NATIONAL INSTITUTE OF TECHNOLOGY
(DEEMED UNIVERSITY)
KURUKSHETRA

AGENDA
OF
SENATE

7th MEETING
TO BE HELD ON 9th JUNE, 2006

NATIONAL INSTITUTE OF TECHNOLOGY,
(DEEMED UNIVERSITY)
KURUKSHETRA-136119

No. R/Senate 7th/1600/ Dated: 2/6/2006

1.	Dr. M.N.Bandyopadhyay, Director, NIT, Kurukshetra.	Chairman
2.	Prof.C.V. Ramakrishnan, Professor, Department of Applied Mechanics, Indian Institute of Technology, New Delhi-110016.	Member
3.	Dr.Mrs.Renu Bhargava, Professor, Civil Engineering Department Indian Institute of Technology, Roorkee (UA).	Member
4.	Dr. R.L. Sharma, Professor, Civil Engineering Department, National Institute of Technology, Hamirpur. (HP).	Member
5.	Dr. M.L. Kothari, Professor, Electrical Engineering Department, Indian Institute of Technology, Hauz Khas, New Delhi. 110 016	Member
6.	Sh. Ravi Jaidka, President, Indian Sugar & Gen. Engg. Corporation, Yamuna Nagar, Haryana	Member
7.	Shri S.P. Mahi, Chief Engineer-II Konkan Railway Corp Ltd., Jyotipuram Road, Tirantha, Post Gram More, Riyasi, Distt. Udhampur Jammu & Kashmir, PIN 182311	Member

8.	Er. Mukesh Gulati, Sr. Cluster Development Adviser, United Nations Industrial Development Organization, USO House, USO Road, 6 Special Institutional Area, New Delhi. 110 067,	Member
9.	Shri Adesh Gupta, Chief Executive Officer, Liberty Group of Industries, KARNAL.	Member
10.	Dr. Ranjit Singh, Director, Netaji Subhash Institute of Technology, Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi.	Member
11.	Dr. Krishna Gopal, Professor, Elect. Engg. Deptt. and Dean (Planning & Development), NIT, Kurukshetra.,	Member
12.	Dr. R K Bansal, Professor, Civil Engineering Department NIT, Kurukshetra.	Member
13.	Dr. T K Garg, Professor, Mech. Engg.Deptt., and PTSW, NIT, Kurukshetra.	Member
14.	Dr. M.K.Soni, Professor, (Electrical Engineering Deptt., & Dean (Estate, Constn. & Elect Mtc.) NIT, Kurukshetra	Member

15.	Dr. S P Jain, Professor Electrical Engineering Department, NIT, Kurukshetra.	Member
16.	Dr. V K Arora, Professor, Civil Engineering Department NIT, Kurukshetra.	Member
17.	Dr. V K Sehgal, Professor & Chairman, Civil Engineering Department, NIT, Kurukshetra.	Member
18.	Dr. S K Sharma, Professor & Chairman, Mechanical Engineering Department, NIT, Kurukshetra.	Member
19.	Dr. K C Goyal, Professor, Mechanical Engineering Department, NIT, Kurukshetra.,	Member
20.	Dr. A K Gupta, Professor, Electronics & Communication Engg. Deptt., NIT, Kurukshetra.	Member
21.	Dr. K S Kasana, Professor, Mechanical Engineering Department, & Dean(Academic), NIT, Kurukshetra.	Member
22.	Dr. K B Singh, Professor, Department of Humanities & Social Sciences, NIT, Kurukshetra.	Member

23.	Dr. A Swarup, Professor, Electrical Engineering Department, NIT, Kurukshetra.	Member
24.	Dr. S K Chakarvarti, Professor & Chairman, Physics Department NIT, Kurukshetra.	Member
25.	Dr. D V Singh, Professor & Chairman, Mathematics Department, NIT, Kurukshetra.	Member
26.	Dr. D.K. Soni, Professor, Civil Engineering Department, N.I.T. Kurukshetra.	Member
27.	Dr. R.C. Bhattacharjee, Professor, Civil Engineering Department, N.I.T Kurukshetra.	Member
28.	Dr. M.L.Garg, Professor, Mathematics Department, NIT, Kurukshetra	Member
29.	Dr. Kuldeep Kumar, Professor, Mathematics Department, & Chief Warden, NIT, Kurukshetra	Member
30.	Dr. N.K. Gupta, Professor, Civil Engineering Department, N.I.T. Kurukshetra.	Member

31	Dr. S.S.Rattan, Professor, Mechanical Engineering Deptt., NIT, Kurukshetra	Member
32.	Dr. K.S.Sandhu, Professor, Electrical Engineering Deptt., NIT, Kurukshetra	Member
33.	Dr. Sudhir Kumar, Professor, Mechanical Engineering Department, NIT Kurukshetra.	Member
34	Dr. Baldev Setia, Professor, Civil Engineering Department, N.I.T. Kurukshetra.	Member
35	Dr. Rajender Kumar, Professor & Chairman, Department of Humanities, & Social Sciences, NIT, Kurukshetra	Member
36	Dr. Brahamjit Singh, Professor, Electronics & Comm Engg Department, NIT Kurukshetra.	Member
37.	Dr. Dinesh Kumar, Assistant Professor & Chairman, Chemistry Department, NIT, Kurukshetra.	Member
38.	Prof. Mayank Dave, Asstt. Professor & Chairman, Computer Engineering Department, NIT, Kurukshetra.	Member
39.	Shri RPS Lohchab, Registrar, N.I.T. Kurukshetra.	Member-Secretary,

Subject: **Agenda papers for the 7th meeting of the Senate, National Institute of Technology, (Deemed University) Kurukshetra.**

Sir,

This is in continuation of this office letter No.R/Senate 7th/142 dated 29.5.2006 vide which it was intimated to you that the 7th meeting of the Senate, NIT Kurukshetra, will be held on **Friday, the 9th June,** 2006 **at 11.00 AM in the Senate Hall of the Institute at Kurukshetra.**

We enclose herewith Agenda papers for the said meeting for your kind perusal and reference. Kindly make it convenient to attend the meeting of the Senate on the above said date and time.

The external Govt. and non-Govt. members of the Senate are entitled to sitting allowance in addition to TA/DA as per rules of the Institute.

You are cordially invited to join us over lunch at about 1.00 PM in the Institute Guest House after the meeting is over.

Yours faithfully,

RP Kohchad 7/6/2006

Registrar & Member Secretary,
Senate NIT Kurukshetra

Encls: Agenda.

NATIONAL INSTITUTE OF TECHNOLOGY
(DEEMED UNIVERSITY)
KURUKSHETRA-136119

Agenda	:	7th Meeting of Senate
Venue	:	Senate Hall, NIT, Kurukshetra
Date & Time	:	9th June, 2006 at 11.00 AM

Item No. 7.01 **To note the nomination of external members on the Senate.**

The Senate in its 5th meeting while noting the nominations as given in Column 2 of the above table was of the opinion that re-nominations of some external members who did not earlier attend any Senate meeting during their first tenure of three years may be reviewed by the Chairman, BOG.

Our records show that in the category of Three Members from amongst educationists, Dr. MP Kapoor had attended only one out of six Senate meetings held upto .

From the category of six member for their special knowledge Shri Samresh Kar, Professor, IIT Kanpur, Shri K.R. Sharma, (former Prof & Head, EED, IIT Kanpur) Vice-President, Samel Colour Ltd., Ghaziabad, Shri V.K. Raizada, (former Member Railway Board) Managing Director, IRWO, 58, Rail Vihar, Noida, Dr. AK Bhatnagar, Petrotech Chair Professor, Department of Chemical Engineering, IIT Hauz Khas New Delhi, did not attend even a single meeting from the date of their nomination/re-nomination: Whereas Shri VK Sachdeva, Executive Director, The Sarswati Sugar Mills, Yamuna Nagar attended only one of the six meetings.

It was, therefore, proposed that those members who have not so far attended any or only one meeting of the Senate they will cease to be members of the Senate. In their places the following persons were recommended to be nominated on the Senate for the remaining period of three years i.e. upto 31.8.2008. from the date of approval of the Chairman, Board of Governors:

For the category of 3 Members from amongst educationists:

New names proposed for membership of the Senate	In place of :
Dr. R.L. Sharma, Professor in Civil Engineering, National Institute of Technology, Hamirpur (HP)	Dr. MP Kapoor, Y-8A, 1st Floor, Hauz Khas, New Delhi. 110 016.

For the category of 6 members for their special knowledge:

New names proposed for membership of the Senate	In place of
Dr. M.L. Kothari, Professor, Electrical Engineering Department, Indian Institute of Technology, Hauz Khas, New Delhi. 110 016	Prof. Sameresh Kar, (Retd. Professor, IIT Kanpur) House No. 501, IIT Campus Kanpur – 208016 (UP)
Shri S.P. Mahi, Chief Engineer-II Konkan Railway Corp. Ltd., Jyotipuram Road, Tirantha, Post Gram More, Riyasi, Distt. Udhampur (J&K) PIN 182311 Ph: 09419156944.	Shri V.K. Sachdeva, Executive Director, The Sarswati Sugar Mills, Yamuna Nagar 135001(Haryana)
Er. Mukesh Gulati, Sr. Cluster Development Adviser, United Nations Industrial Development Organization, USO House, USO Road 6, Special Institutional Area, New Delhi. 110 067. Ph: 011 – 26602885, 26602886.	Shri K.R. Sharma, (Former Professor and Head, Electrical Engg Department, IIT Kanpur) Vice-President, Samtel Colour Ltd., Ghaziabad. (UP)
Shri Adesh Gupta, Chief Executive Officer, Liberty Group of Industries, KARNAL.	Shri V.K. Raizada, Former Member Railway Board, Managing Director, IRWO, 58, Rail Vihar, Sector 33, NOIDA.
Dr. Ranjit Singh, Director, Netaji Subhash Institute of Technology, Azad Hind Fauz Marg, Sector 3, Dwarka, New Delhi.	Dr. A.K. Bhatnagar, Petrotech Chair Professor, Department of Chemical Engg., Indian Institute of Technology, Hauz Khas, New Delhi. 110 016

The matter is placed before the Senate to note the nominations of external members on the Senate as mentioned in column 1 of the above tables for the period from 18.5.2006 to 31.8.2008.

Item No.7.2 **To confirm the minutes of the 5th meeting of the Senate held on 14.01.2006.**

The minutes of the 5th meeting of the Senate held on 14.01.2006 were circulated to all the members. The minutes are enclosed as **Appendix I from Pages 4 to 19.**

NATIONAL INSTITUTE OF TECHNOLOGY
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Minutes of the 5th meeting of Senate, National Institute of Technology, Kurukshetra, held on 14th January, 2006 at 11.00 AM in the Board Room of the Institute.

The following were present:-

Members present:

1. Dr. M.N.Bandyopadhyay, In Chair
   Director,
   NIT, Kurukshetra.

2. Dr.Mrs.Renu Bhargava,
   Professor,
   Civil Engineering Department
   Indian Institute of Technology,
   Roorkee (UA).

3. Dr. Krishna Gopal,
   Professor, Elect. Engg. Deptt.
   and Dean (Planning & Development),
   NIT, Kurukshetra.

4. Dr. R K Bansal,
   Professor,
   Civil Engineering Department
   NIT, Kurukshetra.

5. Dr. T K Garg,
   Professor, Mech. Engg.Deptt.,
   and PTSW,
   NIT, Kurukshetra.

6. Dr. S P Jain,
   Professor,
   Electrical Engineering Department,
   NIT, Kurukshetra.

7. Dr. V K Arora,
   Professor,
   Civil Engineering Department
   NIT, Kurukshetra.

8. Dr. V K Sehgal,
Professor & Chairman,
Civil Engineering Department,
NIT, Kurukshetra.

9. Dr. S K Sharma,
Professor & Chairman,
Mechanical Engineering Department,
NIT, Kurukshetra.

10. Dr. K C Goyal,
Professor,
Mechanical Engineering Department,
NIT, Kurukshetra.

11. Dr. A K Gupta,
Professor,
Electronics & Communication Engg. Deptt.,
NIT, Kurukshetra.

12. Dr. K S Kasana,
Professor,
Mechanical Engineering Department,
& Dean(Academic),
NIT, Kurukshetra.

13. Dr. K B Singh,
Professor,
Humanities Department,
NIT, Kurukshetra.

14. Dr. A Swarup,
Professor & Chairman,
Electrical Engineering Department,
NIT, Kurukshetra.

15. Dr. S K Chakarvarti,
Professor & Chairman,
Physics Department
and Chief Warden,
NIT, Kurukshetra.

16. Dr. D V Singh,
Professor & Chairman,
Mathematics Department,
NIT, Kurukshetra.

17. Dr. Rajender Kumar,
Asstt. Professor & Chairman,
Department of Humanities,
NIT, Kurukshetra

18. Prof. Umesh Ghanekar,
Asstt. Professor & Chairman,
Electronics & Communication Engineering Department,
NIT, Kurukshetra.

19. Dr. Dinesh Kumar,
Assistant Professor & Chairman,
Chemistry Department,
NIT, Kurukshetra.

20. Prof. Mayank Dave,
Asstt. Professor & Chairman,
Computer Engineering Department,
NIT, Kurukshetra.

21. Dr. Baldev Setia,
Asstt. Professor, (Special Invitee)
Civil Engineering Department,
& Officer Incharge (Academic Affairs),
NIT, Kurukshetra

22 Sh. RPS Lohchab,
Registrar & Member Secretary,

The following members could not attend the meeting:-

1. Prof. C.V. Ramakrishnan,
Professor,
Department of Applied Mechanics,
Indian Institute of Technology,
New Delhi-110016.

2. Dr. M P Kapoor,
Y-8A, Ist Floor,
Hauz Khas,
New Delhi – 110 016

3. Prof. Sameresh Kar,
(Retired Professor, IIT Kanpur),
House No. 501,
IIT Campus,
Kanpur-208016 (UP).

4. Sh. Ravi Jaidka,
President,
Indian Sugar & Gen. Engg. Corporation,
Yamuna Nagar, Haryana

5. Er. V K Sachdeva,
Executive Director,
The Saraswati Sugar Mills,
Yamuna Nagar-135001. (Haryana).

6. Prof. K R Sharma,
(Former Prof. & Head, EE, IIT Kanpur),
Vice-President, Samtel Colour Ltd.,
Ghaziabad (UP).

Shri V K Raizada,
(Former Member Rly. Board),
Managing Director, IRWO,
58, Rail Vihar, Sector 33,
NOIDA (UP).

Dr. A K Bhatnagar,
205/7-A,
Faridabad-6 (Haryana)

9. Dr. R K Arora ,
Professor,
Electrical Engineering Department,
and Dean(Administration),
NIT, Kurukshetra.

10. Dr. M.K.Soni,
Professor,
Electrical Engineering Deptt.,
NIT, Kurukshetra

Through an intimation received from the P.S. of Sh. Ravi Jaidka, President, ISCEC, Yamuna Nagar, it was conveyed that Sh. Jaidka is away to Europe and hence will not be able to attend the meeting. Also, Prof.C.V. Ramakrishnan, Professor, Department of Applied Mechanics, Indian Institute of Technology, New Delhi-110016 had expressed his inability to attend the meeting due to his other pressing commitments.

Before the agenda items were taken up for discussion, the members of the Senate welcomed the new Director of the Institute and Chairman of the Senate Dr. M.N. Bandyopadhyay. The members also welcomed Dr. (Mrs.) Renu Bhargava, Professor, Civil Engineering Department, Indian Institute of Technology, Roorkee (UA) as external member of the Senate.

On the request of the Member-Secretary, the Senate took up the agenda item 5.22 for discussion at the outset. The Senate decided that Dr. Beldev Setia be invited to participate in the deliberations of the Senate as a Special Invitee. The Senate further decided that Dr. Setia will not have a voting right in the proceedings of the Senate, if any occasion arises, till he is otherwise eligible to have the voting right.

Item No. 5.1 To confirm the minutes of the 4th meeting of the Senate held on 5.02.2005

The Member-Secretary informed the Senate that the minutes of the 4th meeting had been circulated to the members and no comments had been received. However, the BOG in its 7th meeting held on 19.2.2005 (Item No. 7.28) while approving the minutes of the Senate had made certain observations. Those relevant to the present meeting of the Senate are as follows:

> *The Board felt that quality research work - leading to publication of papers in renowned Science Journals like "Nature" and "Science" or patents should be honoured. Also quality teaching at UG needs recognition.*
> *A comprehensive note on quality teaching and research/ development work and its recognition including award of one additional increment should be presented in the next Board meeting.*

The Senate members were of the view that the observations of the Board as in Para 1 above, should include the words 'technology' and 'National/International journals' and should read as follows:

> *The quality research work leading to publication of papers in renowned National and International Journals of Science and Technology and patents should be honoured. Also quality teaching at UG needs recognition.*

Regarding the para concerning the comprehensive note on quality teaching and research/development work and its recognition, a committee comprising of the following members was constituted:

1. Dr. Krishna Gopal — Prof. Electrical Engg. Deptt.
2. Dr. K S Kasana — Dean (Academic) (Covenor)
3. Dr. Mayank Dave — Asstt. Prof. and Chairman, Computer Engg. Deptt.

The minutes of the 4th meeting of the Senate held on 05.02.2005 were confirmed.

Item No. 5.2 To consider the 'Action Taken Report' (ATR) on the minutes of the 4th meeting of the Senate held on 5.02.2005

The Senate noted the 'Action Taken Report' on the minutes of the 4th meeting of the Senate held on 05.02.2005. The Senate, however, pointed out some typographic errors in the list of Ph.D. Scholars. The Officer Incharge (Academic Affairs) was asked to present the corrected list to the Chairman, Senate.

The Senate desired that follow up action on the observations made by the Board in its 6th meeting held on 30.09.2004 as indicated against the Senate agenda item 4.11 (i) be reported to the Senate in its next meeting.

Item No. 5.3 To consider modifications in the Grade Based Examination System (GBES)

The item had three paras which were deliberated upon and the following modifications were approved:

Sr. No.	Existing	Modification approved
1.	If a student gets "E" Grade in a subject, he/she can improve the grade only by re-appearing in the end-semester examinations. His/her sessional marks will remain the same as was earned in the first attempt. He/she will require a total of 40 marks including sessional & new end semester exam marks, to pass.	If a student gets 'E' Grade in a subject, he/she may be allowed to improve his/her grade, both in sessionals and end-semesters examinations. In sessionals, while there will be no change in the marks he/she has got for 'class work', he/she may be allowed to appear in the two tests/Viva-voce (20 marks each). Similarly for the subject of Practical /Seminar/Project, he/she will be allowed to improve upon his/her performance through teacher's evaluation during the semester. However, in such cases the maximum sessional marks be limited to 40%. **This will also be applicable to all old students of the GBES if their sessional marks are less than 40% . However, such**

		students will be permitted a maximum of two chances. The tests of such students will be conducted by the respective departments along with the test series of the regulars semesters.
2.	If a student gets 40% of the total in sessionals, it is not necessary for him to appear in the end-semester examination.	For a student to pass in a subject, a separate minimum of 40% has to be earned separately, both in sessionals and end-semester examination. **This will be implemented with effect from the examinations commencing May, 2006.**
3.	A 5 point grading system with a 25-marks range (75-100) for the 'A'(Excellent) grade.	The grading system be changed from 5-points to 7-points as shown in the Table 5.3.

Table 5.3

	Existing				**Amended**				
Sr. No.	**Marks Obtained and Grade**			**Category**	**Grade points**	**Marks obtained and Grade**			**Category**	**Grade points**
1	75 ≤	A	≤ 100	Excellent	10	85 ≤ (100)	A+	≤ 100	Excellent	10
2	65 ≤	B	< 75	Good	8	75 ≤ (85)	A	< 85	Very Good	9
3	50 ≤	C	< 65	Fair	6	65 ≤ (75)	B	< 75	Good	F
4	40 ≤	D	< 50	Poor	4	50 ≤ (65)	C	< 65	Average	6
5		E	< 40	Fail	2	40 ≤ (50)	D	< 50	Pass	4
6.	.....					20 ≤ (40)	E	< 40	Required to Improve	2
						[illegible]	F	< 20	Regret	0
						This will be implemented with effect from admissions commencing July, 2006.				

