Id	1-462631611
Name of the Institute	NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA	Institute Address	BLOCK - FC, SECTOR - III, SALTLAKE CITY, KOLKATA, NORTH 24 PARGANAS, West Bengal, 700106
Name of the Society/Trust	NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA	Society/Trust Address	BLOCK - FC, SECTOR - III, SALT LAKE CITY,KOLKATA,NORTH 24 PARGANAS,West Bengal,700106
Institute Type	Government		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2012-13

Note: This is a Computer generated Extension of Approval Letter. No signature is required.

Letter Printed On:18 May 2012.

Printed By : AIC000364

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Application Id: 1-755949362			Course	Full/Part Time	Affiliating Body	Intake 2011-12	Intake Approved for 12-13	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
ENGINEERING AND TECHNOLOGY	1st Shift	POSTGRADUATE	MANUFACTURING TECHNOLOGY	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POSTGRADUATE	MULTIMEDIA AND SOFTWARE ENGINEERING	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POSTGRADUATE	MECHATRONICS	FULL TIME	West Bengal University of Technology, Kolkata	28	28	No	No	No
ENGINEERING AND TECHNOLOGY	1st Shift	POSTGRADUATE	STRUCTURAL ENGINEERING	FULL TIME	West Bengal University of Technology, Kolkata	18	18	No	No	No

The above mentioned approval is subject to the condition that NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

2. **The Director Of Technical Education,**
   West Bengal

3. **The Registrar,**
   West Bengal University of Technology, Kolkata

4. **The Principal / Director,**
   NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA
   BLOCK - FC, SECTOR - III, SALTLAKE CITY,
   KOLKATA,NORTH 24 PARGANAS,
   West Bengal,700106

5. **The Secretary / Chairman,**
   NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, KOLKATA
   BLOCK - FC, SECTOR - III, SALT LAKE CITY,
   KOLKATA,NORTH 24 PARGANAS,
   West Bengal,700106

6. **Guard File(AICTE)**

Note: This is a Computer generated Extension of Approval Letter. No signature is required. Letter Printed On:18 May 2012.

Printed By : AIC000364

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Application Report - Part 1

Application Status: Submitted to RO
Application Sub-Status: Payment Received

Report Generated on :-19/02/2015

Other Building Details (Contd)

Data not entered by Institute

Programme and courses

Sr. No.	Course Unique Id(1)	Program me (2)	Level (3)	Course (4)	Shift (5)	FT/PT (6)	Started In (7)	Applying For(8)	Course duration (9)
1	1-1454818905	ENGINEERING AND TECHNOLOGY	POSTGRADUATE	MANUFACTURING TECHNOLOGY	1st Shift	FULL TIME	2002	EoA Only	2
2	1-1454818908	ENGINEERING AND TECHNOLOGY	POSTGRADUATE	MULTIMEDIA AND SOFTWARE ENGINEERING	1st Shift	FULL TIME	2005	EoA Only	2
3	1-1454818910	ENGINEERING AND TECHNOLOGY	POSTGRADUATE	MECHATRONICS	1st Shift	FULL TIME	2005	EoA Only	2
4	1-1454818912	ENGINEERING AND TECHNOLOGY	POSTGRADUATE	STRUCTURAL ENGINEERING	1st Shift	FULL TIME	2011	EoA Only	2

Programme and courses (Contd)

Sr. No.	Course Unique Id (10)	Program me (11)	Course (12)	Current intake (14-15) (13)	Applied for intake (15-16) (14)	University / Board(15)	NRI (16)	PIO (17)	Twining Program Request (18)	NBA Accreditation status (As on 10-April-2015) (19)
1	1-1454818905	ENGINEE	MANU	28	28	West	Not	Not	Not	NO

DIRECTOR
NATIONAL INSTITUTE OF TECHNICAL
TEACHERS' TRAINING AND RESEARCH
BLOCK - FC, SECTOR - III, SALT LAKE CITY
KOLKATA - 700 106

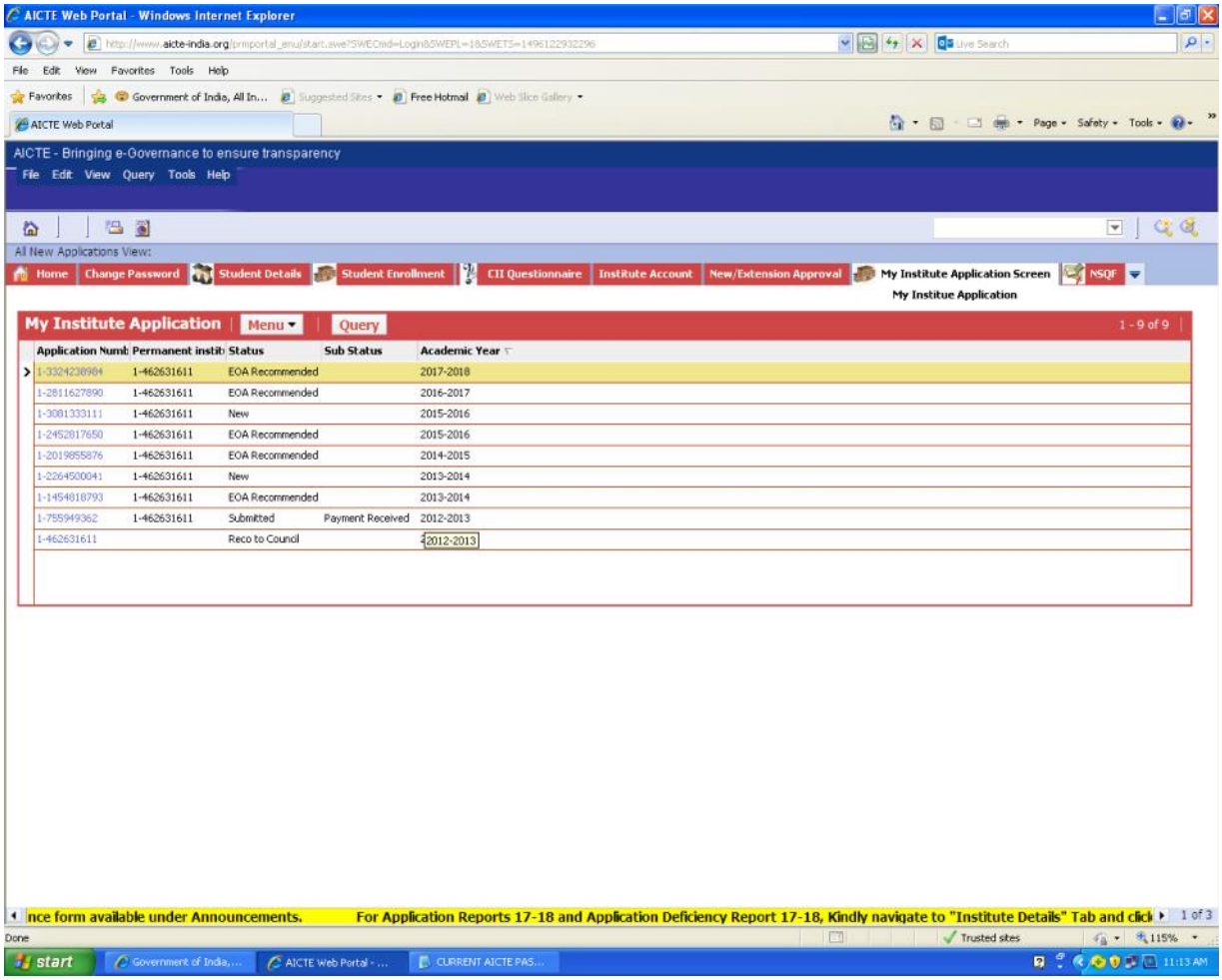
26/02/15
Date of Signature(dd/mm/yyyy)