Item No. 5.4 To consider the starting of new M.Tech. courses in CAD/CAM, Transportation Engineering and Power Electronics and Drives under TEQIP

The matter was discussed at length and it was decided that the annual intake be amended as shown in Table 5.4 below:

Table 5.4

Department	Name of the Programme	Level	Proposed Annual Intake
Civil Engg.	Transportation Engineering	PG	10+5
Electrical Engg.	Power Electronics & Drives	PG	10+5
Computer Engg.	Computer Engg.	PG	10+5
Mechanical Engg.	CAD/CAM	PG	10+5

It was observed that the Annexures of the course/proposal submitted by various departments be reviewed by the respective Boards of Studies with reference to the following parameters:-

(i) Courses : Number, Relevance, Contents

(ii) Eligibility conditions for admissions : Students with engineering background only to be included.

The Senate approved the courses in principle and decided that the modified courses proposals be submitted directly to the Chairman, Senate for consideration and approval.

Item No. 5.5 To consider starting of an M.Tech. course in Environmental Engineering in Civil Engineering Department

The Senate approved the course in principle. However, it was observed that the Course proposal be reviewed by the Department Board of Studies and submitted to the Chairman, Senate for consideration and approval. The Senate observed that the matter also needs approval of the MHRD.

Item No. 5.6 To note the change in the allocation of Theory and Sessional marks

The Senate approved the weightage of Sessionals and End Semester Examination under Grade Based Examination System as per Table 5.6.

Table 5.6

Table 5.6		Amended Weightage
Theory Papers	**Sessionals** (two class tests of 15 marks each and 10 marks for teacher's assessment through class work)	40
	End Semester examination	60
Practicals	**Sessionals** (Two viva-voce of 15 marks each and 30 marks for teacher's assessment through lab record and lab performace).	60
	End Semester examination	40

Item No.5.7 To consider the modifications of the syllabi of the subject of Physics-I (PHT-105)

The Senate approved the modifications as proposed by the Department of Physics.

Further, the Senate advised that the syllabi should be presented in a standard format for consideration of the Senate in future. The standard format will be provided by the Dean (Academic).

Item No.5.8 To consider modifications in the syllabi of B.Tech. & M.Tech. Programmes of Mechanical Engineering

The Senate was of the opinion that Changes in the Scheme of B.Tech. Programme be routed through the Board of Studies of the Department, before being placed before the Senate for its consideration.

Item No. 5.9 To consider changes in the existing Scheme of B.Tech. (Civil Engineering)

The Senate was of the opinion that the Syllabi of B.Tech. and M.Tech. Programme in the standard format may be presented before the Senate in the next meeting for its consideration after having been duly reviewed by the Department B.O.S.

Item No. 5.10 To consider restructuring of courses in the Department of Humanities

The Senate approved the item as proposed in the agenda.

Item No. 5.11 To consider the proposal of change of name of the Department of Humanities

The Senate approved the item as proposed in the agenda.

Item No. 5.12 To consider the criteria for awarding Merit Scholarship to 26nos students yearwise

The Senate approved the proposal as contained in the agenda. However, Senate was of the opinion that the amount of scholarship be enhanced from Rs. 100/- to Rs. 1000/- per annum. The Academic Section would prepare an agenda item to be placed before the Finance Committee for its consideration and approval.

Item No. 5.13 To consider modifications in the present examination system.

The Senate discussed the issue and apprehending difficulties because of long duration of the Examination period, summer-training, survey-camp etc. decided to handover the matter to a committee comprising of the following members.

1.	Prof. Krishna Gopal	Dean (P&D)
2.	Prof. K S Kasana	Dean (Academic)
3.	Prof. D V Singh	(Controller of Examination)

The decision of the Committee in the matter will be final.

Item No. 5.14 To consider the departmentwise allocation of Ph. D. Scholarship through TEQIP.

The Senate approved the Ph.D. scholarships through TEQIP as mentioned in the agenda.

The Senate noted the allocation of 25 Scholarships from the Institute side as mentioned in the agenda.

Item No. 5.15 To consider the eligibility for getting admission to Ph.D. Programme and Scholarship

The decision under the agenda item 5.17.be referred to.

Item No. 5.16 To consider changes in the 'Panel of Examiners' for evaluation of Ph.D. thesis

The decision under the agenda item 5.17 be referred to.

Item No. 5.17 Regarding consolidating the information to be enshrined in the Ordinance of Studies for the Degree of Philosophy (Ph.D.) of our Institute.

A committee comprising of the following members was constituted to consolidate the information as proposed in the agenda.

1.	Prof. S.P. Jain, Professor	Elect. Engg. Deptt., (Chairman)
2.	Prof. K S. Kasana	Dean(Academic)
3.	Prof. S K Chakarvarti	Ex-Dean (Academic)

The Committee will also consider the proposals as contained in the agenda item 5.15 and 5.16.

Item No. 5.18 To consider constitution of a 'Standing Committee on Senate Affairs' and its working thereof

Senate constituted a 'Standing Committee on Senate Affairs' (SCSA) comprising of:

(i) All Deans
(ii) Chairman/Chairmen of concerned Department(s)
(iii) Three Senior-most professors of the Institute, not covered under (i) & (ii) above.

Item 5.19 To consider the scheduling of meetings of the Senate

The Senate decicied to hold regular meetings preferably in the months of February, May, August and November of each calendar year.

Item No. 5.20 To note the appointment of three members as educationists of repute and six other members for their special knowledge, as members on the senate, NIT, Kurukshetra, for a period of 3 years

The Senate noted the nominations of external members on the Senate as per details furnished in the agenda.

Senate was of the opinion that re-nominations of some external members who did not earlier attend any Senate meeting during their first tenure of three years may be reviewed by the Chairman, BOG.

Item No 5.21 To ratify the action taken by the Director and Chairman of the Senate for approving one expert nominee of the Senate on the Selection Committee for Faculty, non-teaching and scientific staff in the scale of post of Lecturer and above of NIT, Kurukshetra

The Senate ratified the action taken by the Chairman, Senate in recommending Dr. C V Ramakrishanan, Professor, Deptt. of Applied Mechanics, IIT, Delhi as Expert Member of the Senate on the Selection Committee for direct recruitment/promotion under CAS as well as nominee of the Senate for non-teaching and scientific staff in the scale of the post of Lecturer and above on establishment of the Institute.

The Senate, however, noted that the Chairman of the Department concerned will be a member on the Selection Committee for direct recruitment/promotion under CAS for the post for which selection/ promotion is being made is at least one step lower than the one occupied by the Chairman of the department.

Item No. 5.22 To consider inviting the Officer Incharge (Academic Affairs) in the Senate meetings.

The matter was discussed in the beginning of the meeting.

The Senate decided that Dr. Baldev Setia be invited to participate in the deliberations of the Senate as a Special Invitee. The Senate further decided that Dr. Setia will not have a voting right in the proceedings of the Senate, if any occasion arises, till he is otherwise eligible to have the voting right.

Item No. 5.23 Any other items with the permission of the Chair

1 Dr. Akhilesh Swarup, Professor, Electrical Engineering Department raised a point regarding 'Information Security Awareness' in education .

The Institute has entered Memorandum of understanding with Ministry of Communications and information Technology, Department of Information Technology, Electronics Niketan, C.G.O. Complex, New Delhi, for producing specialized manpower in the area of information Security. The components identified for our Institute under this programme are as under:-

Retrofitting in B.Tech. Curriculum

Resource Centres and Participating Institutes should offer two courses in Information security from the list of courses mentioned for M.Tech. in Information security. A minor project done in the area of information security may also be treated as equivalent to two theory courses.

Retrofitting of M.Tech.

Resource Centres and Participating Institutes should offer two courses in Information security from the list of courses mentioned for M.Tech. in information Security. In addition to this, students should do a minor project in the area of information security.

One semester Certificate Course in Information Security

2 week course Information Security

Details of Courses

M.Tech. in Information Security

10 courses and one graduate major project may be offered in M.Tech. in Information Security Curriculum program, with the following break up:

i. Minimum of three courses form Information Security
ii. Minimum of three course from Computer Science & Communications
iii. Minimum of two courses from Management
iv. Electives from related streams: Electronics, Communications, Nano-technology etc.

Note: The above are broad guidelines as each Institute/University may follow a different pattern; there is flexibility in adapting the basic requirements into the structure of the respective Institute / University appropriately.

The following is the suggested broad list of courses (they are by no means exhaustive):

Information Security Stream Courses

i) Introduction to Computer Security
ii) Security Engineering : Dependable Distributed Systems
iii) Mathematical Models for Internet
iv) Digital Defense: Issues in Security, and Critical Infrastructure Protection
v) Cryptography foundations, probabilistic proofs and pseudo randomness
vi) Intrusion Detection
vii) Game theory and its applications
viii) Public Key Infrastructure and Trust Management
ix) Mobile and Wireless Network Security
x) Optical Network Security
xi) Information Warfare
xii) Technical Foundations for E-Commerce
xiii) Biometric Security
xiv) Computer Crime Investigation and Forensics
xv) Financial Mathematics

II. Dr.V.K.Sehgal, Chairman and Professor, Civil Engineering Department and Dr. V.K.Arora , Professor , CED raised the following issues:

(a) External members on B.O.S. be paid honorarium for attending the meetings.
(b) The honorarium should be at par with external members attending meetings of B.O.G., Senate, F.C. etc.
(c) M.Tech. examiners should be treated as Institute Guests.
(d) M.Tech. examiners' honorarium (Evaluation fee) to be enhanced.

For all these points the Chairman, Senate suggested that a proposal be sent to the Director for his consideration.

III Dr. T. K. Garg, Professor, Training & Placement, raised the issue of condoning the attendance of 7th & 8th semester students appearing in campus interviews for placement.

The matter was to taken up by the Standing Committee on Senate Affairs (SCSA).

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

RPS Lohchab

(R P S Lohchab)
Registrar & Member-Secretary

Approved

-Sd-
(M.N.Bandyopadhyay)
Director of the Institute
& Chairman, Senate

Item No.7.3 **To confirm the minutes of the 6th meeting of the Senate held on 16.03.2006.**

The minutes of the 6th meeting of the Senate held on 16.03.2006 were circulated to all the members. The minutes are enclosed as **Appendix II from Pages 21 to 29.**

NATIONAL INSTITUTE OF TECHNOLOGY
(DEEMED UNIVERSITY)
KURUKSHETRA-136119

Minutes of the 6th meeting of Senate, National Institute of Technology, Kurukshetra, held on 16th March, 2006 at 11.00 AM in the Senate Hall of the Institute.

The following were present:-

Members present:

1. Dr. M.N.Bandyopadhyay — In Chair
Director,
NIT, Kurukshetra.

2. Prof. C.V. Ramakrishnan
Professor,
Department of Applied Mechanics,
Indian Institute of Technology,
New Delhi-110016.

3. Sh. Ravi Jaidka
President,
Indian Sugar & Gen. Engg. Corporation,
Yamuna Nagar, Haryana

4. Dr. Krishna Gopal
Professor, Elect. Engg. Deptt.
and Dean (Planning & Development),
NIT, Kurukshetra.

5 Dr. R.K. Bansal
Professor,
Civil Engineering Department
NIT, Kurukshetra.

6. Dr. T. K. Garg
Professor, Mech. Engg.Deptt.,
and PTSW,
NIT, Kurukshetra.

7. Dr. M. K. Soni
Professor,
Electrical Engineering Department,
NIT, Kurukshetra

8. Dr. S. P. Jain
Professor,
Electrical Engineering Department,
NIT, Kurukshetra.

9. Dr. V. K. Sehgal
Professor & Chairman,
Civil Engineering Department,
NIT, Kurukshetra.

10. Dr. S. K. Sharma
Professor & Chairman,
Mechanical Engineering Department,
NIT, Kurukshetra.

11. Dr. K. C. Goyal
Professor,
Mechanical Engineering Department,
NIT, Kurukshetra.

12. Dr. A. K. Gupta
Professor,
Electronics & Communication Engg. Deptt.,
NIT, Kurukshetra.

13. Dr. K. S. Kasana
Professor,
Mechanical Engineering Department,
& Dean (Academic),
NIT, Kurukshetra.

14. Dr. K. B. Singh
Professor,
Humanities Department,
NIT, Kurukshetra.

15. Dr. A. Swarup
Professor & Chairman,
Electrical Engineering Department,
NIT, Kurukshetra.

16. Dr. S. K. Chakarvarti
Professor & Chairman,
Physics Department
NIT, Kurukshetra.

17. Dr. D. V. Singh
Professor & Chairman,
Mathematics Department,
NIT, Kurukshetra

18. Dr. M. L. Garg
Professor,
Mathematics Department,
NIT, Kurukshetra

19. Dr. S. S. Rattan
Professor & COE,
Mechanical Engineering Deptt.,
NIT, Kurukshetra.

20. Dr. K. S. Sandhu
Professor,
Electrical Engineering Deptt.,
NIT, Kurukshetra.

21. Dr. Sudhir Kumar
Professor,
Mechanical Engineering Deptt.,
NIT, Kurukshetra.

22. Dr. Rajender Kumar
Professor & Chairman,
Department of Humanities,
NIT, Kurukshetra

23. Dr. Brahamjit Singh
Professor,
Electronics & Comm. Engg. Department
NIT, Kurukshetra

24. Prof. Umesh Ghanekar
Asstt. Professor & Chairman,
Electronics & Communication Engg.Department,
NIT, Kurukshetra.

25 Dr. Dinesh Kumar
Assistant Professor & Chairman,
Chemistry Department,
NIT, Kurukshetra.

RK

26. Prof. Mayank Dave
Asstt. Professor & Chairman,
Computer Engineering Department,
NIT, Kurukshetra.

27 Dr. Baldev Setia (Special Invitee)
Asstt. Professor,
Civil Engineering Department,
& Officer Incharge (Academic Affairs),
NIT, Kurukshetra

28. Sh. R. P. S. Lohchab
Registrar & Member Secretary

The following members could not attend the meeting:-

1. Dr.(Mrs.) Renu Bhargava
Professor,
Civil Engineering Department
Indian Institute of Technology,
Roorkee (UA).

2. Dr. M. P. Kapoor
Y-8A, Ist Floor,
Hauz Khas,
New Delhi – 110 016

3. Prof. Sameresh Kar
(Retired Professor, IIT Kanpur),
House No. 501,
IIT Campus,
Kanpur-208016 (UP).

4. Er. V. K. Sachdeva
Executive Director,
The Saraswati Sugar Mills,
Yamuna Nagar-135001. (Haryana).

5. Prof. K. R. Sharma,
(Former Prof. & Head, EE, IIT Kanpur),
Vice-President, Samtel Colour Ltd.,
Ghaziabad (UP).

6. Shri V. K. Raizada
(Former Member Rly. Board),
Managing Director, IRWO,
58, Rail Vihar, Sector 33,
Noida (UP)

7. Dr. A. K. Bhatnagar
205/7-A,
Faridabad-6 (Haryana)

8. Dr. V. K. Arora
Professor,
Civil Engineering Department
NIT, Kurukshetra.

9. Dr. Kuldeep Kumar
Professor,
Mathematics department,
NIT, Kurukshetra.

Before the Agenda Items were taken up for discussion, Sh. R.P.S. Lohchab, the Member-Secretary welcomed the members, especially the external members namely Sh. Ravi Jaidka, President, ISGEC, Yamuna Nagar, Professor C.V. Ramakrishnan, Professor, Department of Applied Mechanics, Indian Institute of Technology, New Delhi and the new members of the Senate.

Item No. 6.1 To report the proceedings of the first meeting of the Standing Committee on the Senate Affairs

The Registrar and Member-Secretary intimated the house that actions taken on the minutes of 5th Senate meeting held on 14th January, 2006 will be reported to the Senate in its next meeting.

First meeting of the Standing Committee on Senate Affairs (SCSA) was held on 21.02.2006 in the Board Room of the Institute under the Chairmanship of the Director in connection with the 3rd Convocation to be held on 18th March, 2006.

The minutes of the meeting (SCSA) were circulated by the Dean (Academic) on 22nd February, 2006 copy of which had been appended alongwith the Agenda Item.

Senate approved the said minutes.

Item No. 6.2 **To consider approval for students to be awarded degrees on the 3rd Convocation scheduled to be held on 18th March, 2006.**

The detailed list of qualified graduates was supplied by the Controller of Examinations, which had been circulated to the members as part of the agenda items.

Alongwith this Item, two supplementary items 6.2(a) and 6.2(b) were also considered for the award of degrees to one B.Tech. and one M.Tech. student.

Thus the Senate approved the award of Degrees to the following No. of students.

Bachelor of Technology

S.No.	Discipline	Number
1.	Civil Engg.	47
2.	Computer Engg.	29
3.	Electrical Engg.	75
4.	Electronics & Comm. Engg.	63
5.	Mechanical Engg.	84
	Total	**298**

Master of Technology

S.No.	Discipline	Number
1.	**Civil Engg.**	
	Soil Mechanic & Foundation	05
	Structural Engg.	03
	Water Resources Engg.	01
2.	**Electrical Engg.**	
	Power System	06
	Control System	08
3.	**Electronics & Comm. Engg.**	15
4.	**Instrumentation**	06
5.	**Mechanical Engg.**	09
	Total	**53**

RK

Item 6.3 **To consider the approval for the students to be awarded Medal/Certificates in the 3rd Convocation scheduled to be held on 18th March, 2006.**

Following Medals and Academic Prizes were recommended for the students of B.Tech. for the year 2004-2005.

Medals for Branchwise-toppers

Computer Engg.	–	Rahul Rajwanshi, Roll No. 2K1-140
ECE Engg.	-	Anupam Parashar, Roll No. 2K1-036
Mechanical Engg.	-	Deepak Kr.Goel, Roll No. 2K1-143
Electrical Engg.	-	Pradeep Kumar, Roll No. 2K1-223
Civil Engg.	-	Vikas Boora, Roll No. 2K1-270

Medal for Best All-round Student

Pradeep Kumar, Roll No. 2K1-223

Sh. Shyam Sunder Dhingra Medal

Pradeep Kumar, Roll No. 2K1-223

Dr. R. P. Singh Medal

2nd year Mechanical – Sameer Mithal, Roll No. 101/03

3rd year Mecahnical – Savin Bansal, Roll No. 2K2-172

Major Project

Sr. No.	Roll No.	Name of Students	Branch	Highest Marks
1	2K1018	Goyal Sandeep	Computer Engineering	238/250
2.	2K1077	Abhinay Vishnoi	Electronics & Comm.Engg.	91/100
3.	2K1154	Lathkar Onkar Sunil	Mechanical Engineering	160/175
4.	2K1168	Anuj Jindal	Mechanical Engineering	160/175
5.	2K1195	Wani Mohit Gopal	Electrical Engineering	109/125
6.	2K1223	Pradeep Kumar	Electrical Engineering	109/125
7.	2K1243	Sunny Bhardwaj	Civil Engineering	138/150
8.	2K1303	Ankit Goyal	Civil Engineering	138/150

Academic Prizes:-

Sr. No.	Roll No.	Name of Students	Branch	Semester SGPA
1.	267/04	Robin Bansal	--	1st
2.	08/04	Rohit Bhat	--	2nd
3.	23/03	Alok	CO	3rd
4.	88/03	Mahima Vashisht	EC	3rd
5.	101/03	Sameer Mithal	M	3rd
6.	202/03	Shilpi Garg	E	3rd
7.	287/03	Vishal Garg	C	3rd
8.	30/03	Rishab Sharma	CO	4th
9.	39/03	Abhishek Kr Chaterwedi	EC	4th
10.	107/03	Aneesh Aggarwal	M	4th
11.	224/03	Nitish Wadhwa	E	4th
12.	273/03	Rakesh Swain	C	4th
13.	2K2021	Chandan Aggarwal	CO	5th
14.	2K2042	Kapil Kumar	EC	5th
15.	2K2172	Savin Bansal	M	5th
16.	2K2237	Mayank Kansal	E	5th
17.	2K2260	Himanshu	C	5th
18.	2K2021	Chandan Aggarwal	CO	6th
19.	2K2067	Sahil Khurana	EC	6th
20.	2K2172	Savin Bansal	M	6th
21.	2K2230	Aastha Bansal	E	6th
22.	2K2293	Mayank Gupta	C	6th
23.	2K1140	Rahul Rajwanshi	CO	7th
24.	2K1046	Rohit Bhardwaj	EC	7th
25.	2K1107	Nalin Sethi	M	7th
26.	2K1223	Pradeep Kumar	E	7th
27.	2K1270	Vikas Boora	C	7th
28.	2K1010	Mrityunjay Kumar	CO	8th
29.	2K1157	Nitin Sharma	EC	8th
30.	2K1102	Vinay Mehta	M	8th
31.	2K1223	Pradeep Kumar	E	8th
32.	2K1270	Vikas Boora	C	8th

The Senate approved the names of the Medals and Academic Prizes winners.

RK

Item No. 6.4 **Regarding Item No. 5.3 and 5.6 of 5the meeting of the Senate held on 14.1.2006.**

Item 5.3. To consider modifications in the Grade Based Examination System (GBES)

Item 5.6 To note the change in the allocation of Theory & Sessional marks

In light of the emergent nature of Item No. 5.3 (para 1), the Senate authorized the Chairman, Senate to take appropriate steps through Standing Committee on the Senate Affairs (SCSA).

The other points of the Item No. 5.3 (para 2 & 3) and Item No. 5.6 were deferred for next meeting of the Senate.

General observations:

Some observations regarding the presentation of data in the Agenda Item of the Senate Meetings were made. It was suggested that the data should be in a better presentable form.

The meeting ended with thanks to the Chair.

R P S Lohchab

(R P S Lohchab)
Registrar & Member Secretary

Approved

Sd/-
(B N Bandyopadhyay)
Director & Chairman, Senate

Item No. 7.4 To consider the Action Taken Report on the minutes of the 5th Meeting of the Senate held on 14.01.2006.

The Action Taken Report on the minutes of the 5th meeting is as under:-

Item No.	Minutes	Action Taken
5.3	**To consider modifications in the Grade Based Examination System (GBES).**	The matter was notified for implementation but was withdrawn under certain circumstances for review. Later on, in accordance with the decision taken in the 6th meeting of the Senate, the urgent part of the item was discussed in the SCSA and implemented. The other parts were deferred for the 7th meeting and are being placed at item no. 7.12 for discussion.
5.4	**To consider the starting of new M.Tech. Courses in CAD/CAM, Transportation Engineering and Power Electronics Drives under TEQIP.**	The scheme routed through the respective Board of Studies (BOS) has been read by the Chairman, Senate for further action.
5.5	**To consider starting of an M.Tech. course in Environmental Engineering in Civil Engineering Department.**	The modified scheme duly approved by the Department Board of Studies is being taken up for necessary action. The item is being included in the present agenda at Item No. 7.19.
5.6	**To note the change in the allocation of Theory and Sessional marks.**	Approved to be implemented w.e.f. admissions commencing 2006-07.
5.7	**To consider the modifications of the syllabi of the subject of Physics-I (PHT-105).**	Implemented
5.8	**To consider modifications in the syllabi of B.Tech. & M.Tech. Programmes of Mechanical Engineering.**	Implemented

5.9	**To consider changes in the existing Scheme of B.Tech. (Civil Engineering).**	No follow up action received from the Department.
5.10	**To consider restructuring of courses in the Department of Humanities.**	Implemented
5.11	**To consider the proposal of change of name of the Department of Humanities.**	Implemented
5.12	**To consider the criteria for awarding Merit Scholarship to 26 nos. students year wise.**	The Finance Committee had simultaneously proposed a reduced number of scholarships. The matter was discussed with the Director and sent for review by the Finance Committee.
5.13	**To consider modifications in the present Examination system.**	The matter had been referred to a Committee. The Committee has submitted its report which is being discussed under item No. 7.17.
5.14	**To consider the departmentwise allocation of Ph. D. Scholarship through TEQIP.**	Noted for implementation.
5.15	**To consider the eligibility for getting admission to Ph.D. Programme and Scholarship.**	The matter had been referred to a Committee. The Committee has submitted its report which is being placed under item No. 7.7 for discussion.
5.16	**To consider changes in the 'Panel of Examiners' for evaluation of Ph.D. thesis.**	
5.17	**Regarding consolidating the information to be enshrined in the Ordinance of Studies for the Degree of Philosophy (Ph.D.) of our Institute.**	
5.18	**To consider constitution of a 'Standing Committee on Senate Affairs' and its working thereof.**	Implemented. The Committee has started functioning and three meetings have been held this year.

5.19	**To consider the scheduling of meetings of the Senate.**	Implemented
5.23	**Any other item with the permission of Chair:**	
(i)	**Introduction of 'Information Security Awareness' at B.Tech. and M.Tech. level (Ref.: Point raised by Dr. A. Swaroop, Professor Electrical Engineering Department).**	Implemented in the Department of Electrical Engineering (Report of Chairman, Electrical Engineering Department attached at **Annexure 1 (page 33).**
(ii)	**Regarding Honorarium for external members of Board of Studies (BOS) etc. (Points raised by Dr. V. K. Sehgal, Professor, Civil Engineering and Dr. V. K. Arora, Professor, Civil Engineering Department.**	Reported to concerned authorities for necessary action.
(iii)	**Regarding condoning the attendance of 7th and 8th semester students appearing in campus interviews (points raised by Dr.T. K. Garg, Prof. Incharge (Training and Placement).**	Discussed in the Senate Committee on Senate Affairs (SCSA) and approved.

Annexure-I

Reference No. R/Senate 7th /30 dated 29.05.06

Action taken report on agenda item 5.23-

Retrofitting of Information Security Courses in MTech Programmes:

A course ' Information Security' , and a course 'Cryptography' have been retrofitted in MTech Programmes of the Dept as approved in the BOS meeting held on 13.02.06.

Retrofitting of Information Security Courses in BTech Programme:

A minor project course on information security has been retrofitted in BTech final year as approved in the BOS meeting held on 13.02.06.

This is for your kind information and further necessary action.

(SP Jain)
Chairman

Item 7.5 To consider the Action Taken Report on the minutes of the 6th Meeting of the Senate held on 5.02.2006.

The Action Taken Report on the minutes of the last meeting is as under:

Item No.	Minutes	Action Taken
6.2	**To consider approval for students to be awarded degrees on the 3rd Convocation scheduled to be held on 18th March, 2006.**	Degrees for 298 undergraduates and 53 Postgraduates students were approved. The convocation was held on 18th March, 2006 during which 190 degree certificates for B.Tech. and 38 degree certificates for M.Tech. were conferred in person and the remaining in absentia.
6.3	**To consider the approval for the students to be awarded Medal/Certificates on the 3rd Convocation scheduled to be held on 18th March, 2006.**	The Medals and merits certificates were awarded as approved.
6.4	**Regarding Item No. 5.3 and 5.6 of 5th meeting of the Senate held on 14.1.2006.**	As approved, the Chairman Senate discussed the matter before the SCSA and appropriate measures were taken. The matter is being reported at Item No. 7.12 for discussion.

Item No. 7.6 **To report the agenda and Minutes of 2nd and 3rd meetings of SCSA.**

The 2nd meeting of the SCSA was held on 22.03.2006 to discuss the issue of improvement of sessional marks of students. The discussion on the issue had been necessitated following the difficulty being faced by a number of students whose sessional marks had been overly low. According to the then existing regulations, a student is required to have 40% marks to pass a particular course. Though opportunity for appearing at the end semester examination is given more than once, a chance to appear for the mid semester examinations (class tests) is limited to only one. Acting on the representation of the students, the Director appointed a committee comprising of the following to look into this aspect.

Dr. K S Kasana, Dean (Academic) In Chair
Dr. D V Singh (Outgoing COE)
Dr. S S Rattan (COE)
Dr. Baldev Setia (Officer Incharge Academic Affairs)

Students of 3rd year (3 from each branch) and 2nd year (2 from each branch) attended the meeting. Names of the students had been forwarded by their respective Chairmen of the Departments in accordance with the format – **one** topper (2 Nos.), one affected (2 Nos.) and one more (1 No.) randomly.

Minutes of this meeting were conveyed to the SCSA.

Based on these minutes the SCSA held long deliberations and arrived at the following decisions:

(i) Students should allowed to improve their sessional marks through class tests.

(ii) A minimum of two chances be given for improving i.e. one with the regular batch and one more when that particular semester is in progress i.e. odd with odd and even with even.

(iii) As a one-time special measure, for this running semester (Even 2005-06), class-tests should be held for all subjects of 1st to 5th semester, alongwith the remaining two test series (Details and notification on page 39)

Regarding relaxation in attendance of 7th and 8th semester. The proposal was to reduce the number of contact hours so that the students 7th & 8th semesters are left with more time for preparation of competitive examinations, higher and allied studies and campus placements. It was decided that lecture classes of these two semesters will be held first during the day and tutorials would be scheduled for later part of the day. During the tutorials, the faculty members would be available for teaching/counseling on the subject but it would not be mandatory for the students to attend these classes.

The Senate may kindly note.

NOTIFICATION:

Keeping in view, the problems faced by some students of Grade Based Examination System (GBES) from the last about two years, the Chairman of the Senate conducted a meeting of Standing Committee on Senate Affairs (SCSA) on 22nd March, 2006 and made the modifications in undergraduate ordinance as followings:

> **"The students having 'E' Grade and less than 40% marks in the sessionals will be allowed to improve their sessional marks to maximum of 40% through regular class test series. Such students will be allowed to avail of one extra chance to improve the sessional marks. (Thus, a student gets practically two chances; one with his/her regular batch when he/she is attending the classes and subsequently one later, when that semester is in progress i.e. odd with odd and even with even). If such student with Grade 'E' improve their grade either 'D' or 'C' (i.e. sum of new sessional marks and highest marks in the end semester exams. which he/she earned upto the declaration of this result) will not be allowed to appear in the end semester examination for improving the Grade. Despite this extra chance and regular end-semester examination if he/she is unable to clear a particular subject, than he/she has to repeat the subject."**

However as a one-time measure, the Standing Committee on Senate Affairs (SCSA) allowed one special chance for all students (having 'E' Grade and less than 40% marks in the sessionals) of odd as well as even semester to improve their sessionals to a maximum of 40% for 1st to 5th Semester through the remaining two test – series of this even semester (2005-06). The subjectwise lists of such students supplied by the Controller of Examinations have been sent to the various Departments. ***No student other than those in the lists should be allowed to appear in these tests.*** If Roll Nos. of any student of GBES with ***'E' Grade and less than 40% marks*** is not in these lists, he/she should contact the Controller of Examinations and the Academic Section latest by 28.03.2006.

Dean (Academic)

The Senate may kindly note the decision of the SCSA which had been implemented during the even semester of 2005-06.

The 3rd meeting of the Standing Committee on Senate Affairs (SCSA) was held on 1.05.2006 at 3:30 PM in the Committee Room of the Institute to discuss the following issues:

1. Mercy additional chances to old students (1994, 96 & 97 batch)
2. Academic Calendar for the Session 2006-07
3. Any other Item.

Minutes of the meeting are as follows:

Item No. 1 Mercy additional chances to old students (1994, 96 & 97 batch)

The following students who could not complete their B.Tech. Degree Course within a maximum period of eight years had requested vide their applications dated 24.11.2005, 25.11.2005, 13.12.2005, 14.12.2005 and 14.2.2006 for an additional/mercy chance to enable them to complete the B.Tech. Degree Course (Old Scheme).

S.No.	Roll No.	Name
1.	94148	Deepak Chaudhary (Mech.)
2.	96255	Ram Singh (Civil)
3.	97176	Parminder Pal (Electrical)
4.	97915	Manish Gaur (Computer)
5.	97228	Lalit Baggan(Electrical)

The matter was discussed and in light of the ordinance, which reads as follows;

> **'A candidate who fails to pass the B.Tech. Examination within a period of eight years from the date of his admission to the course shall be deemed to be unfit for the Bachelor of Technology Course'**

the requests were declined.

Item No. 2 Academic Calendar for the Session 2006-07.

Academic calendar for the session 2006-07 as presented by the Dean Academic was discussed and finalized. Copy of the same is being placed at **Annexure-II (Page 40 to 41)**

Item No. 3 Any other Item

Regarding sliding of branch of a first year student.

A specific case of sliding of branch of a student was presented by Dean(Academic). A committee was constituted to look into the matter and report to the Chairman, Senate.

The Senate may kindly note.

Annexure-II

ODD SEMESTER JULY, 2006 to DECEMBER, 2006

1.	Registration	17 & 18 July 2006 (Monday & Tuesday)
2.	Classes begin	19.7.2006 (Wednesday)
3.	Last Date for late registration with late fee of Rs. 250/- with the permission of Director/Dean (Academic)	24.7.2006 (Monday)
4.	Mid-Semester Exam.-I	31.08.2006 to 02.09.2006 (Thursday to Saturday)
5.	Mid Semester Vacation	30.09.2006(Saturday) to 8.10.2006 (Sunday)
6.	Mid-Semester Exam-II	16.10.2006 to 18.10.2006 (Monday to Wednesday)
7.	Mid-Semester Exam.-III	May be arranged by the teachers as per their convenience
8.	End of Teaching	17.11.2006 (Friday)
9.	Convocation	November, 2006 (**Date will be notified later**)
10.	End Semester Exams. begin	27.11.2006 (Monday)
11.	Winter Vacation	11.12.2006 to 22.12.2006 (Monday to Friday)
12.	Showing of Answer book to students	26.12.2006 to 27.12.2006 (Tuesday to Wednesday)
13.	Declaration of Result	28.12.2006 (Thursday)

EVEN SEMESTER DECEMBER, 2006 to MAY , 2007

1.	Registration	29.12.2006 to 31.12.2006 (Friday to Sunday)
2.	Classes begin	01.01.2007 (Monday)
3.	Last Date for late registration with late fee of Rs. 250/- with the permission of Director/ Dean (Academic)	08.01.2007 (Monday)
4.	Athletic Meet	02.02.2007 to 04.02.2007 (Friday to Sunday)
5.	Mid-Semester Exam.-I	12.02.2007 to 14.02.2007 (Monday to Wednesday)
6.	Confluence-2007	23.02.2007 to 25.02.2007 (Friday to Sunday)
7.	Mid Semester Vacation	03.03.2007 to 11.03.2007 (Saturday to Sunday)
8.	Mid-Semester Exam-II	22.03.2007 to 24.03.2007 (Thursday to Saturday)
9.	Mid-Semester Exam.-III	May be arranged by the teachers as per their convenience
10.	Literati-2007	06.04.2007 to 08.04.2007 (Friday to Sunday)
11.	End of Teaching	27.04.2007 (Friday)
12	End Semester Exams. begin	07.05.2007 (Monday)
13.	Showing of Answer book to students	17.5.2007 and 18.5.2007 (Thursday and Friday)
14.	Summer Vacation	21.5.2007 (Monday) to 06.07.2007 (Friday)
15.	Practical Training Starts	23.05.2007 (Wednesday)
16.	B.Tech. Final year Result	21.05.2007 (Monday)

Sd._____
Dean (Academic)

CALENDAR FOR SESSION 2006-2007

JULY-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

AUGUST-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SEPTEMBER-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

NOVEMBER-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

DECEMBER-2006						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JANUARY-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

MARCH-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JUNE-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JULY-2007						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Item No. 7.7 To consider the eligibility for admission to Ph.D. Programme, Scholarships, changes in the 'Panel of Examiners' for evaluation of Ph.D. thesis and Ordinance of Ph.D. (Ref. Item No. 5.15 , 5.16 & 5.17).

The items were originally placed for discussion in the 5th meeting of Senate vide item No. 5.15, 5.16 & 5.17. After deliberations, a committee was constituted of the following to look into the finer points of the items and propose the appropriate recommendations:

1.	Dr. S. P. Jain	Chairman
2.	Dr. K. S. Kasana	Member
3.	Dr. S. K. Chakarvarti	Member

A number of meetings were held to discuss the issues. During the meetings Dr. Baldev Setia, Professor Incharge (Academics) was included as special invitee.

The committee has prepared its report which is being presented in **Annexure-III (pages-43-47).**

The Senate may kindly consider, discuss and approve the recommendations.

The following are the proposed amendments of the committee constituted vide item nos. 5.15 , 5.16 and 5.17.

Item No. 5.15 To consider the eligibility for getting admission to Ph.D. Programme and Scholarship

	Existing		Proposed Amendment
1.	**R 3.1. Educational Qualifications:** An applicant possessing the following qualifications in appropriate areas shall be eligible to apply for admission for Ph.D. Programmes of the Institute. Master's degree in an appropriate discipline or equivalent with a minimum Cumulative Grade Point Average (CGPA) of 6.75 on a 10 point scale or equivalent as determined by the Institute wherever Letter Grades are awarded; or 60% marks in aggregate (of all the years/semesters) where marks are awarded.	1.	**R-3.1 Educational Qualifications:** An applicant possessing the following qualification shall be eligible for admission to a Ph.D. Programme of the Institute. i) Engineering Stream- (a) Master's degree (M.Tech/M.E/M.S.) in appropriate discipline, or equivalent, with a minimum of 65% marks in aggregate (of all the years/semesters of the course), or equivalent CGPA. (b) Bachelor's degree (B.Tech. /B.E.) in appropriate discipline, or equivalent, with a minimum of 90% marks in aggregate (of all the years/semesters of the course), or equivalent CGPA. Such a candidate has to compulsorily clear at least four theory courses of M. Tech. in relevant discipline, as decided by the DRC. (c) Bachelor's degree (B.Tech./B.E.) in appropriate discipline, or equivalent, with a minimum of 70% marks in aggregate (of all the years/semesters of the course), or equivalent CGPA, and a minimum of 15 years of regular service in Govt Organizations or teaching Institutes of degree level. For registering in an Engineering Department, the applicant must have at least one degree (Bachelor's, or Master's) in the appropriate engineering discipline. ii) Sciences/Mathematics Stream- (a) Master degree (M.Sc. /M.A.) in the

			appropriate discipline, or equivalent, with a minimum of 65% marks in aggregate (of all the years/semesters of the course), or equivalent CGPA. (b) Humanities & Social Sciences Stream- Master degree (M.A.) in the appropriate discipline, or equivalent, with a minimum of 60% marks in aggregate (of all the years/semesters of the course), or equivalent CGPA.
2.	**Scholarship:** Only the candidates passing through Graduate Aptitude Tests in Engineering (GATE) are eligible for Government scholarship. In 2002, the MHRD has raised the scholarship amount to Rs. 7000/- per month for M. Tech. Degree holders and Rs. 6000/- per month for B. Tech./ M. Sc. Degree holders, with increment of Rs. 500/- per annum. There shall be a contingency grant of Rs. 10,000/- per annum. Ph.D. Scholars should do around 8 to10 hours of teaching per week.	2.	**R-3.4 Eligibility for Institute Scholarship** Only full-time Ph.D. research scholars are eligible for the award of the Institute scholarship. A candidate/scholar is required to apply for scholarship. In a particular department, scholarships will be awarded only if these are available in that department. (a) In Engineering Stream, scholarship to those scholars who have a Master's degree will be awarded first to GATE- qualified scholars on the basis of the GATE score merit list, then to the non-GATE scholars on the basis of their Master's degree score merit list. (b) Scholarship to those scholars who are only B.Tech/B.E. or equivalent, will be awarded first to such scholars who have a valid GATE score card, and then to the non-GATE- scholars. (c) In Sciences/ Mathematics, and Humanities & Social Sciences Streams, only those scholars who are M. Phil., or have cleared relevant national level tests like NET conducted by UGC, CSIR, ICAR and possess a valid score card, are eligible. However, preference will be given first to M.Phil. scholars. (d) In case no eligible candidate as defined above is available for the award of the

			scholarship, the Director, on the recommendation of the Chairman of the concerned Deptt. and the DAc may award the scholarship to the scholars at his discretion. The scholarship amount* will be as under- M.Tech/M.E/M.S. or equivalent, and M.Phil: Rs 9500/- p.m. Only B.Tech/B.E, or equivalent, and only M.A./M.Sc., or equivalent : Rs 8000/- p.m. There shall be an annual increment of Rs 1000/-. An annual contingency grant of Rs. 10,000/- per full-time scholar, and of Rs. 5000/- per part-time scholar will be allocated to the concerned Department. * Subject to the approval of MHRD. Those who are awarded scholarship from any other source will not be eligible for Institute scholarship/scholarship. The scholarship can be awarded for at the most three years. In case the semester research progress is unsatisfactory, the scholarship/scholarship shall be discontinued. A Ph.D. research scholar receiving scholarship is required to devote at least eight hours per week towards the departmental or Institute work assigned to him/her by the chairman/Director. A scholar will be required to furnish a bond of Rs 1 lac and bring surety from two responsible persons before his scholarship can be released. The bond amount will be forefeited in case the scholar does not complete all the requirements of Ph.D. degree as per the regulations, or leaves without completing his Ph.D. The above rules will be implemented wef 2006-07 admissions.