Seal of Institute

Name & signature of Director /Principal

Please submit the hard copy of this Report to Regional Officer only if Application status is "Submitted to RO"

***Note :- All the Dates in the Report are in dd/mm/yyyy format


AICTE Web Portal - Windows Internet Explorer
AICTE - Bringing e-Governance to ensure transparency
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Academic Year
1-3324238984 1-462631611 EOA Recommended 2017-2018
1-2811627890 1-462631611 EOA Recommended 2016-2017
1-3081333111 1-462631611 New 2015-2016
1-2452817650 1-462631611 EOA Recommended 2015-2016
1-2019855876 1-462631611 EOA Recommended 2014-2015
1-2264500041 1-462631611 New 2013-2014
1-1454818793 1-462631611 EOA Recommended 2013-2014
1-755949362 1-462631611 Submitted Payment Received 2012-2013
1-462631611 Reco to Council 2012-2013
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Library Facilities

Type	Available	Required	Deficiency
Volumes	23282	1700	No
Titles	17804	50	No
National Journals	1	20	Yes
Library Management Software	1	1	No
Reading Room Capacity	51	51	No
MultiMediaPC	10	3	No

Instructional Area

ENGINEERING AND TECHNOLOGY / Existing Programme

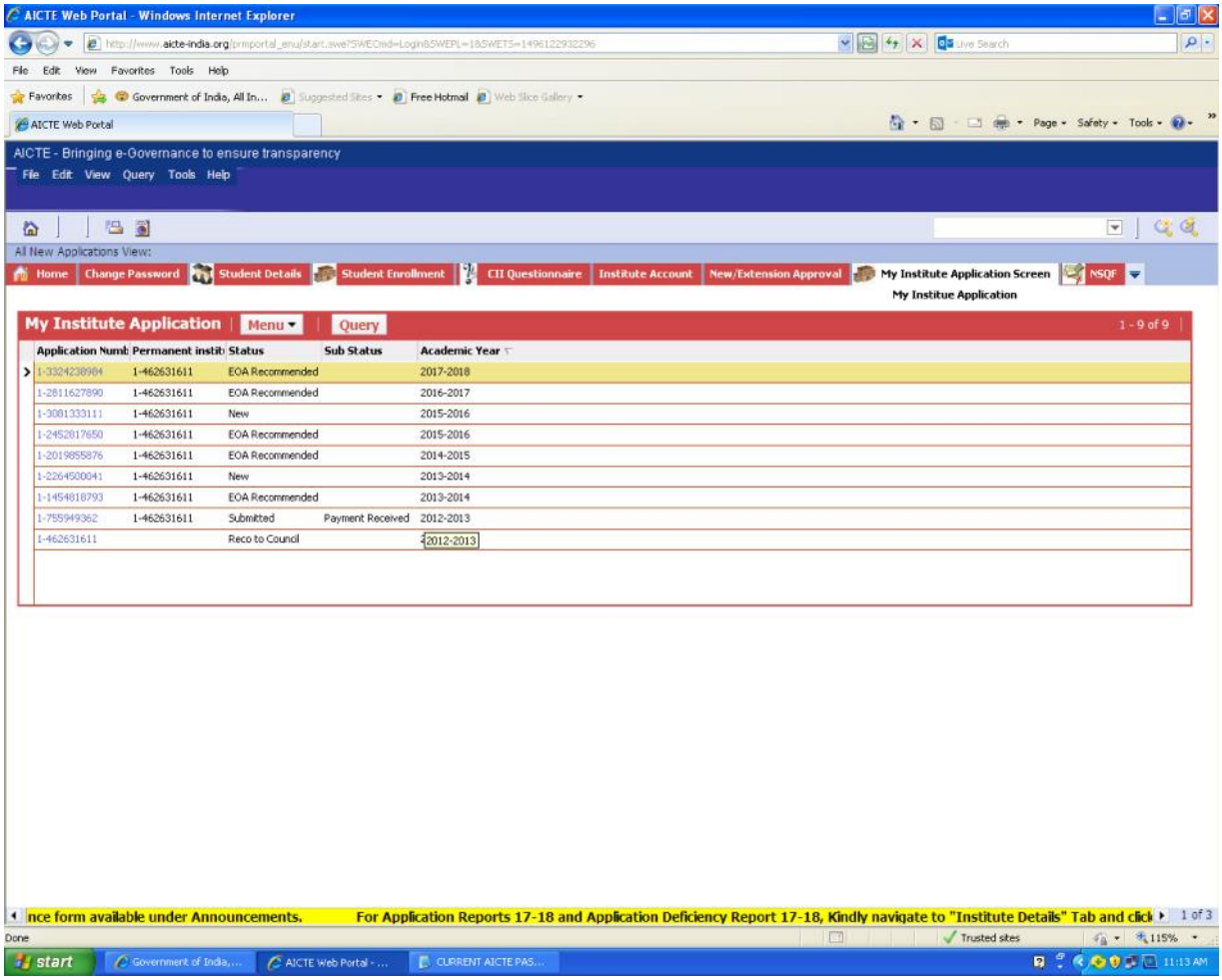
Type	Level	Actual Room Area (Sq. m.)	Expected Room Area (Sq. m.)	Deficiency
Tutorial Rooms - PG	POST GRADUATE	80	264	Yes
Laboratories-All	UG/PG	1830	528	No
Workshops	UG/PG	0	200	Yes
Drawing Halls	UG/PG	0	132	Yes
Seminar Hall	UG/PG	828	528	No