3.	Last date of submission of application is 31st August and 31st January		Last date of submission of application is 31st May and 30th November of every calendar year.

Item 5.16 To consider changes in the 'Panel of Examiners' for evaluation of Ph.D. thesis.

Existing (Ordinance and Regulations for the Degree of Doctor of Philosophy, NIT, Kurukshetra)	Proposed modification
R.11.3 Panel of Examiners: A panel of at least ten external experts in the area of the Ph.D. thesis would be suggested by the Supervisor(s) and recommended by the DRC while forwarding the title and synopsis of the thesis. The panel so recommended may include the examiners from outside India. The recommended panel will be considered and approved by BOS.	**R-11.3 Panel of Examiners** A panel of at least ten external experts, including foreign experts, and the authors of the recent papers in the references cited by the scholar in the area of his Ph.D. work would be suggested to the DRC by the Supervisor(s). The DRC will consider the suggested panel and will finally recommend to the BOS a panel of ten examiners which will include at least three examiners from outside India, from advanced/developed countries and the rest from India, preferably from the IITs/Institutes of repute. The recommended panel will be considered and approved /modified by BOS.
R. 12 Board of Examiners On receipt of the title and synopsis of the thesis, the Director will appoint a Board of Examiners for each candidate from the list approved by the BOS. The Board will consist of one internal examiner, normally the	**R-12 Board of Examiners** On receipt of the title and synopsis of the thesis, the Director will appoint a Board of Examiners for each candidate from the list approved by the BOS. The Board of examiners will consist of one internal examiner, normally the supervisor as recommended by DRC, and two external examiners, out of which one

Supervisor as recommended by DRC & BOS and two external examiners, who shall be experts in the subject of the thesis. These external examiners shall be chosen normally form the panel of examiners recommended and approved by the DRC and BOS as aforesaid. A person working in the same laboratory (ies)/ Institution(s) where Research Candidate is employed cannot, however, be appointed as External Examiner for evaluating the Thesis of that Research Candidate. Further no person can be appointed as External Examiner from Laboratory/Institution to which the Co-Supervisor (s) of the Research candidate belongs.	**would be from within India, and the other from abroad.** These external examiners shall be chosen normally form the panel of examiners recommended by the BOS as aforesaid. A person working in the same organization(s)/ institute(s) where the research scholar is employed cannot, however, be appointed as External Examiner for that research scholar. Further, no person can be appointed as External Examiner from an Organization/Institute to which the Co-Supervisor (s) of the research scholar belongs. For evaluating the thesis, the Indian external examiner will be paid at the rate of Rs 2000/- per thesis; and the foreign external examiner shall be paid at the rate of US $ 200/-. The viva-voce examination of the scholar will be given by the Indian examiner, who will be paid an additional honorarium of Rs 1000/-. An examiner will be reimbursed TA/DA as per the Institute (NITK) rules. He will also be reimbursed all associated correspondence expenses incurred by him for the purpose of examination.

Item No.5.17 Regarding consolidating the information to be enshrined in the Ordinance of Studies for the Degree of Philosophy (Ph.D.) of our Institute.

Item 5.17 also has been considered, deliberated upon and some amendments proposed. However, it being an extensive exercise, some more meetings and deliberations will have to be done before the exercise is complete.

Sd.___ (SP Jain)	Sd.___ (KS Kasana)	Sd.___ (SK Chakarvarti)	Sd.___ (B Setia)

Item No. 7.8 To note the starting of new M.Tech. courses in CAD/CAM, Transportation Engineering and Power Electronics and Drives under TEQIP (Ref. Item No. 5.4).

Concise Institutional Proposal (CIP) of our Institute provides for the starting of the following Post-Graduate (M.Tech.) Programmes as indicated below:-

Department	Name of the Programme	Level	Proposed Annual Intake
Civil Engg.	Transportation Engineering	PG	20
Electrical Engg.	Power Electronics & Drives	PG	20
Computer Engg.	Computer Engg.	PG	20
Mechanical Engg.	CAD/CAM	PG	10

The matter was presented for discussion in the 5th meeting and discussed at length. It was decided that the annual intake be amended as shown in Table below:

Department	Name of the Programme	Level	Proposed Annual Intake
Civil Engg.	Transportation Engineering	PG	10+5
Electrical Engg.	Power Electronics & Drives	PG	10+5
Mechanical Engg.	CAD/CAM	PG	10+5

It was observed that the Annexures of the course/proposal submitted by various departments be reviewed by the respective Boards of Studies with reference to the following parameters:-

(i) Courses : Number, Relevance, Contents

(ii) Eligibility conditions for admissions : Students with engineering background only to be included.

The Senate approved the courses in principle and decided that the modified courses proposals be submitted directly to the Chairman, Senate for consideration and approval.

Now the revised proposal routed through the respective Board of Studies have been submitted directly to the Chairman, Senate (Appended as Appendix TEQIP).

The courses will commence w.e.f. the semester commencing July, 2006.

The Senate may kind note.

Item No7.9 To Consider modifications in scheme and syllabi of M.Tech. (Electrical Engineering) in the specialization of Power Systems and Control Systems.

The Department of Electrical Engineering has modified the scheme & syllabi of M. Tech. (Power System) and M. Tech. (Control System).

The items have been considered and approved by the Department B.O.S. (Cover letter as received from the Department is appended below)

The Senate may kindly consider, discuss and approve the modifications.

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. DEE/06/Senate/MTech / 350 Dated: 29.05.06

Enclosed please find the scheme and syllabi of MTech (Electrical Engineering) in the specializations of Power Systems, Power Electronics & Drives (a new specialization approved under TEQIP), and Control Systems. The scheme and syllabi have been considered and approved in BOS meetings held on 13.02.06, and 09.05.06.

These may please be placed in the next Senate meeting for consideration and approval.

29/5/06
(SP Jain)
Chairman

Dr B Setia
Prof in charge (Academic affairs)
Enclosure: As above

Item No 7.10 To Consider modifications in the syllabi of B.Tech. & M.Tech. Mechanical Engineering.

The Department of Mechanical Engineering has modified the scheme & syllabi of B.Tech. & M.Tech.

The items have been considered and approved by the Department Board of Studies (Cover letter as received from the Department is appended below).

The Senate may kindly consider, discuss and approve the modifications

DEPTT. OF MECH. ENGG.
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

No. MED/BOS/06/ 250
Dated: 15.5.2006
15.5.2006

Enclosed, please find a copy revised B.Tech. & M.Tech. Scheme & Syllabi as Annexure 'A' & 'B" recommended by B.O.S. in Mech. Engg. in its meeting held on 10.5.2006

(S.K. Sharma)
Chairman

Encls: Annexure 'A' & 'B'

Dean (Acad.)

Item 7.11 **To consider modification in the eligibility criteria for M.Tech. (Water Resources Engineering) in the Department of Civil Engineering.**

Presently, there are three M.Tech. Courses being run by the Department of Civil Engineering. One of the courses is M.Tech. in Water Resources Engineering. Those graduating in Water Resources Engineering are absorbed in Agriculture and Irrigation Departments, besides other fields. Water Resources Engineering and Agricultural Engineering are complementary to each other in certain areas, especially those related to Irrigation, Watershed Management, Groundwater Hydrology and Rain Water Harvesting.

In light of this, it is proposed that the eligibility criteria of those being admitted to M.Tech. in Water Resources Engineering be modified to include graduates of Agriculture Engineering as well. The Item in the same spirit has been duly passed by the Board of Studies of Civil Engineering Department **(Minutes attached as Annexure IV (page-52).**

Existing Criteria	**Proposed Criteria**
Graduate in Civil Engineering	Graduate in Civil/Agriculture Engineering

The neighboring Indian Institute of Technology (IITs) of the region also have the same criteria.

The matter is placed before the Senate for its consideration and approval.

CIVIL ENGINEERING DEPARTMENT
N.I.T., KURUKSHETRA.

No.CE/BOS/
Dt:14.2.06

Minutes of the meeting of Board of Studies in Civil Engg., N.I.T., Kurukshetra, held on 14.2.06 at 11.00 A.M. in Civil Engg.Deptt., N.I.T., Kurukshetra.

The following members were present:

1 Dr.V.K.Sehgal (In Chair)
2 Prof.R.K.Bansal
3 Dr.V.K.Arora
4 Dr.Diwan Singh
5 Dr.Subodh Ranjan
6 Dr.S.K.Madan
7 Prof.Saraswati Setia
8 Prof.Pratibha Aggarwal

The following decisions were taken:

a) The minutes of the last meeting held on 22.10.2005 (already circulated) were confirmed.
b) The list of examiners for B.Tech.(Civil)- Theory & Practical Examinations for session 2005-06 (Even Semester) was finalized and recommended.
c) The list of examiners for M.Tech.(Civil) 2nd semester-Theory & Practicals, for session 2005-06 was finalized and recommended.
d) Ph.D registration of Sh.Shankar Dayal Bhatnagar in this department was considered and approved.
e) Chairman, Board of Studies in Civil Engg., N.I.T., Kurukshetra, was authorized to consider the topics and examiners for M.Tech.Dissertations for students of 4th semester (04 batch).
f) The reorganization of existing Scheme of B.Tech.Courses was considered and approved.
g) It was decided that the Scheme and blows-up syllabi of M.Tech.Courses in Transportation Engg. & Environmental Engg.be circulated to all the B.O.S. members for their consideration. The same will be placed in the coming meeting of B.O.S.
h) It was decided and approved that if in a given subject, there are more than one teacher taking the practical/tutorial classes, the undersigned will appoint Coordinator to oversee the uniform evaluation of the students of the whole class.
i) It was decided & approved that the eligibility criteria for admission to M.Tech. Water Resources Course as Graduate in Civil/Agricultural Engg.
j) Ph.D Progress Reports in respect of Prof.Saraswati Setia, Prof.Pratibha Aggarwal & Prof.Vijay Kumar Bansal, all Lecturers in this department. were considered and approved.
k) Panel of proposed Ph.D Examiners in respect of Ms.Babita Saini, L.C.E., N.I.T., Kurukshetra (Ph.D registered with K.U.K.) was considered and approved.

The meeting ended with a vote of thanks.

(Dr.V.K.Sehgal)
Chairman,B.O.S.in Civil Engg.,
N.I.T., Kurukshetra.

Copy to:

a) All Members of B.O.S. in Civil Engg., N.I.T., Kurukshetra.
b) Controller of Exams., N.I.T., Kurukshetra/K.U.K.
c) Dean (Academic), N.I.T., Kurukshetra.
d) Director (for kind information please)

Item No.7.12 To consider modifications in the Grade Based Examination System (GBES) effective from session July-2006 onward.

Sr. No.	Existing	Proposed Modification
1.	If a student gets "E" Grade in a subject, he/she can improve the grade only by re-appearing in the end-semester examinations. His/her sessional marks will remain the same as was earned in the first attempt. He/she will require a total of 40 marks including sessional & new end semester exam. Marks, to pass.	The students having 'E' Grade and less than 40% marks in the sessionals will be allowed to improve their sessional marks to maximum of 40% through regular class test series. Such students will be allowed to avail of one extra chance to improve the sessional marks.(Thus, a student gets practically two chances; one with his/her regular batch when he/she is attending the classes and subsequently one later, when that semester is in progress i.e. odd with odd and even with even). If such student with Grade 'E' improve their grade either 'D' or 'C' (i.e. sum of new sessional marks and highest marks in the end semester exams. which he/she earned upto the declaration of this result) will not be allowed to appear in the end semester examination for improving the Grade. Despite this extra chance and regular end-semester examination if he/she is unable to clear a particular subject, than he/she has to repeat the subject. **This will be applicable to all old students of GBES, if their sessional marks are less than 40%.** *(This has been duly passed by SCSA and implemented)*
2.	If a student gets 40% of the total in sessionals, it is not necessary for him to appear in the end-semester examination and having a minimum CGPA 4.5.	For a student to pass in a subject, a separate minimum of 40% has to be earned separately, both in sessionals and end-semester examination and having a minimum CGPA 4.5
3.	A 5 point grading system with a 25-marks range (75-100) for the 'A'(Excellent) grade.	The grading system be changed from 5-points to 7-points with 'A$^+$'(Excellent) grade in the range of 75% to 84% and A$^+$ (outstanding) in the range of 85% to 100%. If a student passes a subject through GRADE A to D, he/she will not be allowed to improve his/her grade. However, in a special case, where the CGPA/SGPA of student is less than 4.5, the

		Controller of Examinations on the a written request by the student, may allow the student to improve his/her CGPA/SGPA.
Sr. No.	Existing	Proposed Modification

Table ____

	Marks Obtained and Grade	Category	Grade points	Marks obtained and Grade	Category	Grade points
1	75 ≤ A ≤ 100	Excellent	10	85 ≤ A⁺ ≤ 100	Excellent	10
2	65 ≤ B < 75	Good	8	75 ≤ A < 85	Very Good	9
3	50 ≤ C < 65	Fair	6	65 ≤ B < 75	Good	8
4	40 ≤ D < 50	Poor	4	50 ≤ C < 65	Average	6
5	E < 40	Fail	2	40 ≤ D < 50	Pass	4
6	.....			20 ≤ E < 40	Required to Improve	2
				0 ≤ F < 20	Repeat	0

Allocation of theory & Sessional weightage

4.	Theory Papers	Sessionals (mid semester exam. of 20 marks each and 10 marks teacher's assessment)	50	Sessionals (mid semester exam. of 15 marks each and 10 marks teacher's assessment)	40
		End Semester Examination	50	-	60
	Practicals	Sessionals (mid semester exam. of 20 marks each and 20 marks teacher's assessment)	60	No change	60
		End Semester Examination	40	-	40

(i) The above proposal will be implemented for students to be admitted form July-2006 onwards.

(ii) For students who are detained and are to attend classes with students of lower batch, shall be governed by the academic and examination regulars of that (lower) batch.

Senate may kindly consider and approve the proposal.

Item No. 7.13 **To consider and approve a new course in Physical Fitness of UG students.**

For long it has been felt that the physical fitness of Engineering students is declining. Going by the concept of 'sound mind in a sound body', it has been proposed to introduce courses on Physical Education and Sports in the First & Second semesters. The proposal has been finalized in a meeting of the President Sports with the Sports Officials of the Institute. Letter as forwarded by President Sports is appended below. The scheme and syllabi as proposed is carried on **page 56.**

The Senate may kindly consider, discuss and approve the proposal.

OFFICE OF PRESIDENT SPORTS
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA.

No.PS/06/ ९३७ **1.6.2006**

A meeting of the committee consisting of the following was held on 1.6.2006 in the office of the undersigned:

1. Dr. V.K.Arora, President Sports
2. Sh R.K. Sharma, Director, Sports
3. Sh Zile Singh, Lecturer, Physical Education & Sports

To enhance the sports activities amongst the students, the committee proposes the following initiatives:

1. The committee proposes to start a Compulsory Course on Physical Education and Sports in the First and Second Semesters with one Credit for each semester.

2. Normal sports activities for other years will continue as per past practice. However, due weightage may be given to the students in the final year Viva-Voce Examination of "General Fitness & Professional Aptitude" on the basis of their performance in the sports field in all the proceeding semesters.

3. The Grading system (like A, B, C, D) may be introduced for each semester starting from third semester on the basis of the performance of the students in the sports field. These Grades may be mentioned in the DMC of the students.

(V.K. Arora)
President Sports

L	P	Total
1	1.30	2.30

Max. Marks	100
Sessional	40
Examination	60
Exam. Duration	2 Hours
Credit	1

Course No. PES-111

Unit-I **Health and its Problem**

(A) Common Health Problem - Drugs, Narcotics, Alcohol, Smoking, Allergies.
(B) Faligue, Rest, Sleep, Relaxation and Recreation.
(C) General Health Problem- Diabetes, Hypertension, Heart Diseases & their preventions.

Unit-II **Diet**

(A) Concept of Balance diet and its constituents.
(B) Malnutrition - Its causes.
(C) Effects of Fast food on health, food infection.

Unit-III **Communicable Disease**

(A) Concept and modes of communicable disease.
(B) Diseases- Influenza, Malaria, Small pox, Typhoid, dysentery, cholera, measles.

Unit-IV **Sports**

(A) Yoga- At least five Asanas
Pranayam.
(B) Sports Injuries- First Aid, Preventions.
Sprain, Strain, Dislocation, Fracture,
Hemorrhage- Internal Bleeding
External Bleeding

B.Tech 2nd Semester (Common to all branches)
Physical Education and Sports

L	P	Total
1	1.30	2.30

Max. Marks	100
Sessional	40
Examination	60
Exam. Duration	2 Hours
Credit	1

Course No. PES-111

Unit-I **Health and its Problem**

(A) Common Health Problem - Drugs, Narcotics, Alcohol Smoking, Allergies.
(B) Fatigue, Rest, Sleep, Relaxation and Recreation.
(C) General Health Problem- Diabetes, Hypertension, Heart Diseases & their preventions.

Unit-II **Diet**

(A) Concept of Balance diet and its constituents.
(B) Malnutrition - Its causes.
(C) Effects of Fast food on health, food infection.

Unit-III **Communicable Disease**

(A) Concept and modes of communicable disease.
(B) Diseases- Influenza, Malaria, Small pox, Typhoid, dysentery, cholera, measles.

Unit-IV **Sports**

(A) Yoga- At least five Asanas
Pranayam.
(B) Sports Injuries- First Aid, Preventions.
Sprain, Strain, Dislocation, Fracture,
Hemorrhage- Internal Bleeding
External Bleeding

1st Semester

1st- 5 Weeks

Fitness Tests

A. General Fitness Test
B. Athletics Events Test- Track, Jump, Throw
C. Introduction of major/minor games
Basic Fundamentals of games, Rules, their Skills.

2nd 5 Weeks

A. Players proficiency test.
B. Selection of the Teams/ Players.
C. Skill improvement of the players.
D. Participation in various competitions/ tournaments.

3rd 5 Weeks

A. Inter Class Tournaments.
B. Participation in Tournaments.

2nd Semester

A. Inter Class Tournaments.
B. Annual Sports Meet.
C. Inter Professional tournaments (Inter N.I.T'S) etc.

Item 7.14 **To consider fixing up a minimum number of classes to be engaged for a course.**

Presently, the academic regulations of the Institute require that a student has to attend a minimum of 75% of the classes engaged in a course. However, there are no guidelines on the duration in which the particular part of the syllabus is to be completed.

In order to bring about uniformity and well distributed coverage of the course, a minimum of '12 weeks equivalent of classes' must be engaged by the teacher in that particular course. This minimum duration will also imply that the subject/course has received its minimum due coverage/ weightage.

The Senate may kindly consider and approve the matter.

Item 7.15 **To consider and approve the norms for issuing the Duplicate Degree certificate and semester/overall Grade Report.**

Academic Section of the Institute is receiving requests from the undergraduate and postgraduate students for issuing the duplicate degree certificates and grade reports. The situation arises in the eventuality of the documents being lost damaged or defaced presently the Institute has no set norms to issue the same.

The following procedure is being proposed to obtain duplicate degree certificate and grade report. The students shall request the Institute in writing for issuing the duplicate documents and shall attached the following:

(i) A copy of the FIR of the complaint in this regard lodged at the local police station and the untraceable report of the police.

(ii) Cutting of the newspaper in which the information of the documents being lost was made public.

(iii) An affidavit on Rs. 20/- stamp paper duly attested by a Notary, containing the relevant details of the student **(Annexure V)**

(iv) Receipt of payment

a) Rs. 500/- for duplicate degree certificate

b) Rs. 200/- for duplicate grade sheet.

Senate may kindly consider and approve the proposal.

ANNEXURE -V

Rs. 20/- Non-Judicial Stamp Paper

AFFIDAVIT

I,(Name)_____Son/Daughter of Shri _____ _____Resident of _____ _____ do hereby solemnly declare and affirm as under:-

a. That I was student of National Institute of Technology, Kurukshetra from _____ to _____

b. That I appeared and passed the B.Tech/M.Tech./Ph.D. Degree in _____ from National Institute of Technology, Kurukshetra in the year _____.

c. That the original B.Tech./M.Tech./Ph.D. degree certificate conferred upon me by the National Institute of Technology, Kurukshetra has actually been lost and to the best of my knowledge and belief,, there is no immediate likelihood of the said original certificate being traced out.

d. That in the unlikely event of the original degree certificate ever getting found, it will not be misused.

DEPONENT

VERIFICATION:

Verified that the contents of this affidavit are true and correct to the best of my knowledge and belief and nothing has been concealed therein.

Date :

Place:

DEPONENT

(NOTARY)

Item 7.16 **To consider and approve the norms for issue of official Transcripts to the students Alumni.**

The student of NIT, Kurukshetra are requesting for issuance of official transcript for admission to other universities/institutions from time to time. Though the needful is being duly taken care of, there are no set norms to issue the same.

The following procedures are proposed to be followed:

(i) The student/old student shall prepare copies of his/her grade sheet as many in numbers as the number of transcript required.

(ii) Seek the approval of the Dean(Academic)/ Prof-in-Charge(Academic) for getting the transcripts.

(iii) Deposit the requisite fee in the Accounts Section. Fee structure mentioned below:

(iv) Get the copies of the grade sheet attested from the Academic Section.

Fee proposed for issuing of official transcripts:

		Within in India	Abroad
1.	For first copy of the transcript	Rs. 50/-	USD 5
2.	For every additional copy	Rs. 10/-	USD 1
3.	For postage & handling	Rs.100/-	USD 5

This amount will be deposited in cash through Demand Draft in the account of Director, National Institute of Technology, Kurukshetra, payable at NIT, Kurukshetra, No cheques will be entertained.

The Senate is requested to kindly discuss and approve the above matter.

Item No. 7.17 **To consider modifications in the present Examination System (Ref. Item No. 5.13).**

Presently, the examinations are being conducted twice an year, at the end of each semester. The supplementary examinations (odd and even semesters) are already being held twice. This requires a long duration for conducting the examinations.

The item was presented for discussion in the 5th meeting of the Senate wherein the proposal forwarded by the Controller of Examination was discussed.

The discussion being inconclusive, a committee comprising of the following was constituted to look into the issue of reduction in duration of examination period:

Prof. Krishan Gopal	Dean (P & D)
Prof. K.S. Kasana	Dean (Academic) Convenor
Prof. D.V. Singh	Controller of Examinations (then)

The Committee invited Dr. S. S. Rattan (present Controller of Examinations) and Dr. (Mrs.) Lillie Dewan (Prof. Incharge Secrecy) as special invitees.

The Committee examined the several alterative of scheduling examinations and came to the conclusion that the total duration of the examination period of about 32 days at present can not be reduced without modifications in the present B.Tech. ordinance. However, the committee recommends that the preparatory days which are at present 9-10 days be reduced to 06 days only.

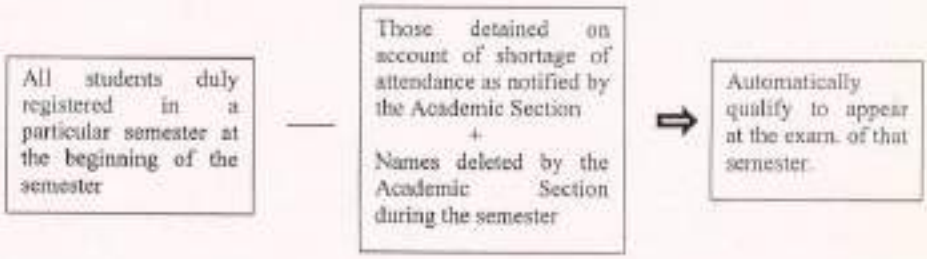
The Senate may kindly consider the report and approve.

Item No. 7.18 **To consider modifications in the practice of filling up of Examination forms and late fee submission of Examination forms for the re-appearing Examinations.**

Prior to being declared as 'Deemed to be University' the Institute was affiliated to the Kurukshetra University Kurukshetra (KUK) for the examinations. According to the then regulations of Kurukshetra University Kurukshetra (KUK), each student was required to fill up and submit an examination form alongwith a requisite amount of examination fee to the Kurukshetra University Kurukshetra (KUK) through the Institute.

Presently, the Institute has its own Examination Cell which has been functioning satisfactorily for more than three years now. Also, the examination fee is being charged only once at the time of admission to the Institute.

Under the circumstances, the practice of filling up of examination forms for the regular students, is practically serving no useful purpose. Therefore, it is proposed that the present practice of submitting application forms by regular students (students studying in a particular semester after due registration at the beginning of the semester) be dispenced with. All students registered for a set of courses in a semester reach the stage of examination unless declared detained by the Academic Section.



However, for students who are re-appearing in certain subjects of previous semester will be required to submit the duly filled up forms to the Academic Section. The modified

Examination Fee Structure as received from the Controller of Examination (COE) is being shown in the table below:-

Table 7.18: Fee Structure for filling up Examination forms for re-appearing in subjects per semester

	Days of filling the Examination forms	Existing	Proposed
(a)	30 days before the starting of the Examination	150	300
(b)	15 days before the starting of the Examination	300	500
(c)	10 days before the starting of the Examination	500	1000
(d)	Before the starting of the Examination	-	2000

The Senate is requested to kindly consider, discuss and approve the proposal.

Item 7.19 **To note the starting of new M.Tech. Courses in Environmental Engineering (Civil Engineering Department); Master of Business Management (Humanities & Social Sciences) M. Tech. (Environmental Engineering) M.Tech. (Robotics & Automation), M.Tech. (Nanotechnology and UG Courses in Industrial Engineering & Management, and Information Technology.**

The Board of Governors in its 10th meeting held on 28.4.2006 while considering introduction of 2 Nos. PG Courses in the Institute starting from the Academic Session 2006-2007 vide Item No. 10.17 decided as under:

The Board decided to introduce 2 UG and 4 PG Courses in the Institute as detailed below with effect from the Academic Session 2006-07 subject to approval by the MHRD/AICTE:

Name of the programme	Coordinating Department	Intake capacity
U.G.(B.Tech.)		
1. Industrial Engineering and Management	Mechanical Engg.	60
2. Information Technology	Computer Engg.	60
P.G. (M.Tech./MBA)		
1. Environmental Engg.	Civil Engineering	10+5*+3R
2. Robotics & Automation	Mechanical Engg.	10+5*+3R
3. Nano Technoogy	Applied Physics ECE & Computer Engg. Department	10+5*+3R
4. Master of Business Administration	Humanities and Social Sciences Department	10+5*+3R

* Industry Sponsored

R Reserved category

At present, it is telephonically learnt that AICTE has accorded the necessary approval. After the formal approval letter is received from the AICTE the cases will be forwarded to the MHRD for further necessary action.

The senate may kindly note.

APPENDIX-TEQIP

M.TECH.

IN

POWER ELECTRONICS

&

DRIVES

DEPARTMENT OF THE ELECTRICAL ENGINEERING
NATIONAL INTITUTE OF TECHNOLOGY, KURUKSHERA

NO.DEE/06/M.TECH./ 376-79 DATED:31.05.2006

With reference to the Item 5.4 of the Minutes of 5th Senate Meeting ,enclosed please find the Scheme and Syllabi of proposed M.Tech.(Elect.Engg.) in the specialization of Power Electronics & Drives (a new specialization under TEQIP). The Scheme and Syllabi have been considered and approved in BOS meetings held on 13.02.2006 and 9.05.2006.

This is for your kind approval.

31/05/06
CHAIRMAN

Encl: As above

Director &
Chairman,Senate

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KURUKKSHETRA

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

FIRST SEMESTER

DAC 27.12.05
BOS 13.02.06, 09.05.06

Course No.	Title	Schedule of Teaching				Credit Point
		Lecturer	Tutorial	Practical	Total	
E-501	Advanced Power System Analysis	4	--	--	4	4
E-531	Power Electronics Devices	4	--	--	4	4
E-533	Modeling and Analysis of Electrical Machines	4	--	--	4	4
E-535	Digital Control Systems	4	--	--	4	4
	Elective-I	4	--	--	4	4
E-537	Power Electronics Lab	--	--	3	3	1.5
E-539	Seminar-I	--	--	1	1	1
	Total	20	--	4	24	22.5

E-501 APSA is a core course in 1st sem PS also.

E-533 MAEM is also an elective course in 3rd sem PS.

E-535 DCS is a core course in 1st sem CS also.

SECOND SEMESTER

Course No.	Title	Schedule of Teaching				Credit Point
		Lecturer	Tutorial	Practical	Total	
E-508	Power Apparatus and machines	4	--	--	4	4
E-510	Information Security	4	--	--	4	4
E-532	Electric Drives	4	--	--	4	4
E-534	AC Controllers	4	--	--	4	4
E-536	System Modeling and Optimization	4	--	--	4	4
E-538	Electrical Machines and Drives Lab	--	--	3	3	1.5
E-540	Seminar-II	--	--	1	1	1.0
	Total	20	--	4	24	22.5

E-508 PAM is a core course in 2nd sem PS also.

E-510 IS is a core course in 2nd sem PS and 2nd CS also.

THIRD SEMESTER

Course No.	Title	Schedule of Teaching				Credit Point
		Lecturer	Tutorial	Practical	Total	
	Elective-II	4	--	--	4	4
	Elective-III	4	--	--	4	4
E-631	Simulation Lab	--	--	3	3	1.5
	Dissertation	--	--	9	9	
E-633	Seminar-I on Dissertation					
	Total	8	--	12	20	9.5

FOURTH SEMESTER

Course No.	Title	Schedule of Teaching				Credit Point
		Lecturer	Tutorial	Practical	Total	
E-632	Dissertation	--	--	20	20	--
E-634	Seminar-II on Dissertation	--	--	--	--	--
	Total	--	--	20	20	--

For Theory Courses : During Semester Evaluation Weightage = 50%
End Semester Examination Weightage = 50%

For Laboratory Courses : During Semester Evaluation Weightage = 60%
End Semester Examination Weightage = 40%

Duration of end semester examination in each theory and laboratory course is three hours.

The examination in the subject of Dissertation is to be conducted jointly by two examiners, one of which will be the dissertation supervisor, and the other, an external examiner.

The result of the examination in Dissertation shall be one of the following- Approved, Approved with Distinction, Rejected.

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KURUKKSHETRA

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS AND DRIVES SPECIALIZATION
W.E.F. 2006-07

DAC 27.12.05
BOS 13.02.06, 09.05.06

List of courses under Electives-I, II, III

S No	Course No	Title
1	E-717	Intelligent Control
2	E-719	Cryptography
3	E-731	PLC And Micro Controllers
4	E-733	Computer Aided Design Of Electrical Machines
5	E-735	Special Topics In PED
6	E-737	Signal Processing
7	E-561	Microprocessors And Digital Signal Processors

E-717 IC is an elective course in 3rd sem PS and 3rd sem CS also.

E-719 Cryptography is an elective course in 3rd sem PS and 3rd sem CS also.

E-737 SP is an elective course in 3rd sem CS also.

E-561 MP&DSP is also a core course in 1st sem CS, and an elective in 1st sem PS.

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KURUKKSHETRA

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS AND DRIVES SPECIALIZATION
W.E.F. 2006-07

DAC 27.12.05
BOS 13.02.06, 09.05.06

QUALIFYING DEGREE -

The qualifying degree for admission to the M.Tech. (Electrical Engineering) in the specialization of 'Power Electronics and Drives' shall be B.Tech./B.E., or equivalent in any one of the following three disciplines-

i) Electrical Engineering

ii) Electrical and Electronics Engineering

iii) Instrumentation and Control Engineering

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-531 **Power Electronics Devices**

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Review of power switching devices, i.e., Thyristors, GTO, MOSFET, BJT, IGBT and MCT. Trigger technique, optical isolator, protection circuit, isolation transformers. Natural and forced commutation of SCRS, phase-controlled rectifier configuration. Control of output voltage by sequence and sector control. Reduction of harmonic using multiple-pulse control. Design of rectifier circuit. Comparative aspect of design using converter transformers-forced and self turn off devices. Chopper step down and step up configurations. Design of chopper circuits. Reduction of harmonics. Introduction to multiphase choppers. Analysis of rectifier and chopper circuits. Unity p.f. rectifiers.

References:

1. N. Mohan, T.M. Undeland & W.P. Robbin, "Power Electronics, Converter Applications and Design", John Wiley & Sons, 1989.
2. M.H. Rashid, Power Electronics, Prentice Hall, 1994
3. B.K. Bose, Power Electronics and AC Drives, 1986
4. R.Bausiere and G. Seguier, Power Electronics Converters, Springer-Verlag, 1987
5. D.M. Mitchell, DC-DC Switching Regulator Analysis, McGraw Hill, 1987

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-535 **Digital Control Systems**
(A core course in 1st sem CS also)

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Review of Z-transform and inverse Z-transform modified Z-transform.
Representation of discrete time systems: Pulse Transfer Functions & State Space models.
Stability analysis: Jury's Test, Routh's test.
Issues of sampling and discretization.
Models of Digital control devices and systems: Z-domain description & digital filters.
Analysis of Discrete time systems, Controllability and Observability, Effects of sampling, multirate sampling.
Design of Digital controller: Classical & State-space techniques.
Realization of Discrete time controller: Quantization errors.

References:

1. Digital Control Systems – by P.N. Paraskevopoulos, Prentice Hall, 1996.
2. Digital Control & State variable methods – by M. Gopal, TMH 1997.

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-532 **Electric Drives**

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Basic concept characteristics and operating mode of drive motors. Starting; braking and speed control of motors. 4 quadrant drives. Types of loads. Torque and associated controls used in process industries. Applications of solid state controllers such as choppers, rectifiers, inverter and cycloconverter in drive System, and their performance characteristics. Modern trend in industrial drives. Studies relating to steel mills, paper mills, textile mill, machine tools etc. A.C. motor drives in transportation system and traction. Duty cycle. Heating/cooling and insulation in motors. Choice of motors and rating.

References:

1. G.K. Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, New Delhi
2. R. Krishan, Electric Motor Drives: Modeling analysis and control : PH Pvt Ltd., New Delhi, 2001.
3. B.K. Bose, Power Electronics and Variable Frequency Drives : Technology and Applications IEEE Pres, 1997.
4. B.K. Bose, Modern Power Electronics and AC Drives, Pearson, Delhi, 2002.
5. L.A. Oliver, Adjustable Speed Drives : Application Guide, JARSCO Engg Corpn., and FPRI, Palo Alto, 1992.
6. J.M.D. Murphy and FG Turnbull, Power Electronics Control of AC Motors, PERGAMON Press, UK, 1988.

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-534 A.C. Controllers

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Single-phase and three-phase back controllers. Triggering technique for pawer factor and harmonic controls. Design analysis of phase control circuits, solid state transfer switches.

Concept of three-phase to single phase and single phase to three-phase cyclo-converter.

Symmetrical and asymmetrical control. Harmonic analysis of the output voltage. Effect of source inductance. Line commutated inverter. Single-phase and three-phase inverters, configuration of VSI & CSI. Concept of PWM techniques, single and multiple pulse periodic and DC level modulation strategies. Reduction of harmonics. Software and hardware methods of generating firing pulses.

References:

1. N. Mohan, T.M. Undeland & W.P. Robbin, Power Electronics, Converter Applications and Design, John Wiley & Sons, 1989.
2. M.H. Rashid, Power Electronics, Prentice Hall, 1994
3. B.K. Bose, Power Electronics and AC Drives, 1986
4. R.Bausiere and G. Seguier, Power Electronics Converters, Springer-Verlag, 1987
5. D.M. Mitchell, DC-DC Switching Regulator Analysis, McGraw Hill, 1987

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-536 System Modeling and Optimization

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

System Modeling:
Introduction, types of modeling, modeling of time-varying, distributed, stochastic, nonlinear, discrete event and hybrid systems.
Conventional tools for linear system modeling. Introduction to non-conventional modeling tools , Neural models, fuzzy models.
Model simulation languages and tools.

Optimization Theory:
Introduction to optimization theory, Importance in solving system engineering problems, Convex sets & Functions; affine and convex sets, supporting and separating hyper planes, dual cones and generalized inequalities.
Linear Programming problem; Formulation, Simplex Method, Dual Simplex method, sensitivity analysis, duality in programming.
Introduction to nonlinear programming;
Unconstrained Optimization-formulation of quadratic optimization problems, gradient descent and steepest descent methods, Newton's method, self-concordance.
Constrained optimization – direct optimization, Cutting plane methods, methods of feasible direction, analytic center cutting plane methods.
Multi-objective optimization.
Application to approximation and filling problems.

References:

1. SS Rao, "Optimization theory and applications" Wiley Eastern Ltd.
2. KV Mittal, "Optimization methods", Wiley Eastern Ltd.
3. NA Kheir, "System modeling and computer simulation" Marcel Decker, New York.
4. Kern G.A., "Interactive Dynamic System Simulation", McGraw Hill, N.Y.

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-731 PLC & Microcontrollers

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Logic design, Principle of Operation, Controller, Interfacing circuits, Modbus, Programming examples

PLC Microcontroller

Architecture, instruction set, timer, interrupts, I/O port, interfacing A/D converter, I2Cbus operation

References:

1. Programmable Logic controllers : Operation, interfacing and programming by Job Den Otter, PHI
2. Design with PIC Microcontrollers by John B Peatman, Pearson

MASTER OF TECHNOLOGY (ELECTRICAL ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION
W.E.F. 2006-07

Course No. E-733 Computer Aided Design of Electrical Machines

L	T	P	Total
4	0	0	4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 50%
End Semester Examination Weightage- 50%

Review of design processes of transformer and rotating electrical machines.

Computer aided design :

Advantages, limitation, analysis and synthesis methods, selection of input data, design variables and flow charts for the design of transformer and rotating electrical machines, introduction of optimization techniques, optimal design of electrical machines.

References:

1. M. Ramamoorthy, Computer Aided Design of Electrical Equipment, East West Press, New Delhi.
2. Cyril G. Veinott, Computer Aided Design of Electric Machinery, MIT Press, UK
3. A.K. Sawhney, A Course in Electrical Machine Design, Dhanpat Rai & Co., Delhi
4. Upadhyay K.G., Conventional and Computer aided design of electrical machines, Galgotia Publications, New Delhi

APPENDIX-TEQIP

M.TECH.

IN

TRANSPORATION ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA.

No.C/06/ 939 1.6.2006

Action Taken Report on the Minutes of the 5th & 6th Meetings of the Senate

-Item No. 5.3: Extra tests for the candidates were conducted for improving their sessionals.

-Item No. 5.4: The Scheme and syllabi of M.Tech. Course in Transportation Engineering was reviewed and approved by the Board of Studies in its meeting held on 19.5.2006. The approved Scheme and Syllabi alongwith eligibility conditions for admission are enclosed. (Annexure C-I).

-Item No. 5.5: The Scheme and syllabi of M.Tech. Course in Environmental Engineering was reviewed and approved by the Board of Studies in its meeting held on 19.5.2006. The approved Scheme and Syllabi alongwith eligibility conditions for admission are enclosed. (Annexure C-2).

Item No.5.9: The existing Scheme and Syllabi of B.Tech, Civil Engineering is under review of the Department. The modifications in the Scheme and Syllabi will be put up in the next meeting of the Board of Studies for consideration and approval.

Item No.5.23: A proposal to treat external members of Board of Studies and examiners for M.Tech. Thesis as Institute Guest and honorarium to be paid to them is being sent to the Chairman, Senate.

Item No.6.4: The amended weightage to theory papers and practicals was incorporated for the even semester courses.

(V.K. Schgal)
Chairman

Director

Copy to: Dean (Academic)/Prof. Incharge (Academic)

Encl: As above

Annexure C-1

PROPOSAL

FOR

M.TECH. COURSE

in

TRANSPORTATION ENGINEERING

CIVIL ENGINEERING DEPARTMENT
NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

NEW COURSE TO BE STARTED

- Name of the Course: **M.Tech. in Transportation Engineering**
- Starting Year: **July 2006**
- Total Intake of Students:

  15 (10 seats for regular students through GATE + 05 seats for in-service / part-time candidates. The seats of both categories are interchangeable.) The candidates will be allowed to join the M.Tech. at different points of time at the start of each semester.

- Qualifications for M.Tech.:

  B.Tech / B.E.in Civil / Structures / Building Construction or Arch. / Town Planning , etc., or equivalent.

- Proposed Fee Structure: Same as for the other M.Tech Courses presently running in the Institute.