XX- No Rooms Available
DNA- Data Not Available / Insufficient Data
Blank Field-Data Not Entered
* Laboratories required and Actual Number includes Total Number of Laboratories, Research Laboratories, and Additional WS/Labs for UG and PG courses, as applicable
^ Actual Number of Tutorial Rooms for Under Graduate includes the Number of Tutorial Rooms Available for PG, if applicable
** Actual Number of Guest Rooms for Under Graduate includes the Actual Number of Guest Rooms Available for PG, if applicable
*** Actual Number of Kitchen for Under Graduate includes the Actual Number of Kitchen Available for PG, if applicable

Information regarding intake applied

Sr Num	Course Unique Id	Program	Course	Level	Shift	Approved Intake 15-16	Intake Applied 16-17	Application type	Accreditation status	NRI	PIO	Foreign Collaborati
1	1-145481 8905	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	POST GRADUATE	1st Shift	28	28	EoA Only	NOT ACCREDITED	Not interested	Not interested	Not interested
2	1-145481 8908	ENGINEERING AND TECHNOLOGY	MULTIMEDIA AND SOFTWARE ENGINEERING	POST GRADUATE	1st Shift	28	28	EoA Only	NOT ACCREDITED	Not interested	Not interested	Not interested
3	1-145481 8910	ENGINEERING AND TECHNOLOGY	MECHATRONICS	POST GRADUATE	1st Shift	28	28	EoA Only	NOT ACCREDITED	Not interested	Not interested	Not interested
4	1-145481 8912	ENGINEERING AND	STRUCTURAL ENGINEERING	POST GRADUA	1st Shift	18	18	EoA Only	NOT ACCREDITED	Not interested	Not interested	Not interested

DIRECTOR
NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING & RESEARCH
BLOCK - FC, SECTOR - III, SALT LAKE CITY
KOLKATA - 700 106


AICTE Web Portal - Windows Internet Explorer
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All New Applications View:
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Student Details
Student Enrollment
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Institute Account
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My Institute Application Screen
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Application Deficiency Report

Application Status:
Application Sub-Status:

Report Generated on :-30/01/2017

Type	Level	Actual Room Area (Sq. m.)	Expected Room Area (Sq. m.)	Deficiency
Tutorial Rooms - PG	POST GRADUATE	80	132	Yes
Laboratories-All	UG/PG	1830	384	No
Workshops	UG/PG	1600	200	No
Drawing Halls	UG/PG	156	132	No
Seminar Hall	UG/PG	828	528	No

XX- No Rooms Available
DNA- Data Not Available / Insufficient Data
Blank Field-Data Not Entered
* Laboratories required and Actual Number includes Total Number of Laboratories, Research Laboratories, and Additional WS/Labs for UG and PG courses, as applicable
^ Actual Number of Tutorial Rooms for Under Graduate includes the Number of Tutorial Rooms Available for PG, if applicable
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*** Actual Number of Kitchen for Under Graduate includes the Actual Number of Kitchen Available for PG, if applicable

Information regarding intake applied

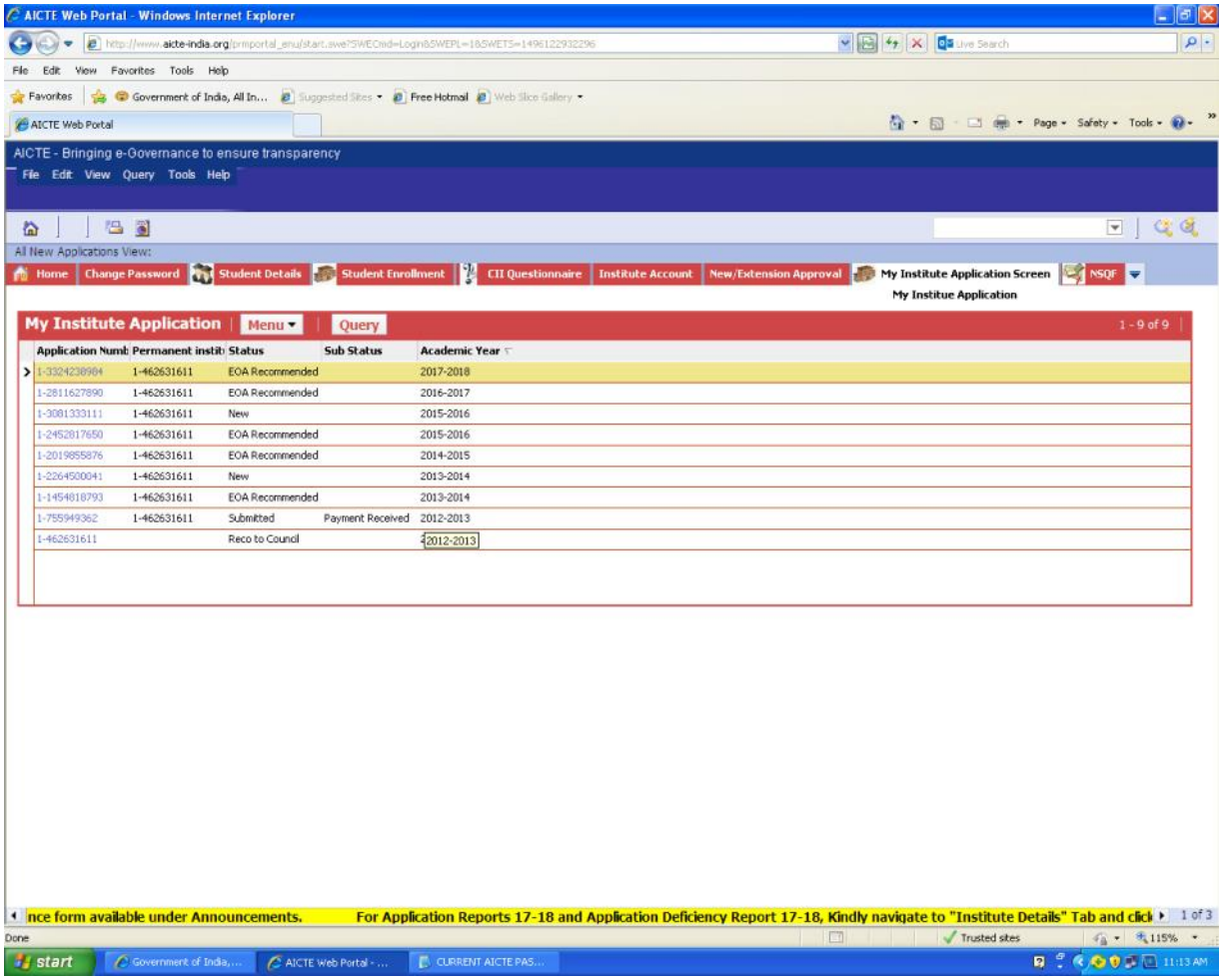
Sr Num	Course Unique Id	Program	Course	Level	Shift	Approved Intake 16-17	Intake Applied 17-18	Application type	Accreditation status	NRI	PIO	Foreign Collaborati
1	1-145481 8905	ENGINEERING AND TECHNOLOGY	MANUFACTURING TECHNOLOGY	POST GRADUATE	1st Shift	28	28	EoA Only	NOT APPLICABLE	Not interested	Not interested	Not interested
2	1-145481 8908	ENGINEERING AND TECHNOLOGY	MULTIMEDIA AND SOFTWARE ENGINEERING	POST GRADUATE	1st Shift	28	28	EoA Only	NOT APPLICABLE	Not interested	Not interested	Not interested
3	1-145481 8910	ENGINEERING AND TECHNOLOGY	MECHATRONICS	POST GRADUATE	1st Shift	28	28	EoA Only	NOT APPLICABLE	Not interested	Not interested	Not interested
4	1-145481 8912	ENGINEERING AND TECHNOLOGY	STRUCTURAL ENGINEERING	POST GRADUATE	1st Shift	18	18	EoA Only	NOT APPLICABLE	Not interested	Not interested	Not interested