- Duration of the P.G. Course:

  Multi-level entry is proposed with 2 Years duration for regular students and maximum of 5 years duration for the students joining the M.Tech. at different points of time. The students will be allowed to join the M.Tech. at the start of each semester. The students shall be free to select any number of courses in a semester subject to the condition that the duration of M.Tech. shall be minimum 2 years and maximum of 5 years.

- **Proposed Course Curriculum**

Semester - I

Sr.No.	Course No.	Subject	Examination Schedule				Teaching Schedule				Credits
			L	T	P/D	Total	Sessional	Theory	Practical	Total	
1	CET - 691	Traffic Engineering	4	1	-	5	50	50		100	4.5
2	CET - 693	Geometric Design	4	1		5	50	50		100	4.5
3	CET - 695	Pavement Materials	4	1		5	50	50		100	4.5
4		Elective -I	4	1		5	50	50		100	4.5
5	CET - 697	Transportation Lab.	-	-	3	3	60		40	100	1.5
6	CET - 699	Seminar - I	-	1	-	1	50			50	0.5
		Total	16	5	3	24	310	200	40	550	20.0

Semester -II

1	CET - 692	Pavement Analysis & Design	4	1	-	5	50	50		100	4.5
2	CET - 694	Pavement Construction, Maintenance and Management	4	1	-	5	50	50		100	4.5
3	CET - 696	Transportation Planning	4	1	-	5	50	50		100	4.5
4		Elective -II	4	1	-	5	50	50		100	4.5
5		Elective -III	4	1	-	5	50	50		100	4.5
		Total	20	5	0	25	250	250		500	22.5

Semester - III

1	CET - 701	Transportation Economics and Finance	4	1	-	5	50	50		100	4.5
2	CET - 703	Public Transportation	4	1	-	5	50	50		100	4.5
3	CET - 705	Transportation Safety and Environment	4	1	-	5	50	50		100	4.5
4		Elective -IV	4	1	-	5	50	50		100	4.5
5	CET - 707	Computational Lab.	-	-	3	3	50	50		100	1.5
6	CET - 709	Seminar - II	-	1	-	1	50			50	0.5
		Total	16	5	3	24	300	250	0	550	20.0

Semester - IV

	Dissertation

Detailed Syllabi are attached at the **end of the Proposal**

List of Electives for M.Tech. Transportation

CET - 710	Statistics and Operation Research	CET - 716	Land Use and Transport Planning
CET - 711	GIS in Transportation	CET - 717	Rail Transportation Systems Planning and Design
CET - 712	Concrete Technology	CET - 718	Airport System Planning and Design
CET - 713	Project Management	CET - 719	Advanced Geology
CET - 714	Transportation Drainage Systems	CET - 720	Transportation and Traffic Infrastructure Design
CET - 715	Water Resources	CET - 721	Ground Improvement Engineering

- **Flexibility of Timings and Selection of Subjects**

  The proposed P.G. Programme is made highly flexible in the choice of subjects and timings of attending the classes to facilitate their pursuit by in-service personnel. The classes for in-service persons can be conducted on Saturdays / Sundays / holidays, or in the evening hours as per the feasibility and convenience of the faculty and students.

- **Existing Faculty**
  - Dr. S.N.Sachdeva, Assistant Professor
    Ph.D., M.E. (Highways).
  - Dr. Parveen Aggarwal, Lecturer
    Ph.D., M.E. (Highways)
  - Highly qualified faculty is available from other specializations of Civil Engg Deptt / other disciplines to teach subjects of interdisciplinary nature.

- **Additional Load**

  40 hours per week for both years of M.Tech. (@ 4 periods per day)

- **Additional Staff Requirement**

  1-Professor (12 hours) + 2- Assistant Professors (14 hours each) + 1-Lab Tech. + 1-Lab Attendant / Peon

Category of Staff	Designation	Gross Annual Emoluments (Rs.)	Number to be added in different project yeas					Total Staff to be added
			1	2	3	4	5	
			2006-07	07-08	08-09	09-10	11-12	
Academic	Professor	3,60,000	1					1
	Asstt Prof.	3,00,000	1	1				2
	Lab Tech.	96,000	1					1
	Lab Attendent	72,000	1					1

- **Sustainability of the Course**

Same fee structure as being followed for the other M.Tech courses presently running in the Institute is proposed to be followed. However, after funding from the TEQIP project is over and the proposed M.Tech Course is not given funds from any other source, a fee of Rs 15000/- per semester (Rs. 2500/- p.m.) may be charged from the students. In that case the funds position will be:

- Total funds generated through fee per month:

  2500 x 40 (20 first yr + 20 second yr students) = 100,000/-

- Total funds needed to meet the salary requirement of the above staff per month:

  1- Professor (30,000) + 2-Asstt Prof. (25,000 x 2) + 1-Lab Tech (8000) + 1-Lab Attendant / Peon (6000) = 94,000/-

- As multi-level and multi-back-background entry has been proposed with full flexibility in the timings and selection of the subjects, it is believed that the programme will be able to attract a large number of students including the in-service personnel.

- From the above, it is hoped that the proposed P.G. programme will be able to sustain even after the funding from the project is over.

Justification and Need of Starting M.Tech Course in Transportation

The progress of a country to a great extent depends upon its systems of transportation. For rapid growth of economy, the transportation means have to be very efficient. With the advent of liberalization and globalization of our economy, a great need is felt to provide for fast and efficient transportation in the country to meet the demands of increased traffic for which good roads are required along with other modes of transportation. As a result, transportation has become a **thrust area of the Government**. Some really very big projects like National Highway Development Project (Golden Quadrilateral and North-South-East-West Corridor Project) and PMGSY have been started in the Transportation Sector. The outlay for both the projects is more than one lac crore. Similarly other big projects like improvement of riding quality of roads, Mass Rapid Transit Systems in big cities like Delhi, improvements in Railway, Waterway and Airway sectors have already started / likely to be started in near future. **Implementation of all these projects require the availability of technically advanced manpower in the country.** With the rapid growth and development of our

economy, the demand for transport sector will further increase in future necessitating the need of more Transportation Engineers in the country.

In order to meet the requirements of making the technologically advanced manpower available in the country, an M.Tech. Course in Transportation is fully justified specially in view of the fact that **only a few of the institutes in the region are offering this course at the moment.** The proposed course will also provide an opportunity to the in-service transport personnel of the region to get trained to the latest developments and new techniques in the transportation sector. The training and knowledge gained through the course when applied in the field would enrich the community, society and the country as a whole by bringing in the benefits of improved transportation in the country leading to better living standards in the country.

India is having the second largest network of roads in the world having more than 33 lac k.m. of roads which require many transport engineers to meet its maintenance and construction activities. Moreover, about 40 % of our villages are still to be connected by all-weather roads. Our urban centers have grown disproportionately in the absence of any scientific planning and **need the services of transport engineers to mitigate the problems of congestion, accidents, delays and vehicular pollutions.** These all points to lot of developmental activities in this sector in near future. Thus, out of various transportation sectors, **the road sector alone has the potential to absorb many transportation engineers.** The transportation engineers of the Institute are most likely to be absorbed in various Government / Private organizations in the transport sector such as States PWD (B&R) Deptts, CPWD, Railways, RITES, IRCON, CRRI, Other Research labs, Educational / Engineering Institutes, Pollution Boards, World Bank Projects, MORD, MORTH, NRRDA, NHA, Private Sector Organisations / Consultancy Firms dealing with Transport Planning, Design, Construction and Maintenance of Roads / Railways / Other modes of transportation, and Town & Country Planning Deptts, Airport Authority of India, Various Port Trusts, etc.

Capability to Run the Course

- The Transportation Section is a part of Civil Engineering Department, N.I.T.Kurukshetra, which is an autonomous Institution having good managerial, administrative, academic and financial practices creating the ambience for excellence.
- The department is **well equipped with physical and learning resources** in the form of good labs, library and Internet connected computational centre. The department has highly qualified (Ph.D,s) and experienced faculty to teach the subjects in the area of

proposed P.G.Course in Transportation. It has **One Assistant Professor and one Senior Lecturer, both Doctorates in the field of Transportation Engineering.** The department also has Professors and other faculty from the related fields of Soil, Structure, Hydraulics, Operation Research and Remote sensing to teach the elective subjects as proposed in the programme.

- **The Transportation Lab of the department has been recently modernized** in 2002 through a MODROB Project of MHRD. An Advanced Transportation Lab has also been set up recently.
- The senior most faculty in the Transportation section, that is, Dr. S.N.Sachdeva is currently completing one **Research Project of MHRD** on 'Evaluation of Causal Factors of Road Accidents' as Principal Investigator of the project.
- The Transportation Faculty has to their credit more than 50 papers published in various International / National Journals / Conferences.
- The Transportation Section is deputed as **State Technical Agency** by the Central Govt. for the implementation of Pradhan Mantri Gram Sadak Yojna in Haryana. In this connection, it provided consultancy and guidance to the State Govt. and scrutinized proposals of roads worth about Rs. 200 crores so far. The Transportation section is also providing consultancy to various other organizations to the tune of about Rs. 7-8 lacs per annum every year and earning revenue for the institution.
- The Transportation Section is having effective linkages with Central Roads Research Institute, N.Delhi, Ministry of Rural Development, Govt. of India; National Rural Roads Development Agency, Govt. of India; and I.I.T.Roorkee for the purpose of carrying out various schemes of research and consultancy.
- The Transportation Section is providing service to the community in the form creating trained manpower, and research and consultancy conducted / provided to provide better roads / modes of transportation that will lead to improved economy of the country.
- **The proposed course provides multi-background and multi-point entry** to the students including the in-service professionals.

In view of vast experience of the highly qualified faculty, the availability of the adequate physical and learning resources, and the elements of multi-background and multi-point entry being in-built into the proposed course of M.Tech. in Transportation, it is assured that the Civil Engineering Department is fully capable to implement and execute the objectives of the proposed project.

M.Tech. (Transportation) First Semester
CET - 691 Traffic Engineering

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks: 100
Theory: 50 Marks
Sessional: 50 Marks
Duration: 3 Hours

Traffic Characteristics: Importance of traffic characteristics. Road user characteristics. Vehicular characteristics. Max dimensions and weights of vehicles allowed in India. Effects of traffic characteristics on various design elements of the road.

Traffic Studies: Traffic volume study, speed study and origin and destination study. Speed and delay study. Use of photographic techniques in traffic surveys.

Traffic Accidents: Accident surveys. Causes of road accidents and preventive measures.
Capacity and Level of Service: Fundamental diagram of traffic flow. Relationship between speed, volume and density. Level of service. PCU. Design service volume. Capacity of non-urban roads. IRC recommendations. Brief review of capacity of urban roads.

Traffic Regulation and control Devices: Traffic control devices: signs, signals, markings and islands. Types of signs, Types of signals. Design of signals. Intersections at grade and grade separated intersections. Design of a rotary. Types of grade separated intersections.

Design of Parking Lighting and Terminal Facilities: Parking surveys. On street parking, off street parking.

Traffic Regulation: Need and scope of traffic regulations. Regulation of speed, vehicles and drivers. General traffic regulations. Motor vehicle act. Scope of traffic management.

Recommended Books

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Traffic Engg and Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iv) Principles of Transportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
(v) Traffic Engg. *by* Matson, T.M., Smith, W.S. and Hurd, F.W, McGraw- Hill Book Co., New York.
(vi) Traffic Flow Theory *by* Drew, D.R., McGraw- Hill Book Co., New York.

M.Tech. (Transportation) First Semester

CET - 693 Geometric Design

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks: 100
Theory: 50 Marks
Sessional: 50 Marks
Duration: 3 Hours

Highway Alignment: Requirements, factors controlling alignment, Obligatory points, Engineering surveys for Highway location, Route selection, steps in new project, Highway Classifications.

Cross Sectional Element: Pavement Surface Characteristics, Factors affecting skid resistance, Pavement Unevenness, Camber, Providing camber in the field, Width of carriageway, Design Vehicle, Medians, Kerbs, Road Margins, Right of Way, Typical Cross Sections of Roads.

Sight Distances: Introduction, Stopping Sight Distance, Reaction Time, Analysis of Stopping distance, Overtaking Sight distance, Analysis of Overtaking Sight distance, Effect of grade on sight distances, Overtaking zone, Intermediate sight distance, Sight distance at intersections.

Super elevation: Requirement of superelevation, Limits and attainment of superelevation in the field.

Horizontal Alignment: General, Design speed, Horizontal curves, superelevation, Analysis of superelevation, Superelevation design, Attainment of superelevation, Widening of pavement on horizontal curves, Methods of introducing extra widening, Horizontal Transition curves, Different types of Transition curves, length of transition curve, Setting out of transition curve, Set-back distance on horizontal curves, Curve Resistance.

Vertical Alignment: General, Gradients, Compensation in gradient on horizontal curves, Vertical curves, Summit curve, Length of summit curve, Valley Curve, Length of valley curve.

Relevant IRC standards for Urban and Rural roads.

Recommended Books

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iv) Principles of Transportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
(v) Principles of Highway Engineering and Traffic Analysis, by Mannering, F., W. Kilareski, and S. Washburn 3rd Edition, John Wiley and Sons, 2005.

M.Tech. (Transportation) First Semester
CET - 695 Pavement Materials

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks: 100
Theory: 50 Marks
Sessional : 50 Marks
Duration: 3 Hours

Sub grade: Significance of subgrade soil, Characteristics of soil, Desirable properties, Index Properties of Soil, Soil Classification based on Grain size, Soil Classification System, Evaluation of soil Strength.

Aggregates: Introduction, Desirable properties of Road Aggregates, Tests for Road Aggregates.

Bituminous Materials: Introduction, Types of Bituminous materials, Tests on Bitumen, Cutback and Emulsions

Paving Mixes: Granular mix design, Design of Bituminous Mix, Marshal method of bituminous mix design.

Polymer and Rubber Modified binders: Physical and chemical properties. Fly ash and its characterization. Performance based mix design Approaches. Visco elastic properties of bitumen and bituminous mixture.

Materials for joints in Cement Concrete Pavements.

Recommended Books

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iv) Principles of Transportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
(v) MORTH Specifications for Road and Bridge Works, IRC Publication.

M.Tech. (Civil) First Semester

CET - 697 Transportation Lab.

L	T	P/D	Credits
-	-	3	1.5

Max Marks	: 100
Practical	: 40 Marks
Sessional	: 60 Marks
Duration	: 3 Hours

1. Traffic volume and speed study using videography technique.
2. Speed study by Radar Gun
3. Determination of Reaction time of Driver
4. Traffic study by automatic counter and classifier.
5. Overlay design by Benkelman Beam
6. Unevenness Index of road
7. Bitumen content determination
8. Bituminous Mix Design
9. Mix Design for Cement Concrete Pavement
10. Non destructive testing of CC pavements

M.Tech. (Transportation) Second Semester
CET - 692 Pavement Analysis & Design

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks: 100
Theory: 50 Marks
Seasional : 50 Marks
Duration: 3 Hours

Pavement Types: Definition, Highway and Airport Pavement comparison, Wheel Loads, Tyre Pressure, Contact Pressure, Design Factors, Type of distresses: structurdl and functional, Servicenbility.

Stresses in Flexible Pavements: Layered system concept, multilayered solutions, Burmister's method, Fundamental Design concepts.

Stresses in Rigid Pavements: Relative stiffness of slabs, Modulus of subgrade reaction, Stresses due to warping, stresses due to friction, effect of warping, contraction and expansion, Plain versus reinforced pavements, stresses in dowel bar, tie bar, combined stresses.

Design of Flexible Pavements: Design factors, Design wheel load, Equivalent single wheel load, Difference between Airport and Highway Design concept, Different design methods, Examples of comprehensive design process

Design of Rigid Pavement: General design considerations, Design of joints in cement concrete pavements, spacing of expansion joint, Spacing of contraction joints, Design of dowel bars and tie bars, IRC recommendations for design of Concrete pavements.

Pavement Evaluation and Rehabilitation: Pavement distresses in flexible and rigid pavements, condition and evaluation survey, Present serviceability index, Methods of measuring condition, skid resistance, Principles of maintenance, Methods of structural evaluation and overlay design.

Recommended Books.

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles of Pavement Design, by Yoder E.J. and Witczak M.W. 2nd, John Wiley & Sons, INC.
(iv) Principles of Tranaportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.

M.Tech. (Civil) Second Semester

CET - 694 Pavement Construction, Maintenance and Management

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Introduction: history of road construction, stages of construction, seasonal limitations of pavement construction.

Stabilisation of soil: mechanical stabilization, cementing additives and chemicals, thermal stabilization.

Construction of non-bituminous pavements: brief introduction to earthwork machinery:, shovel, hoe, clamshell, dragline, bulldozers, cleaning and grubbing, excavation for road and drain, principles of field compaction of embankment / subgrade. Compacting equipments. Granular roads. Construction steps of GSB, WBM and WMM.

Construction of bituminous pavements: various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, premix carpet, BM, DBM and AC. Brief coverage of machinery for construction of bituminous roads: bitumen boiler, sprayer, pressure distributer, hot-mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MORTH specifications.

Construction of cement concrete roads: construction of cement concrete pavements, machinery involved in construction, slip-form pavers, joints in cc pavements, IRC and MORTH specifications.

Construction of other types of pavements: basic concepts of the following: soil stabilized roads, use of geo-synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements. Use of fly ash in cement concrete road construction.

Highway maintenance: pavement distresses. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Functional and structural evaluation of pavements, pavement maintenance, maintenance management

Related topics: emulsified bituminous mix, precoating of aggregates, recycling of bituminous pavements, shoulder construction.

Recommended Books

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iv) Principles of Transportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
(v) MORTH Specifications for Road and Bridge Works, IRC Publication.

M.Tech. (Civil) Second Semester

CET - 696 Transportation Planning

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

TRANSPORT PLANNING PROCESS : Status of transportation in India. Objectives and scope of transport planning.Urban, regional and national transport planning. Transport planning process, various stages. Land use and traffic.

TRANSPORTATION SURVEY: Definition of study area. Zoning. Types of surveys. O-D surveys. Inventories of existing transport facilities, land use and economic activities.
TRIP GENERATION: Trip purpose. Factors affecting trip generation. Trip generation estimation by multiple linear regression analysis, brief review of category analysis, advantages and limitations of these methods.

TRIP DISTRIBUTION: Methods of trip distribution. Basic concepts of uniform factor method, average factor method and opportunity model. Trip distribution by gravity model.

TRAFFIC ASSIGNMENT: Principles of assignment. Assignment techniques. All or nothing assignment. Brief review of multipath assignment, capacity restraint assignment and diversion curves.

MODAL SPLIT: General considerations for modal split. Factors affecting modal split. Brief introduction to various methods of modal split.

EVALUATION: Need for evaluation. Several plans to be formulated. Testing. Considerations in evaluation. Economic evaluation, basic principles, brief introduction to various methods of economic evaluation, comparison.

MASS RAPID TRANSIT SYSTEMS: Problems of Urban Transport. Introduction to MRTS. Requirements of MRTS. Types of MRTS. MRTS in India

Recommended Books

(i) Traffic Engg and Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Introduction to Transport Planning *by* Bruton, M.J., Hutchinson Technical Education, London.
(iv) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

M.Tech. (Transportation) Third Semester

CET - 701 Transportation Economics and Finance

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks: 100
Theory: 50 Marks
Sessional : 50 Marks
Duration: 3 Hours

Economic Evaluation of Transport Plans: Need for economic evaluation, Cost and benefits of Transport Projects, Time horizon in Economic Assessment, Basic Principles of Economic evaluation, Interest rate, Method of economic evaluation, Benefit cost ratio method, First year rate of return, Net Present value method, Internal rate of return method, Comparison of various methods of economic evaluation.

Vehicle Operating Costs: Introduction, Road user cost study in India, Components of VOC, Factors affecting VOC, Fuel consumption Relationship, Spare parts consumption, Maintenance and Repairs, labour cost, Tyre life, Lubricants, Utilisation and fixed costs.

Value of travel time savings: Introduction, Classes of transport users enjoying travel time savings, Methodology for monetary evaluation of passengers' travel time, Review of work in India on passengers' travel time.

Accidents Costs: Introduction, Relevance of accident costing for a developing country, Review of alternative methodologies for accident costing, Indian studies.

Traffic Congestion, Traffic Restraints and Road Pricing: Congestion as a factor in road traffic, Traffic Restraint, Road Pricing.

Highway Finance: Basic principles, Distribution of highway cost, Sources of Revenue, Highway Financing in India.

Recommended Books

(i) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iv) Principles of Transportation and Highway Engineering *by* G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.

M.Tech. (Civil) Third Semester
CET - 703 Public Transportation

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Modes of public transportation and application of each to urban travel needs

Transit system operations, para-transit systems, street transit systems, rapid transit systems, Estimation of transit demand, route development, properties of a good route set, determination of a good route set, stop location and stopping policy, schedule development, properties of a good schedule, determination of a good schedule.

Capacity of rapid transit systems, line capacity of RTS, capacity of street transit systems.

Transit corridor, identification and planning, mass transport management measures, integration of public transportation modes. Public transport infrastructure, case studies, multi mode transportation system.

Planning for public transport, fares and subsidies.

Intermediate Public Transport in Indian Cities, types of IPT vehicles, Characteristics of IPT modes.

Recommended Books:

(i) Traffic Engg. And Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(ii) Introduction to Transport Planning *by* Bruton, M.J., Hutchinson Technical Education, London.
(iii) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

M.Tech. (Civil) Third Semester

CET – 705 Transportation Safety and Environment

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Trends in Roads and Highways Development, Problem of Road Accidents In India, Characteristics of Road Accidents, Causes of Accidents, Global and Indian Road Safety Scenario, Factors Responsible for Success Stories in Road Safety, Role of Highway Professionals in Highway Safety.

Planning of Roads for Safety, Land Use Planning and Zoning, Development Control and Encroachment, Network Hierarchy, Route Planning Through Communities, Access Control, Traffic Segregation, Traffic CalmingDesigning for Safety: Road Link Design, Alignment Design, Cross-Sectional Elements, Traffic Control Devices, Roadside Safety, Roadside Facilities, Some Critical Elements, Junction Design Basic Principles, Selection of Junction Type, Factors Affecting Safety at Various Junction Types, Elements to Improve Road Safety, Provisions for Vulnerable Road Users.

Road Safety Audit, Concepts of Road Safety Audit, Road Safety Auditors & Key Personnel in RSA, Organising and Conducting a Road Safety Audit, Example and Commonly Identified, Issues During RSA, Road Safety Audit Report, Development of Cost-effective of Road Safety AuditAccident Investigation and Prevention, Basic Strategies for Accident Reduction, Significance of Accident Data, Accident Investigation and Identification of Potential Sites for Treatment, Problem Diagnosis, Selection of Countermeasures, Example of Selection of Countermeasures, Detailed Design and Implementation of Countermeasures, Monitoring and Evaluation Non-Engineering Measures for Road Safety, Behavioural Countermeasures, Education, Training and Publicity, The Goal of Police Traffic Control Activities, Strategy for Road Safety Management by Police, Role of NGOs in Road Safety, Legal Framework for Road Safety

Transport related pollution, noise pollution, air pollution, effects of weather conditions, vehicular emission parameters, pollution standards, EIA requirements of highway projects, world bank guidelines, EIA practices in India.

Fuel crisis and transportation, factors affecting fuel consumption, fuel economy in various modes of transportation, various types of alternative fuels.

Books recommended:

(i) Traffic Engg and Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Trainers Road Safety Manual, NHA and Ministry of Shipping, Road Transport and Highways, Govt of India.

M.Tech. (Transportation) Third Semester
CET - 707 Computational Laboratory

L	T	P/D	Credits
-	-	3	1.5

Max Marks : 100
Practical : 40 Marks
Sessional : 60 Marks
Duration : 3 Hours

Exposure to various Transportation Related Softwares like

Rate Analysis by MORTH software

MX Road

IRC software for Pavement Design

IRC software for Decision modeling

List of Electives for M.Tech. Transportation

CET - 710	Statistics and Operation Research
CET - 711	GIS in Transportation
CET - 712	Concrete Technology
CET - 713	Project Management
CET - 714	Transportation Drainage Systems
CET - 715	Bridge Engineering
CET - 716	Land Use and Transport Planning
CET - 717	Rail Transportation Systems Planning and Design
CET – 718	Airport System Planning and Design
CET – 719	Advanced Geology
CET – 720	Transportation and Traffic Infrastructure Design

M.Tech. (Transportation) Elective
CET - 710 Statistics and Operation Research

L	T	P/D	Total	Credit
4	1	-	4	4.5

Max. Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Fundamental of Operation Research : Deterministic Operations Research Models, Dynamic Programming, Linear Programming, Integer Programming, Branch-and-Bound Technique, Deterministic Inventory Models, Sequencing Problems.

Classification and Presentation of Data – Basic Concepts of Probability – Probibility Axioms – Analysis and Treatment of Data, Population and Samples – Measures of Central Tendency – Measures of Disperaion – Measures of Symmetry – Measure of Peakedness.

Probability Distribution – Discrete abd Continous Probability distribution Functions – Binoinal, Poisson, Normal, Lognormal, Exponential, Gamma Distribution, Extreme Value Distribution – Transformations of Normal Distributions, Selecting a Probability Distribution, Parameter Estimation – Method of Moments – Method of Maximum Likelyhood – Probability Weighted Moments and Least Square Method, Joint Probability Distributions.

Regression Analysis – Simple Linear Regression – Evaluation of Regression – Confidence Intervals and Tests of Hypotheses – Multiple Linear Regression – Correlation and Regression Analysis.

Recommended Books:

Applied Numerical Methods for Engineers by Akai
Numerical Recipes – The Art of Scientific Computing by Press, Flannery, Teukisky, Vetterling.

M.Tech. (Transportation) Elective
CET - 711 GIS in Transportation

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Introduction: GIS Operations, GIS for Transportation.

Map Projection and Coordinate System: Map Projection, Coordinate Systems.

Data Modeling & Data Base Design: Vector Data Model, Spatial Data Model, Data modeling in GIS-T.

Shortest Path & Routing: Fundamental Network properties, Shortest Path analysis,

Network flows & facility Location: Flow through Network, Closed Facility.

GIS Based Spatial Analysis and Modeling: GIS and Spatial analysis, function, Customizing GIS, Geographic Visualization.

Recommended Books:

1. Miller, H.J. and Shaw S.L. "GIS for TransportationPrinciples and Applications" Oxford University Press.
2. Chang K.T. "Introduction to GIS" TMH, New Delhi.

M.Tech. (Transportation) Elective
CET - 712 Concrete Technology

L	T	P/D	Total	Credit
4	1	-	5	4.5

Max. Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Concrete as Pavement Material: Introduction, Preparation and Grade of Concrete.

Concrete Ingradients: Types of Cement, Aggregates, Classification of Aggregate, Properties of Aggregate, Quality of Mixing Water, Admixtures, .

Properties of Concrete: Introduction, Workability, Stress Strain Characterisics of Concrete, Young's Modulus of concrete, Creep and shrinkage of Concrete, Permeability, Durability of Concrete, Joints.

Production of Concrete: Batching, mixing, Transportation, compaction, vibration, curing, formwork removing, ready mixed concrete.

Non-Destructive Testing of Concrete: Significance, Rebound Hammer, Ultrasonic Pulse Velocity Technique, Penetration Technique, Pullout test, Cover meter, Core tests.

Deterioration : Causes, Deterioration by Water, surface weir, Frost action, chemical Reaction, corrosion of reinforcement etc. Preventive Measures

Advances in Concrete: Introduction to Light Weight concrete, High strength Concrete, Prestressed concrete. Fibre reinforced concrete, Polymer concrete composites, Fly ash concrete.

Recommended Books:

1. Gambhir,M.L., "Concrete Technology" TMH Pub. N Delhi.
2. Shetty M.S."Concrete Technology" S. Chand& Co. N Delhi.

M.Tech. (Transportation) Elective

CET - 713 Project Management

L	T	P/D	Total	Credit
4	1	-	4	4.5

Max. Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Time Estimates: Earliest Expected Time, Latest allowable occurenece time, slack time, Earliest start time, Earliest finish time, Latest start time, latest finish time.

Network Scheduling: Critical Path Method (CPM) , Program Evaluation and Review Technique (PERT), Precedence diagram technique (PDM)

Cost Optimization: cost slope, crashing critical path, Optimum duration.

Updating: Introduction, examples, when to update.

Resource allocation: Introduction, resource smoothing, resource levelling, Line of Balancing technique (LOB). Resouse Based Network.

Linear Programming and critical path scheduling: Introduction, standard form, formulation by linear programming, transportation model, method of solution, fictitious cost method, Linear programming and critical path.

Books recommended:

(i) PERT and CPM *by* L.S.Srinath .
(ii) Application of PERT and CPM by B.C. Punmia
(iii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iv) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.

M.Tech. (Civil) Elective

CET - 714 Transportation Drainage Systems

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Introduction, Importance of drainage, Types of Road Drainage, General Criterion for Road Drainage, Systems of Drainage: Surface and sub-surface drainage systems, Internal drainage of pavement structure, components of surface drainage system, surface drains, road side drains, catch water drains, geometric design of road, hydraulic design of drains, shoulder drainage, drainage layer, subsurface drainage with transverse drains, horizontal drains, sub surface drain in heavy clayey soil, sub surface drain at valley curve / change of grade, capillary cut-off. Design of surface drainage and subsurface drainage system: Hydrologic analysis, hydraulic analysis, data for drainage design, design steps, Cross Drainage, Sub surface drainage, lowering of water table, control of seepage flow, control of capillary rise, design of filter material, drainage of slopes and erosion control, road construction in water logged areas. Drainage in hill roads. Drainage systems for Airports and Railways.

Books recommended:

(i) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(ii) Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(iii) Rural Roads Manual, IRC SP-20.

M.Tech. (Civil) Elective

CET - 715 Bridge Engineering

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Types of bridges, Consideration of loads and stresses in bridges, bridge loading as per IRC and IRS specifications,, traffic lanes, footway, kerbs, railing and parapet loading, impact, wind load, longitudinal forces, temp effects, secondary stresses, erection stresses, earth pressure, effect of live load on back fill and on the abutment.

Design of RC bridges, slab culvert, box culvert, pipe culvert, T-beam bridge, super structure, design examples, brief introduction to rigid frame, arch and bow string girder bridges.

Design of pre-stressed concrete bridges, pre-tensioned and post tensioned concrete bridges, analysis and design of multi-lane prestressed concrete T-beam bridge super structure.

Steel bridges, types, economical span, loads, permissible stresses, fluctuation of stresses, secondary stresses, plate girder bridges, general arrangement, bridge floors, plate girder railway bridges, deck type plate girder bridges, design example. Truss bridges, types, wind force on lattice girder bridge, bracings, truss bridge for railway – through type truss bridge.

Pier, abutment and wing walls, types of piers, forces on piers, stability, abutments, bridge code provisions for abutments, wing walls, design examples.

Bearings, functions, bearings for steel and concrete bridges, bearings for continuous span bridges, IRC provisions for bearings, fixed bearings, expansion bearings, materials and specifications, permissible stresses, design considerations for rocker and roller cum rocker bearings, sliding bearings.

Foundations, types, general design criterion, design of well and pile foundations for piers and abutments.

Recommended Books:

1. Victor DJ, Essentials of Bridge Engineering, Oxford & IBH Publ Co.
2. Rowe RE, Concrete ridge Design
3. Krishna Raju N, Design of Bridges, Oxford & IBH Publ Co.
4. Krishna Raju N, Pre stressed Concrete, Tata McGraw Hill, New Delhi.
5. Bakht B and Jaeger LC, Bridge Analysis Simplified, McGraw Hill Int Ed, New Delhi.

M.Tech. (Civil) Elective

CET - 716 Land Use and Transport Planning

L	T	P/D	Credits
4	1	-	4.5

Max Marks	: 100
Theory	: 50 Marks
Sessional	: 50 Marks
Duration	: 3 Hours

Land use and transport planning, Selection of land use transport models, Lowry Derivative models, Garin-Lowry model, Matrix operations for simplifying computations, applications in India, Transpot planning for small and medium sized cities, quick response techniques. Traffic simulation.

Books recommended:

(i) Traffic Engg. And Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(ii) Highway Engg *by* S.K.Khanna & C.E.G Justo, Nem Chand Bros., Roorkee.
(iii) Introduction to Transport Planning *by* Bruton, M.J., Hutchinson Technical Education, London.
(iv) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

M.Tech. (Civil) Elective

CET - 717 Rail Transportation Systems Planning and Design

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Importance of rail transportation, rail transportation v/s other modes, development of rail transportation in India and abroad, Status of rail transportation.

Components of permanent way, preparation of formation, requirements and specifications for various components for construction of railway track, laying of tracks.

Maintenance of track, types of maintenance, mechanized maintenance, M.S.P and D.T.M.

Rail transportation system, Demand analysis and forecasting for passenger and freight traffic, costing and pricing principles, project analysis and design, project interdependencies and programming techniques, systems analysis and planning, macro-economic transportation simulator, case studies and implementation strategies.

Recommended Books:

(i) A text book of Railway Engineering *by* S.C.Saxena and S.P.Arora, Dhanpat Rai Publications, N.Delhi.
(ii) Railway Track Engg. *by* J.S.Mundray, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
(iii) Railway Engineering *by* M.M.Aggarwal.

M.Tech. (Civil) Elective

CET – 718 Airport System Planning and Design

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Air Transport-structure and organization, the challenges and the issues.

Airport planning, site selection, layout plan, Aircraft characteristics affecting airport elements, air traffic control

Forecasting air travel demand, trend forecast and analytical methods, air freight demand.

Airport capacity and configuration, runway capacity determination.

Geometric design of runways, taxiways and aprons.

Passenger terminal area, passenger and baggage flow, design concepts, analysis of flow through terminals, parking configurations and apron facilities.

Airport pavement design

Airport drainage.

Books Recommended:

(i) Airport Planning and Design *by* S.K.Khanna, M.G.Arora, Nem Chand Bros., Roorkee.
(ii) The Planning and Design of Airports *by* Robert Horrjeff, McGraw Hill Book Co.
(iii) Air Transportation Planning and Design *by* Virender Kumar & Satish Chandra, Galgotia Publications, N.Delhi.

M.Tech. (Civil) Elective

CET – 719 Advanced Geology

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Introduction, object and scope, Importance of Geology in Transportation Engg Projects, external and internal geological forces causing changes, weathering and erosion of surface of earth, soil profile and its importance. Rocks of earth surface, texture, structure and origin of rocks, their engineering uses.

Forms of structures of rocks, bedding plane and outcrops, dip and strike, folds, faults, joints and unconformity and recognition on outcrops, importance of geological structures in transportation engg projects.

Hydrogeology, water table, ground water considerations in transportation projects, geological investigations, remote sensing techniques for geological and hydrological investigations. Uses of geological maps, interpretation of data.

Geological conditions and their influence on the selection, location, type and design of tunnels, highways, bridges. Land slides, hill slope stability.

Precautions and treatment against faults, joints and ground water.

Books Recommended:

1. Introduction to Physical Geology by A. Holmes.
2. A Text Book of Geology by P.K. Mukherjee.
3. Physical and General Geology by S.K. Garg.
4. Engineering and General Geology by Prabin Singh.

M.Tech. (Civil) Elective

CET – 720 Transportation and Traffic Infrastructure Design

L	T	P/D	Credits
4	1	-	4.5

Max Marks : 100
Theory : 50 Marks
Sessional : 50 Marks
Duration : 3 Hours

Design and drawing of grade intersections, rotaries, mini round abouts, interchanges, multi-level intersection, on-street parking facilities, off-street parking facilities, layout for buses and trucks, guard rails, retaining sides, pedestrian sideways, foot bridges, underpasses.

Books recommended:

(i) Traffic Engg. And Transport Planning *by* L.R.Kadiyali, Khanna Publishers, Delhi.
(ii) Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
(iii) Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

MECHANICAL ENGINEERING DEPARTMENT
NATIONAL INSTITUTE OF TECHNOLOGY,KURUKSHETRA

No. MED/06/Ac 145 Dated: 1.06.2006

Ref. Office letter No. Acad/Senate / 2006/144 dated 1.6.2006.

Sub:- Scheme and Syllabii of M. Tech. Programme of Mechanical Engineering in CAD/CAM.

Please find, enclosed, herewith the scheme and syllabi as desired in above referred letter.

However, the following points may be taken into consideration while the course is introduced.

1. As P.G (M.Tech.) in CAD/CAM is to be funded by TEQIP, the funds for which are available upto31st December 2007 only. then what about the funds to be made available, i.e. for payment of scholarships to students, staff salary and other recurring expenditure.
2. Two senior faculty members for teaching the subjects for CAD/ CAM course would be required.

pSubmitted for necessary action please.

1.6.2006

(S. K. Sharma)
Chairman

APPENDIX-TEQIP

M.TECH.

IN

CAD/CAM

Department of Mechanical Engineering

National Institute of Technology Kurukshetra
(Deemed University)

Introduction of new **M. Tech.** Course in **CAD/CAM**

First Semester

Sr. No.	Course No.	Title	L	T	P	Credit
1.	MEC-101	Finite Element Method	3	1	-	3.5
2.	MEC-103	Computer Programming & Data Structure	3	1	-	3.5
3.	MEC-105	Machine Vision	3	1	-	3.5
4.	MEC-	Elective –I	3	1	-	3.5
5.	MEC-	Elective – II	3	1	-	3.5
6.	MEC-111	Mechatronics (Pr.)	-	-	3	1.5
7.	MEC-113	Machine Vision (Pr.)	-	-	3	1.5

Second Semester

Sr. No.	Course No.	Title	L	T	P	Credit
1.	MEC-102	Computer Integrated Manufacturing	3	1	-	3.5
2.	MEC-104	Computer Aided Design	3	1	-	3.5
3.	MEC-106	Interactive Computer Graphics	3	1	-	3.5
4.	MEC-	Elective –I	3	1	-	3.5
5.	MEC-	Elective – II	3	1	-	3.5
6.	MEC-112	Computer Aided Design (Pr.)	-	-	3	1.5
7.	MEC-114	Computer Numerical Control (Pr.)	-	-	3	1.5

Third Semester

Sr. No.	Course No.	Title	L	T	P	Credit
1.	MEC-	Elective –I	3	1	-	3.5
2.	MEC-	Elective – II	3	1	-	3.5
3.	MEC-210	Seminar	-	-	2	1.0
4.	MEC-222	Thesis (Start)	-	-	-	-

Fourth Semester

Sr. No.	Course No.	Title	L	T	P	Credit
1.	MEC-222	Thesis	-	-	-	-

List of Electives

Sr. No.	Course No.	Title	L	T	P	Credit
1.	MEC-001	Artificial Intelligence	3	1	-	3.5
2.	MEC-002	Advanced Mechanism Design	3	1	-	3.5
3.	MEC-003	Machine Tool Design	3	1	-	3.5
4.	MEC-004	Optimization Technique	3	1	-	3.5
5.	MEC-005	Soft Computing	3	1	-	3.5
6.	MEC-006	Rapid Prototyping	3	1	-	3.5
7.	MEC-007	Automatic Control System	3	1	-	3.5
8.	MEC-008	Management Information System	3	1	-	3.5
9.	MEC-009	Modelling & Analysis	3	1	-	3.5
10.	MEC-010	Mechatronics	3	1	-	3.5
11.	MEC-011	Simulation of Mechanical System	3	1	-	3.5
12.	MEC-012	Industrial Robotics	3	1	-	3.5

M.TECH. MECHANICAL ENGINEERING
MEC- 101 FINITE ELEMENT METHOD

L	T	P / D	Cr
3	1	-	3.5

1. **Introduction to Finite Element Method:**
Basic Concept, Historical background, Engineering applications, general description, Comparison with other methods. **(4hrs)**

2. **Integral Formulations And Variational Methods:**
Need for weighted-integral forms, relevant mathematical concepts and formulae, weak formulation of boundary value problems, variational methods, Rayleigh-Ritz method, and weighted residual approach. **(10 hrs)**

3. **Finite Element Techniques:**
Model boundary value problem, finite element discretization, element shapes, sizes and node locations, interpolation functions, derivation of element equations, connectivity, boundary conditions, FEM solution, post-processing, compatibility and completeness requirements, convergence criteria, higher order and isoparametric elements, natural coordinates, Langrange and Hermite polynomials. **(12 hrs)**

4. **Applications To Solid and Structural Mechanics Problems:**
External and internal equilibrium equations, one-dimensional stress-strain relations, plane stress and strain problems, axis-symmetric and three dimensional stress-strain problems, strain displacement relations, boundary conditions, compatibility equations, Analysis of trusses, frames and solids of revolution, computer programs. **(10 hrs)**