31/01/17
Date of Signature (dd/mm/yyyy)

NATIONAL COUNCIL FOR TECHNICAL TEACHERS' TRAINING & RESEARCH BLOCK - FC, SECTOR - III, SALT LAKE CITY KOLKATA - 700 106
Seal of Institute

Name & signature of Director /Principal

***Note :- All the Dates in the Report are in dd/mm/yyyy) format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Annexure XII

सत्यमेव जयते

भारतीय लेखापरीक्षा और लेखा विभाग
प्रधान निदेशक, लेखापरीक्षा का कार्यालय,
केन्दीय, कोलकाता

INDIAN AUDIT AND ACCOUNTS DEPARTMENT
OFFICE OF THE PRINCIPAL DIRECTOR OF AUDIT
CENTRAL, KOLKATA

No: OA II (AB)/AR/2015-16/NITTTR/ 410
Date: 04-11-16

A copy of the Separate Audit Report alongwith Annexure on the accounts of **National Institute of Technical Teachers' Training and Research,** for the year 2015-16 is forwarded to the **Director National Institute of Technical Teachers' Training and Research Block FC, Sector-III, Salt Lake Kolkata700106,** for information and necessary action.

Arrangement may please be made for preparation of Hindi Version of the Separate Audit Report with Annexure at your end and sending the same directly to the Ministry.

It may please be ensured that the Audited Accounts and the Separate Audit Report along with Annexure are placed before the apex body for consideration and adoption before the same are sent to the Government for being placed in Parliament.

Two copies of the printed Annual Report for the year 2015-16 (both English and Hindi Version) containing the Audited Accounts and the Separate Audit Report along with Annexure, as laid before Parliament, may please be forwarded to this office for necessary action at this end.

Encl.: As stated

4/11/16
Dy. Director (I)

जी. आई. प्रेस बिल्डिंग, 8, किरण शंकर राय रोड (प्रथम तल), कोलकाता - 700 001
Govt. of India Press Building, 8, Kiran Sankar Roy Road, Kolkata - 700 001
Phone : 2254-0221,(Gram : ACCOUNTCENT) Post Box : 2699,Fax No.: 033 22135377

Separate Audit Report of the Comptroller & Auditor General of India on the Accounts of the National Institute of Technical Teachers' Training and Research, Kolkata for the year ended 31 March 2016

We have audited the attached Balance Sheet of the National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata as at 31 March 2016, the Income and Expenditure account and Receipts and Payments Account for the year ended on that date under Section 20(1) of the Comptroller and Auditor General's (Duties, Power and Conditions of Service) Act, 1971. The audit has been entrusted for the period upto 2017-18. These financial statements include the accounts of two Extension Centers of the Institute. These financial statements are the responsibility of the Institute's Management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification and conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules and Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and

significant estimates made by the management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

4. Based on our audit, we report that:

i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

ii. The Balance Sheet and Income and Expenditure Account/Receipt and Payment Account dealt with by this report have been drawn up in the format prescribed by the Ministry of Human Resource Development, Government of India vide order No. 29-4/2012-FD dated 17 April 2015.

iii. In our opinion, proper books of accounts and other relevant records have been maintained by the National Institute of Technical Teachers' Training and Research, Kolkata as required under the rules and regulations of the NITTTR in so far as it appears from our examination of books.

iv. We further report that

Comments on Accounts

A Balance Sheet

1.1 Liabilities

1.1.1 Corpus/Capital Fund (Sch. 1) ₹4738.33lakh

The above head was understated by ₹14.12 lakh as assets worth ₹14.12 lakh created out of Non Plan grant was included with the Fixed Assets but the corresponding amount was not credited to Capital/ Corpus fund, instead of it, it was shown under current liabilities as unutilized grants.

This resulted in overstatement of current liabilities by ₹14.12 lakh at the end of 2015-16.

1.2 Assets

1.2.1 Fixed Assets (Schedule 4): ₹5324.15 lakh

I. The above head remained understated by ₹3.15 lakh due to the following:-

(a) The Office vehicle purchased in 2015-16 at a cost of ₹15.56 lakh (₹14.12 lakh cost + ₹1.44 lakh taxes and insurance) was only recorded as ₹14.12 lakh as the tax & insurance was not paid in 2015-16.

(b) A pump set purchased in 2015-16 at a cost of ₹0.85 lakh was not included in the fixed asset which was received in March 2016 but payment made in April 2016.

(c) Capital Expenditure on Furniture & Fixture amounting to ₹0.86 lakh was treated as revenue expenditure.

This had also resulted in understatement of Current Liability (Provisions) by ₹2.29 lakh and understatement of Capital Fund through understatement of Surplus by ₹0.86 lakh.

II. The above head was understated and Capital Work in Progress was overstated by ₹18.65 lakh as Electrical installation work of renovation and modernization of Executive Hostel Rooms, completed by CPWD in March 2014, was continued to be shown as Capital Work in Progress.

1.2.2 Loans, Advances & Deposits (Schedule 8): ₹ 497.08 lakh

Advance amounting to ₹320.58 lakh paid to CPWD had been capitalized without completion of the job as well as receipt of utilization certificate instead of showing the same under Loans and Advances.

This had resulted in understatement of Loan, Advances & Deposits and overstatement of Fixed Assets by ₹320.58 lakh (Capital Works-in-Progress).

B Income & Expenditure Account

2.1 Expenditure

2.1.1 Depreciation- ₹296.64 lakh

The above head remained understated by ₹24.59 lakh due to the following:-

a) The depreciation of ₹20.75 lakh was charged less on wi-fi connection (₹1.66 crore) which was included in office equipment (charged depreciation @ of 7.5%) instead of Computers & Peripherals (depreciation @ 20%).

b) The depreciation @ 5% {₹2.80 lakh- (₹1.87 lakh prior period + ₹0.93 lakh current year) on Electrical installation work of renovation and modernization of Executive Hostel Roomsfor ₹18.65 lakh which was completed by CPWD in March 2014 and the depreciation @2% (₹0.84 lakh) on renovation of 4 nos Associate Professor's quarters (left & right side of stair) at DN Block for ₹42.11 lakh which was completed by CPWD in March 2016 had not been charged.

c) The depreciation @ 10% (0.14 lakh) on Office Vehicle whose cost was recorded less by ₹1.44 lakh had not been charged.

d) The depreciation @ 7.5% (0.06 lakh) on Furniture & Fixtures for ₹0.86 lakh treated as revenue expenditure.

This resulted in overstatement of surplus by ₹24.59 lakh at the end of 2015-16.

2.2 Income

2.2.1 Academic Receipts (Schedule 9)- ₹52.00 lakh

The above did not include the M. Tech course fees of ₹19.49 lakh pertaining to 2015-16 for 101 students as the same could not be received in 2015-16 due to shift to online mode of payment by NITTTR.

This had resulted in understatement of surplus by ₹19.49 lakh.

2.2.2 Income from Investment (Schedule 11): ₹184.00lakh

The above income remained overstated by ₹16.80 lakh as the interest on term deposit of Earmarked/ Endowment Fund was included in the Institute's main accounts. Since the interest income was related to Earmarked Fund, the income should have been credited to Earmarked Fund. Inclusion of Earmarked Fund income with the main account resulted in overstatement of Excess of Income over Expenditure by ₹16.80 lakh at the end of 2015-16.

C. General

3.1 During the year the Institute had provided depreciation on assets on Straight line method with new rates in lieu of the earlier system of providing depreciation on Written down Value method at different rates. The impact on the accounts due to change in the method and rates of depreciation on fixed assets had neither been worked out nor disclosed as required under AS-5.

Further, the Institute had directly applied the new method and rates of depreciation on the opening value of assets from the year 2014-15 without observing the procedure to be adopted for change in the method and rates of depreciation as per the provision of AS-6.

3.2 The Schedule 3 (Other liabilities) included a book overdraft (shown as bank overdraft) amountining to ₹383.20 lakh which consisted of cheques issued but not presented at Bank. This included 6 cheques amounting to ₹ 0.50 lakh (Main) which had become time barred.

3.3 The Institute has made provision for Gratuity and Leave encashment benefits of Retirement on cash basis and not on actuarial basis which is in contravention of AS 15.

3.4 The figures of unutilized grants in Schedule 3 is ₹548.85 lakh while in schedule 3(C) the figure is ₹594.76 lakh. This resulted in discrepancy of ₹45.91 which needs to be reconciled.

D. Grants-in-Aid

The Institute is mainly financed by grants from the Government of India. During the year 2015-16, the Institute had unspent balance of previous year of ₹256.07 lakh (Plan ₹56.22 lakh, Non-Plan ₹46.11 lakh and NER ₹153.74 lakh) and further received total grants ₹ 2421.85 lakh (Non-Plan ₹849.69 lakh, Plan-both Recurring and Non-Recurring ₹1397.16 lakh & NER grants of ₹175.00 lakh). Out of total grant of ₹2677.92 lakh (₹256.07 lakh + ₹2421.85 lakh), Institute had utilised ₹2044.27 lakh (₹1100.30 lakh for both Non-Plan grants, ₹861.09 lakh for both Plan grants,₹56.53 lakh for North-East and ₹26.35 lakh for OBC) leaving net unspent balance of ₹633.65 lakh at the end of the year 2015-16.

E. Net Effect

Net effect of the comments given in the preceeding paragraphs is that both the Assets and Liabilities were understated by ₹3.15 lakh as at 31 March 2016 and the Excess of Income over Expenditure had been overstated by ₹21.90 lakh for the year ended 31 March 2016.

F. Management Letter

Deficiencies not included in the Audit Report have been brought to the notice of the Director, NITTTR, Kolkata through a management letter issued separately for remedial/corrective action.

iv. Subject to our observations in the preceding paragraphs, we report that the Balance Sheet and Income and Expenditure Account and Receipts and

Payments Account dealt with by this report are in agreement with the books of accounts.

v. In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure to this Audit Report, give a true and fair view in conformity with accounting principles generally accepted in India.

a. in so far as it relates to the Balance Sheet, of the state of affairs of the National Institute of Technical Teachers' Training and Research, Kolkata as at 31 March 2016 and

b. in so far as it relates to Income and Expenditure Account of the surplus for the year ended on that date.

For and on behalf of the C&AG of India

4.11.16

Place:-Kolkata
Date:- 04.11.2016

(P.K.Singh)
Principal Director of Audit
Central :: Kolkata

Annexure

A. Adequacy of Internal Audit System

Internal Audit System is inadequate in following areas:

1.1 There is no Internal Audit wing of the Institute.Internal audit was conducted by engaging a Chartered Firm

1.2 Internal Audit was not conducted in its extension centres at Guwahati & Bhubaneshwar.

1.3 No spot check on the branches was conducted by Head office.

B. Adequacy of Internal Control System

2.1 Fixed Assets under construction were not separated by job number.

2.2 There was no certificate of monthly physical verification of the cash during the year 2015-16 except for March 2016.

2.3 The Fixed Assets of branch offices are not physically verified regularly.

C. System of Physical Verification of Assets

Physical Verification of Fixed Assets has been conducted by the Institute during the year 2015-16. Register of Fixed assets is not in accordance with GFR-40. Assets of branch offices were not physically verified regularly. Fixed Assets were not insured against unforeseen calamities.

D. Statutory Liabilities: Nil

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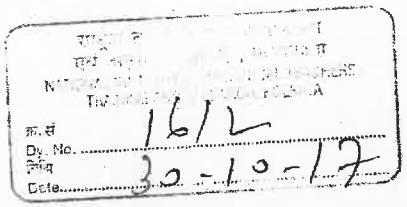
CONFIDENTIAL

सत्यमेव जयते

भारतीय लेखा तथा लेखा-परीक्षा विभाग
महा निदेशक, लेखा-परीक्षा का कार्यालय,
केन्द्रीय, कोलकाता

INDIAN AUDIT AND ACCOUNTS DEPARTMENT
OFFICE OF THE DIRECTOR GENERAL OF AUDIT,
CENTRAL, KOLKATA.



No: OA II (AB)/AR/2016-17/NITTTR/ 349
Date: 24-10-2017

A copy of the Separate Audit Report alongwith Annexure on the accounts of the **National Institute of Technical Teachers' Training and Research,** for the year 2016-17 is forwarded to the **Director, National Institute of Technical Teachers' Training and Research, Block FC, Sector-III, Salt Lake, Kolkata700106,** for information and necessary action.

Arrangement may please be made for preparation of Hindi Version of the Separate Audit Report with Annexure at your end and sending the same directly to the Ministry.

It may please be ensured that the Audited Accounts and the Separate Audit Report along with Annexure are placed before the apex body for consideration and adoption before the same are sent to the Government for being placed in Parliament.

Two copies of the printed Annual Report for the year 2016-17 (both English and Hindi Version) containing the Audited Accounts and the Separate Audit Report along with Annexure, as laid before Parliament, may please be forwarded to this office for necessary action at this end.

Encl.: As stated

Deputy Director (Inspection)

जि. आई. प्रेस बिल्डिंग, 8 किरण शंकर राय रोड (1म मंजिल), कोलकाता- 700001
Govt. of India Press Building, 8, Kiran Sankar Roy Road, Kolkata-700001
Phone : 2254-0221, (Gram : ACCOUNTCENT) POST BOX : 2699, Fax No.: 033 22135377

Separate Audit Report of the Comptroller & Auditor General of India on the Accounts of the National Institute of Technical Teachers' Training and Research, Kolkata for the year ended 31 March 2017

We have audited the attached Balance Sheet of the National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata as at 31 March 2017, the Income and Expenditure account and Receipts and Payments Account for the year ended on that date under Section 20(1) of the Comptroller and Auditor General's (Duties, Power and Conditions of Service) Act, 1971. The audit has been entrusted for the period upto 2017-18. These financial statements include the accounts of two Extension Centers of the Institute. These financial statements are the responsibility of the Institute's Management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification and conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules and Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and

significant estimates made by the management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

4. Based on our audit, we report that:

i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

ii. The Balance Sheet and Income and Expenditure Account/Receipt and Payment Account dealt with by this report have been drawn up in the format prescribed by the Ministry of Human Resource Development, Government of India vide order No. 29-4/2012-FD dated 17 April 2015.

iii. In our opinion, proper books of accounts and other relevant records have been maintained by the National Institute of Technical Teachers' Training and Research, Kolkata as required under the rules and regulations of the NITTTR in so far as it appears from our examination of books.

iv. We further report that

Comments on Accounts

A. Balance Sheet

1.1 Assets

1.1.1 Fixed Assets (Schedule-4)- ₹6031.74 lakh (Gross Block)

The above head was overstated by ₹20.19 lakh due to booking of two vehicles amounting to ₹20.19 lakh for the year 2016-17 though those were delivered in May 2017. This had resulted in overstatement of Capital Fund by the amount of ₹20.19 lakh.

B. Income & Expenditure Account

2.1 Expenditure

2.1.1 Staff Payments and Benefits (Establishment Expenditure) (Schedule-15)- ₹1234.08 lakh

The above head of expenditure was overstated due to booking of entire prepaid expenses incurred on M. Tech Medical Insurance Premium (₹1.23 lakh), Prepaid Pension Contribution (₹0.54 lakh) and Leave Salary Contribution (₹0.26 lakh) as whole expenses for the current year. This had resulted in understatement of Excess of Income over Expenditure by ₹2.03 lakh for the year ended 31 March 2017.

C Other Accounts

3 Provident Fund Account

3.1 Provident Fund- Income & Expenditure Account

Amount of Interest credited to the GP Fund did not tally with the figure shown in the Income & Expenditure Account (₹55.10 lakh) and GPF Ledger (₹55.22 lakh). This resulted in discrepancy of ₹0.12 lakh (₹55.22 lakh – ₹55.10 lakh) which needs reconciliation.

D. General

4.1 Prior Period Expenses of ₹1.99 lakh under the head Staff Payments and Benefits and ₹4.67 lakh under the head Administrative and General Expenses should have been booked under Schedule-22 instead of Schedule-15 and Schedule-17 respectively in Income and Expenditure Account.

4.2 Bank Reconciliation Statement of Axis Bank A/c No.911010001723267 exhibited a time barred cheque of ₹5,219 (Cheque No.43510 dated 01.04.2016) which needs to be written back into the account.

4.3 Loans, Advances & Deposits (Sch-8) included unadjusted advances of ₹16.25 lakh for more than 3 years. The Institute should review the prospect of adjustment of all advances.

4.4 Despite mention in previous year's Audit Report no separate bank account for Earmarked Fund- PDMTVE was shown to the audit and the same remained merged with the main account.

4.5 The following discrepancies between Accounts and Ledger balances need to be reconciled:

Sl. No.	Head	Amount Exhibited in the Accounts under the Head	Amount exhibited in the ledger under the Head
1.	M. Tech Course Fees- 'Academic Expenses'	Nil	₹4.62 lakh
2.	Purchase of Consumable Materials 'Administrative Expenses'	₹15.42 lakh	₹15.96 lakh

4.6 Depreciation

Depreciation as well as Deferred Income (AS-12) was shown excess due to excess charging of depreciation by ₹2.02 lakh due to wrong addition of two vehicles procured in May 2017.

4.7 Accounting Policies

4.7.1 From the year 2014-15 the Institute had been providing depreciation on Assets on Straight Line method with new rates in place of the earlier system of providing depreciation on Written down Value method at different rates. Despite mention in the previous years' Audit Report the Institute had neither worked out nor disclosed the impact on the accounts due to change in the method and rates of depreciation on Fixed Assets as required under AS-5.

Further, the Institute had directly applied the new method and rates of depreciation on the opening value of assets from the year 2014-15 without observing the procedure to be adopted for change in the method and rates of depreciation as per the provision of AS-6.

4.7.2 In contravention to the AS-15 the Institute has made provision for Retirement benefits (Gratuity, Leave encashment etc.) on cash basis instead of actuarial basis.

E. Grants-in-Aid

The Institute is mainly financed by grants from the Government of India. During the year 2016-17, the Institute had unspent balance of previous year of ₹633.65 lakh {Non-Plan (-) ₹204.50 lakh, Plan ₹592.29 lakh, NER grants ₹272.21 lakh & OBC grants (-) ₹26.35 lakh} and further received total grants ₹3030.00 lakh (Non-Plan ₹980.00 lakh, Plan-both Recurring and Non-Recurring ₹1425.00 lakh & NER grants of ₹625.00 lakh[1])

Out of the total grants of ₹3663.65 lakh (₹633.65 lakh + ₹3030.00 lakh), the Institute had utilized ₹2255.19 lakh (Non-Plan ₹1403.70 lakh, Plan ₹816.34 lakh and NER ₹35.15 lakh) leaving net unspent balance of ₹1408.46 lakh at the end of the year 2016-17.

F. Net Effect

The net impact of the comments given in the preceding paragraphs is that the both the Assets and Liabilities of the Institute are overstated by ₹20.19 lakh as at 31 March 2017 and the Excess of Income over Expenditure was understated by ₹2.03 lakh for the year ended 31 March 2017.

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[1] Including Receivable- ₹175.00 lakh

G. Management Letter

Deficiencies not included in the Audit Report have been brought to the notice of the Director, NITTTR, Kolkata through a management letter issued separately for remedial/corrective action.

iv. Subject to our observations in the preceding paragraphs, we report that the Balance Sheet and Income and Expenditure Account and Receipts and Payments Account dealt with by this report are in agreement with the books of accounts.

v. In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure to this Audit Report, give a true and fair view in conformity with accounting principles generally accepted in India.

a. in so far as it relates to the Balance Sheet, of the state of affairs of the National Institute of Technical Teachers' Training and Research, Kolkata as at 31 March 2017 and

b. in so far as it relates to Income and Expenditure Account of the surplus for the year ended on that date.

For and on behalf of the C&AG of India

24.10.17

Place:-Kolkata
Date:- 24·10·2017

(P.K.Singh)
Director General of Audit
Central :: Kolkata

Annexure

A. Adequacy of Internal Audit System

Internal Audit System is inadequate in following areas:

- There is no Internal Audit wing of the Institute. Internal audit was conducted by engaging a Chartered Accountants Firm.
- Internal Audit was not conducted in its extension centres at Guwahati & Bhubaneshwar.
- No checking on the branches was conducted by Head Office.

B. Adequacy of Internal Control System

Internal Control System is inadequate in the following areas:

- There was no certificate of monthly physical verification of the cash during the year 2016-17 except for March 2016.
- Register of Advance was not maintained in the Institute.

C. System of Physical Verification of Assets

Physical Verification of Fixed Assets has been conducted by the Institute during the year 2016-17. Register of Fixed assets is not in accordance with GFR-40. Assets of branch offices were not physically verified during 2016-17.

D. Statutory Liabilities: The Statutory dues in respect of GSLIS amounting to ₹0.21 lakh was remained unpaid.

सत्यमेव जयते

भारतीय लेखा तथा लेखा-परीक्षा विभाग
महा निदेशक, लेखा-परीक्षा का कार्यालय,
केन्द्रीय, कोलकाता

INDIAN AUDIT AND ACCOUNTS DEPARTMENT
OFFICE OF THE DIRECTOR GENERAL OF AUDIT,
CENTRAL, KOLKATA.

No: OA II (AB)/AR/2017-18/NITTTR / 288
Date: 26.10.18

A copy of the Separate Audit Report alongwith Annexure on the accounts of the **National Institute of Technical Teachers' Training and Research,** for the year 2017-18 is forwarded to the **Director, National Institute of Technical Teachers' Training and Research, Block FC, Sector-III, Salt Lake, Kolkata 700106** for information and necessary action.

Arrangement may please be made for preparation of Hindi Version of the Separate Audit Report with Annexure at your end and sending the same directly to the Ministry.

It may please be ensured that the Audited Accounts and the Separate Audit Report along with Annexure are placed before the apex body for consideration and adoption before the same are sent to the Government for being placed in Parliament.

Two copies of the printed Annual Report for the year 2017-18 (both English and Hindi Version) containing the Audited Accounts and the Separate Audit Report along with Annexure, as laid before Parliament, may please be forwarded to this Office for necessary action at this end.

Encl.: As stated

Director (Inspection)

जि. आई. प्रेस बिल्डिंग, 8 किरण शंकर राय रोड (1म मंजिल), कोलकाता-700001
Govt. of India Press Building. 8, Kiran Sankar Roy Road, Kolkata- 700001
Phone : 2254-0221, (Gram: ACCOUNTCENT) POST BOX: 2699, Fax No.: 033 22135377

सत्यमेव जयते

भारतीय लेखा तथा लेखा-परीक्षा विभाग
महा निदेशक, लेखा-परीक्षा का कार्यालय,
केन्द्रीय, कोलकाता

INDIAN AUDIT AND ACCOUNTS DEPARTMENT
OFFICE OF THE DIRECTOR GENERAL OF AUDIT,
CENTRAL, KOLKATA.

No: OA II (AB)/AR/2017-18/NITTTR / 286
Date: 26.10.18

To
The Secretary,
Ministry of Human Resource Development,
Government of India,
Department of Secondary Education & Higher Education, Shastri Bhavan,
New Delhi - 110001

Subject: Separate Audit Report on the accounts of the **National Institute of Technical Teachers' Training and Research, Kolkata** for the year *2017-18*

Sir,

I am to forward herewith the Separate Audit Report in the prescribed format introduced by the C & A.G of India on the accounts of the **National Institute of Technical Teachers' Training and Research, Kolkata** for the year 2017-18. A copy of the annual accounts of the organisation for the year 2017-18 is also enclosed.

2. Two copies of Separate Audit Report (both English and Hindi Version), as presented before Parliament, may please be forwarded to this office for necessary action at this end.

3. The dates of laying the audited accounts and the Separate Audit Reports for the years 2017-18 on the Tables of both the Houses of Parliament may also please be communicated to this office.

Yours faithfully,

Encl.: As stated

(P.K.Singh) 26.10.18
Director General of Audit
Central: Kolkata

जि. आई. प्रेस बिल्डिंग, 8 किरण शंकर राय रोड (1म मंजिल), कोलकाता-700001
Govt. of India Press Building. 8, Kiran Sankar Roy Road, Kolkata- 700001
Phone : 2254-0221, (Gram: ACCOUNTCENT) POST BOX: 2699, Fax No.: 033 22135377

Separate Audit Report of the Comptroller & Auditor General of India on the Accounts of the National Institute of Technical Teachers' Training and Research, Kolkata for the year ended 31 March 2018

We have audited the attached Balance Sheet of the National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata as at 31 March 2018, the Income and Expenditure Account and Receipts and Payments Account for the year ended on that date under Section 20(1) of the Comptroller and Auditor General's (Duties, Power and Conditions of Service) Act, 1971. The audit has been entrusted for the period upto 2017-18. These financial statements include the accounts of two Extension Centres of the Institute. These financial statements are the responsibility of the Institute's Management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules and Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and

significant estimates made by the management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

4. Based on our audit, we report that:

i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

ii. The Balance Sheet and Income and Expenditure Account/Receipts and Payments Account dealt with by this report have been drawn up in the format prescribed by the Ministry of Human Resource Development, Government of India vide order No. 29-4/2012-FD dated 17 April 2015.

iii. In our opinion, proper books of accounts and other relevant records have been maintained by the National Institute of Technical Teachers' Training and Research, Kolkata as required under the rules and regulations of the NITTTR in so far as it appears from our examination of books.

iv. We further report that

Comments on Accounts

A. Balance Sheet

1.1 Assets

1.1.1 Fixed Assets (Schedule-4): ₹32.06 crore

a) The above head was overstated by ₹2.22 crore due to inclusion of Advances to CPWD under Capital Work-in-progress. This also resulted in understatement of Loans, Advances and Deposits (Schedule-8) by ₹2.22 crore.

b) The above head was overstated by ₹5.33 lakh due to inclusion of software of one year validity under Intangible Assets instead of charging to Income and Expenditure Account. This also led to the overstatement of Corpus

Fund (Schedule-1) by ₹5.33 lakh Further. Excess of Income over Expenditure was understated by ₹2.13 lakh due to charging of depreciation @ 40 percent on the value of assets of ₹5.33 lakh.

B. Income and Expenditure Account

2.1 Expenditure

2.1.1 Repairs and Maintenance (Schedule-19): ₹1.15 crore

The above head was overstated by ₹7.37 lakh due to inclusion of maintenance charges of ₹9.47 lakh for three lifts for 36 months instead of apportioning the charge as eight months for the year 2017-18 and rest 28 months under Prepaid Expenses. This led to the understatement of Excess of Income over Expenditure by ₹7.37 lakh.

2.2 Income

2.2.1 Grants/Subsidies (Schedule-10): ₹37.09 crore

In contravention of Format of Accounts prescribed by MHRD, the above head included income amount as ₹37.09 crore instead of income corresponding to matching revenue expenditure of ₹21.08 crore. This resulted in overstatement of above head and Excess of Income over Expenditure by ₹16.01 crore.

C. Provident Fund Account

3.1 Liabilities: ₹9.26 crore

The head was overstated by ₹1.34 lakh due to booking of higher rate of interest under the head Interest Credited. This also resulted in overstatement of assets by ₹1.34 lakh.

D. General

4.1 Despite mention in previous year's Audit Report, no impact on annual accounts was disclosed in the Notes to Accounts due to change of method of

depreciation from Written Down Value to Straight Line method since the year 2014-15 as per Accounting Standard-5.

4.2 No retirement benefits on actuarial method were provided in the annual accounts in contravention to Accounting Standard-15.

E. Grants-in-aid

The Institute is mainly financed by grants from the Government of India. During the year 2017-18, the Institute had unspent balance of previous year of ₹14.35 crore (NER grants ₹8.62 crore) adjusting ₹26.35 lakh with closing balance of ₹14.08 crore of the previous year and further received ₹25.24 crore (NER grants ₹50 lakh). Out of total grants of ₹39.58 crore, the Institute utilised ₹25.89 crore (NER grant ₹51.77 lakh) leaving an unspent grant of ₹13.69 crore (NER grants ₹8.60 crore) excluding receivable grant ₹27.86 crore for the year 2017-18.

F. Net Effect

The net effect of the comments given in the preceding paragraphs is that the both the Assets and Liabilities of the Institute are overstated by ₹5.33 lakh as at 31 March 2018 and the Excess of Income over Expenditure was overstated by ₹15.92 crore for the year ended 31March 2018. Further, assets and liabilities of Provident Fund was overstated by ₹1.34 lakh as at 31 March 2018.

G. Management Letter

Deficiencies not included in the Audit Report have been brought to the notice of the Director, NITTTR, Kolkata through a management letter issued separately for remedial/corrective action.

iv. Subject to our observations in the preceding paragraphs, we report that the Balance Sheet and Income and Expenditure Account and Receipts and

Payments Account dealt with by this report are in agreement with the books of accounts.

v. In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure to this Audit Report, give a true and fair view in conformity with accounting principles generally accepted in India.

a. in so far as it relates to the Balance Sheet, of the state of affairs of the National Institute of Technical Teachers' Training and Research, Kolkata as at 31 March 2018 and

b. in so far as it relates to Income and Expenditure Account of the surplus for the year ended on that date.

For and on behalf of the C&AG of India

26.10.18

(P.K.Singh)
Director General of Audit
Central :: Kolkata

Place:-Kolkata
Date:- 26.10.18

Annexure

A. Adequacy of Internal Audit System

Internal Audit System is inadequate in following areas:

1 The Institute has its own Internal Audit wing but it is in a preliminary stage. Internal audit was conducted by engaging a Chartered Accountant Firm.

2 There was no sactioned post for Internal Audit.

B. Adequacy of Internal Control System

Internal Control System is inadequate in the following areas:

1 Significant variation between actual stocks and book stocks were not investigated.

2 The bank deposits were not made by other person than those who were responsible for receiving cash.

3 All suppliers' invoices are not routed direct to the Accounts Department. Also they are not entered in a Bill Register before submitting them to other department for check or approval.

C. System of Physical Verification of Fixed Assets

Physical Verification of Fixed Assets had been conducted by the Institute during the year 2017-18. Register of Fixed assets was not in accordance with GFR-22.

D. Regularity in payment of Statutory Dues:

The Institute was regular in payment of Statutory Dues