5. **Applications To Heat Transfer Problems:**
Variational approach, Galerkin approach, one-dimensional and two-dimensional steady-state problems for conduction, convection and radiation, transient problems. **(5 hrs)**

6. **Applications To Fluid Mechanics Problems:**
Inviscid incompressible flow, potential function and stream function formulation, incompressible viscous flow, stream function, velocity-pressure and stream function-vorticity formulation, Solution of incompressible and compressible fluid film lubrication problems. **(6 hrs)**

7. **Additional Applications :**
Steady-state and transient field problems. **(10 hrs)**

Books Recommended:

1. The Finite Element Method by Zienkiewicz, Tata McGraw Hill
2. The Finite Element Method for Engineers by Huebner, John Wiley
3. An Introduction to the Finite Element Method by J.N.Reddy, McGraw Hill
4. The Finite Element Method in Engineering by S.S. Rao, Pergamon Press

M.TECH. MECHANICAL ENGINEERING
MEC- 004 OPTIMIZATION TECHNIQUES

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Need of optimization and historical development, engineering applications, classification and formulation of optimization problem. (4 hrs)

2. **Classical Optimization Techniques:**
Single-variable and multi-variable optimization, with and without constraints, Kuhn-Tucker conditions. (8 hrs)

3. **Nonlinear Programming:**
Introduction,One-dimensional optimization methods, unconstrained and constrained optimization techniques; elimination methods, exhaustive search, interval halving, fibonacci, golden section methods; Random search methods, Hooke and Jeeves Method, Powell's method; Indirect search methods: steepest descent, Fletcher-Reeves, Newton's method, DFP, BFGS method; Internal and external penalty approach. (12 hrs)

4. **Other Optimization Techniques:**
Introduction and basic concepts of Geometric Programming, dynamic programming, integer programming, stochastic programming, their applications. (8 hrs)

5. **Advance Topics in Optimization:**
Multiobjective programming, introduction to Genetic algorithms, simulated annealing and ANN based optimization. (8 hrs)

Books Recommended:

1. Engineering Optimization Theory and Practice by S.S.Rao, New Age International
2. Optimization for Engineering Design by Kalyanmoy Deb, PHI
3. Optimization Techniques by J.S Arora, John Wiley

M.TECH. MECHANICAL ENGINEERING
MEC-104 COMPUTER AIDED DESIGN

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Introduction, Review of vectors & Matrices, Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems. (3 hrs)

2. **Transformations:**
Introduction, transformation of points and line, 2-D translation, shearing, rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic, axonometric, oblique and perspective projections. (10 hrs)

3. **Curves:**
Geometry and topology, algebraic and geometric forms of straight lines, circles, conics, cubic splines, Ferguson curve, Hermite curve, bezier curves and B-spline curves, NURBS, composite curves, tangents and normal, blending functions, reparametrization. (9 hrs)

4. **Surfaces:**
Algebraic and geometric forms, tangents and twist vectors, normal, blending functions, reparametrization. Plane surface, sixteen point form, four curve form, ruled surface, surface of revolution, tabulated cylinder, lofted surface, bi-cubic surface, bezier surface, B-spline surfaces, Coons' patch, blending surface, offset surface, rational surface. (9 hrs)

5. **Solids:**
Solid models and representation schemes, their properties, boundary representation, constructive solid geometry, sweep representation, cell decomposition, octree encoding, spatial occupancy enumeration. (7 hrs)

6. **Analytical properties:**
Analytical properties (Intersection & development) of curves and surfaces. (2 hrs)

Books Recommended:

1. CAD/CAM by Groover and Zimmer, Prentice Hall
2. CAD/CAM: Theory and Practice by I. Zeid, McGraw Hill
3. Geometric Modeling by M.E. Mortenson

M.TECH. MECHANICAL ENGINEERING
MEC-105 MACHINE VISION

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction**
Machine vision, Elements of machine vision system, Basic relationship between pixels (Neighbors of a pixel, connectivity, Labeling of connected components, Distance measure) (4hrs)

2. **Image Processing**
Digitization, Noise, Introduction to spatial domain and frequency domain, Spatial filters (mean, median, gaussian smoothing filters, high pass filters), Image enhancement techniques (LUT, Histogram Equalization, Histogram specification, contrast stretching, intensity transformations). (8 hrs)

3. **Image Analysis**
Segmentation of images, Techniques for detecting point, line, edges (Roberts, Prewitt, Sobel, Laplacian operations), Edge linking and boundary detection, Thresholding, Region oriented segmentation (Region growing by pixel aggregation, Region splitting and merging). (8 hrs)

4. **Description**
Boundary Descriptions (Chain code, Signatures, Polygon approximation, shape numbers, Fourier descriptors) Regional descriptors-simple descriptors (Perimeter, area, minimum and maximum radii, no. of holes, corner, bending energy, compactness), Moment based descriptors (center of mass, bounding rectangle, Best fit ellipse, Eccentricity, moment invariants), Texture. **(10 hrs)**

5. **Pattern Recogaition**
Decision theoretic methods (Nearest neighbor classifier, Neural network), Structural methods, syntactic methods, Template matching. **(10 hrs)**

Books Recommended:

1. Digital image processing by Rfael C. Gonzalez and Richard E. Woods.
2. Fundamentals of Digital image processing by Anil K. Jain
3. Digital image processing-Concepts, Algorithms and Scientific Applications by Bernd Jahne
4. Machine vision by Ramesh Jain, Rangachar Kasturi, Brian G. Schunck.

M.TECH. MECHANICAL ENGINEERING
MEC-012 INDUSTRIAL ROBOTICS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
A sense of history, a sense of design, manipulators and manipulations, robot analysis and control in a nutshell. (4 hrs)

2. **Kinematics I: Geometry**
Mathematical preliminary, position and orientation of a rigid body, co-ordinate transformation, Euler angle, homogeneous transformations. Kinematics modeling of manipulator arms, open kinematic chains, the denairt-Hartenberg notation, kinematics equations. Inverse kinematics: introduction, solving the kinematic equation for the 5 RIP manipulators, solvability. (6 hrs)

3. **Kinematics II: Differential Motion**
Kinematic modeling of instantaneous motions, differential relations, infinitesimal relations, computation of the manipulators, Jacobian. Inverse instantaneous kinematics: resolved motion rate, redundancy. Optimal solutions. (6 hrs)

4. **Static's:**
Force and moment analysis, equivalent joint torques, duality, transformations of force and moments. Stiffness, Introduction, endpoint compliance analysis, the principle transformation of compliance matrices. (6 hrs)

5. **Dynamics:**
Newton-Euler formulation of equation of motion, basic dynamic equation, closed form dynamic equations, physical interpretation of the dynamic equation. Longrangian formulation of the manipulator dynamics; Lagrange dynamics, the manipulators, inertia tensor, deriving Lagrange motion equation, transformations of generalized co-ordinates. Inverse dynamics; introduction, recursive computation, moving co-ordinates, Walker Paul's algorithm. (9 hrs)

6. **Trajectory Control:**
Introduction, Position control, load scheme work, trajectory control, sliding surfaces, perfect tracking using switched control laws, continuous control laws to approximate switched control. Robust trajectory control for robot manipulators; Practical evaluation of parametric uncertainties, the modeling/performance trade-off. (9 hrs)

Books Recommended:

1. Robotics Technology & Flexible Automation by S.R. Deb.
2. Fundamentals of Robotics by David, D.Ardayfio.
3. Manufacturing Science and Technology by S.Dalela.

M.TECH. MECHANICAL ENGINEERING
MEC-002 ADVANCED MECHANISM DESIGN

L	T	P/D	Cr
3	1	-	3.5

1. **Kinematics of Plane and Complex Mechanisms:**
Introduction, advanced Kinematics of plane motion, inflection points and the inflection circle, Euler-savary equation, Geometric construction, Pulode curvature, cubic of stationary curvature. (6 hrs)

2. **Synthesis of Plane Mechanisms:**
Introduction, number synthesis, dimensional synthesis –Motion generation, Path generation, function generation, complex number modeling graphical, analytical and combined methods of synthesis. (6 hrs)

3. **Kinematics Synthesis of Advance Topics:**
Introduction, synthesis of multi loop linkages, Burmester theory, synthesis of geared linkages and cam mechanisms multiple reparted position synthesis, computer program for synthesis. (6 hrs)

4. **Dynamics of Mechanisms:**
Introduction, general principle of dynamics, Kineto-statics using Matrix method, time response modification of time response of mechanisms. (4 hrs)

5. **Balancing of Linkages:**
Introduction, force and moment balancing of linkages, optimization of shaking moments, shaking moment balancing effect of moment balance on input torque computer program for force and moment balancing, balancing of flexible rotors, field balancing. (9 hrs)

6. **Machine Vibrations:**
Introduction, single and multiple degree of freedom systems, vibrations of beams and shafts, practical applications. (3 hrs)

7. **Kinematics Analysis of Industrial Robots:**
Transformation, spatial transformations, position, analysis, velocity analysis, acceleration analysis, point kinematics in three-dimensional space. (4 hrs)

Books Recommended:

1. Advanced Mechanisms Design by Sandoor and Erdeman.
2. Theory of Machine and Mechanism by A. Ghosh & A. Malik
3. Theory Machines by J.C. Shiegley.

M. TECH. MECHANICAL ENGINEERING

MEC-102 COMPUTER INTEGRATED MANUFACTURING

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
The meaning of 'I' in CIM. Data & Process integration. A typical process chain, CIM Integration Model. (6 hrs)

2. **Components of CIM:**
PPC, primary data management, planning levels, degree of implementation, new approaches to PPC systems. CAD; links, geometric models, CAD standard interfaces, interactive control. CAP; work scheduling for NC machine, CAM; automated production, computerized organizational forms for flexible production. Computer aided quality assurance, interfaces between CIM components. Data relationships between CAD ? CAM, data flow from PPC to CAD/CAM. GT; introduction, part families, parts classification & coding, GT machine cells, benefits of GT, MRP; introduction, inventory management, material equipment planning large MRP concepts, inputs to MRP, low MRP work, MRP output reports, benefits of MRP. MRP-II, maintenance resource planning. (34 hrs)

Books Recommended:

1. CIM, computer integrated industry: AW. Scheer, Springer Verlag.
2. CAD/ CAM: M.P. Groover, Prentice Hall.

M. TECH. MECHANICAL ENGINEERING

MPC-503 MACHINE TOOL DESIGN

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
General requirements of machine tool engineering; elements of tool selection; techno-economic prerequisites; layout of machine tool units. (5 hrs)

2. **Principle of Machine Design:**
Objectives of machine design, economic factors of design, durability, operational reliability, machine cost, building up machines derivatives on the basis of utilization, reduction of product range preferred numbers and their use in designing, general design rules. (6 hrs)

3. **Machine Tool Drive:**
Speed selection; clutch systems, machine tool gear boxes, mechanical, hydraulic, electrical and stepless drives, servo control; regulation of speed and feed. (6 hrs)

4. **Machine Tool Elements:**
Strength and rigidity considerations; rigidity of structures rigidity criteria, specific rigidity indices of material, enhancing rigidity at the design stage, improving the rigidity of machine construction design of hydrodynamic, hydrostatic and antifriction sideways; design of lathe bed; radial drill columns and milling machine columns; analysis and design of spindle and spindle supports, power screws and bearing guides; model techniques applied to the design of machine tool structures. Kinematics of machine tools; shaping surfaces classification of motions, kinematics constraints, kinematics structure of machine tools, analysis of the kinematic scheme of machine tools having mechanical kinematic constraints and non-mechanical kinematic constraints, effect of various factors on the kinematic structure of machine tool. Static deformation of machine tool structure. (9 hrs)

5. **Machine Tool Dynamics:**
Machine tool cutting process closed-loop system, dynamic characteristics of the equivalent elastic system (EES), dynamic characteristics of the cutting process; vibration of machine tools and dynamic rigidity; sources of vibration, stability against chatter; its general features, theory of chatter and stability analysis, damping and dampers, chatter in grinding. (6 hrs)

6. **Automatic Machine Tools:**
Automatic machine tools; degree of automation; semi-automatics, single spindle, multiple spindle automatics; transfer machines; swiss type automatics; loading, unloading and transfer devices; tooling layouts. Automatic transfer lines, classification of automatic transfer lines, equipment of transfer lines, arrangement of automatic transfer lines. (4 hrs)

7. **Machine Tool Controls:**
Principles and functions of control systems; speed and feed changing systems, automatic and adaptive control system,; ergonomic design of control members, Numerical control fundamentals, manual and computer-aided part programming, machining centers; needs for the types of new machining processes, computer-aided manufacturing. (4 hrs)

Books Recommended:

1. Machine Tools Structures by Koengsberges and Thusty, Pergamon Press.
2. Automatic Machine Tjools by Town , Ilifee Books Ltd, London.
3. Machine Tools by Nichemuv, Mir Pull, Moscow.
4. Machine Tool Design by N. Acherkan, Mis Pull, Moscow.
5. Fundamentals of Machine Design by Orlov Mis Pull, Moscow.
6. Numerical Control of Machine Tools by S.J. Martin, English Language Book Society and English University Press Ltd, London.

M. TECH. MECHANICAL ENGINEERING
MEC-009 MODELING AND ANALYSIS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Need for system modeling, system approach to modeling, open & feed back systems, combination of simple feed lock systems, feed lock time lag effects, feed back and managerial systems. (6 hrs)

2. **Production and Operation Management:**
Principles of analytical modeling, kinds of analytical methods, large systems. (9 hrs)

3. **Computer Programme:**
Development of computer programme for simplex method, assignment and transportation problem, PERT & CPM problems. (10 hrs)

4. **Simulation:**
Monte Carlo Simulation, generation of stochastic variants, continuous and discrete probability distribution , application of Monte Carlo, Methods for production systems, computer simulation models, macro dynamic models, examples form business and Industries, design of management game simulation larger as SIMLA, SIMSCR, PT, GPSS etc. statistical output analysis. (15 hrs)

Books Recommended:

1. System simulation with digital computers by Dass Narsing, Prentice Hall.
2. System simulation by Gordon G. Prentice Hall.
3. Computer simulation Techniques by Naylor T .H., Johan Wiley.

M.TECH. MECHANICAL ENGINEERING
MEC-005 SOFT COMPUTING

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Introduction and need of soft computing tools in engineering, engineering applications, overview. (6 hrs)

2. **AI Applications in Mechanical Engineering:**
Introduction, problem solving, forward versus backward reasoning, heuristic methods, analyzing search algorithms, knowledge representation, applications. (9 hrs)

3. **Fuzzy Logic Applications in Mechanical Engineering:**
Introduction, membership function, fuzzy sets, fuzzy logic, fuzzy rules, fuzzy relations, fuzzy inference, approximate reasoning, predicate logic, applications. (15 hrs)

4. **ANN Applications in Mechanical Engineering:**
Introduction, feedforward networks, multilayer networks, complexity of learning using feedforward networks, adaptive structure networks, competitive learning, applications. **(10 hrs)**

Books Recommended:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, McGraw Hill
2. Fuzzy Logic with Engineering Applications by Timothy Ross
3. Fuzzy Sets and Fuzzy Logic – Theory and Applications by G.J.Klier & Bo Yuan
4. Neural Network Fundamentals by N.K.Bose & P. Liang, TMH

M.TECH. MECHANICAL ENGINEERING
MEC-010 MECHATRONICS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Definitions, trends, control systems, microprocessor / micro controller based controllers, PC based controllers, applications: SPM, robot, CNC machine, FMS, CIM. (3 hrs)

2. **Sensor Technology:**
Sensor and transducers, terminology, displacement, position, proximity – encoders, velocity – tachogenerators, force - strain gauges, pressure, temperature – thermocouples, RTDs, thermistors, light sensors – photoelectric sensors, IR sensors, sensor selection. (4 hrs)

3. **Signal Conditioning:**
Introduction, the operational amplifier, protection, filtering, wheatstone bridge, digital signals, multiplexers, data acquisition, digital signal processing, pulse – modulation. (3 hrs)

4. **Precision Mechanical Actuation:**
Pneumatic actuation systems, electro-pneumatic actuation systems, hydraulic actuation systems, electro-hydraulic actuation systems, mechanical systems, types of motion, kinematics, inverse kinematics, timing belts, ball screw and nut, linear motion guides, linear bearings, harmonic transmission, bearings, motor / drive selection. (4 hrs)

5. **Electronic Devices and Circuits:**
Semiconductor devices, diodes and LEDS, zener diodes and voltage regulator, inductive kick, bandwidth, frequency %& response of a measurement system, bipolar transistor circuits, amplifiers. (4 hrs)

6. **Electromechanical Drives:**
Relays and solenoids, stepper motors, DC brushed and brushless motors, DC servo motors, AC / DC motors for non-servo motion drives, braking methods, pulse width modulated, Bipolar driver, Mosfet drives, SCR drives, variable frequency drives. (4 hrs)

7. **Digital Electronics:**
Digital logic, number systems, logic gates, Boolean algebra, Karnaugh maps, sequential logic. (3 hrs)

8. **Microprocessors:**
Control, microcomputerstructure, microcontrollers, digital interfacing, analog interfacting, DAC, ADC, applications. (3 hrs)

9. **Input / Output Systems:**
Interfacing, input / output ports, interface requirements, peripheral interface adapters, serial communication interface, direct memory access. (3 hrs)

10. **Control System:**
System transfer function, Laplace transformation and its applications, continuous and discrete processes, proportional control, integral control, differential control, PID control, digital controllers, control system performance, controller tuning, adaptive control, frequency response, PLC, PMC, introduction to fuzzy logic and neural networks. **(9 hrs)**

Books Recommended:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, McGraw Hill
2. Fuzzy Logic with Engineering Applications by Timothy Ross
3. Fuzzy Sets and Fuzzy Logic – Theory and Applications by G.J.Klier & Bo Yuan
4. Neural Network Fundamentals by N.K Bose & P. Liang, TMH

M.TECH. MECHANICAL ENGINEERING

MEC-103 COMPUTER PROGRAMMING & DATA STRUCTURE

L	T	P/D	Cr
3	1	-	3.5

1. **The Turbo C++ Language:**
   Basics of programming in C, C++,VC++: Algorithms and flow charts, character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic names,. Input- output functions. Preparing and running a complete simple C++ program in TC/VC++ environment. Loops and decisions, Functions, arrays, structures, classes and unions, operator overloading, pointers, Files and Streams. Introduction to graphics programming in TC/VC++ environment. Object Oriented Programming (OOP). (24 hrs)

2. Data Files:
   Create, open, close, process, formatted and unformatted data files. (4 hrs)

3. Data Structures:
   Stacks, queues, lists, trees, and their applications. (12 hrs)

M.TECH. MECHANICAL ENGINEERING

MEC-011 SIMULATION OF MECHANICAL SYSTEMS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Overview of kinematic descriptions, Degrees of freedom. Kinematic constraints of rigid and flexible systems. (4 hrs)

2. **Rigid Body Motion:**
Energy Methods and variational principles. Euler-Lagranges equation for discrete and continuous systems. Hamiltons principle. Analysis of constraints, non-holonomic systems. (10 hrs)

3. **Modelling of Systems:**
Modelling in multi-energy domain through bond graphs. Modeling of structural systems, hydraulic systems, thermal systems, mechatronic systems. (10 hrs)

4. **Simulation:**
Simulation for Mechanical systems for synthesis using computational tools like MATLAB, Mathematica, etc. (8 hrs)

5. **Dynamic Analysis:**
Dynamics analysis using FEM and other computer software for FEM analysis. (8 hrs)

M.TECH. MECHANICAL ENGINEERING

MEC-001 ARTIFICIAL INTELLIGENCE

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
   Basic concepts of artificial intelligence. (3 hrs)

2. **Modelling:**
   Problem formulation and solution techniques. Expert systems. Knowledge Representation, Knowledge Acquisition, Inference Mechanisms. (12 hrs)

3. **Robot Intelligence:**
   Intelligence for manufacturing tools, manufacturing brain, eye and hand, Trends in robot intelligence. (12 hrs)

4. Artificial Intelligence Techniques:
   ANN, GA techniques for AI. Search techniques & solutions to AI problems. (9 hrs)

5. Case studies:
   Case studies in the application of artificial intelligence in manufacturing. (4 hrs)

M.TECH. MECHANICAL ENGINEERING

MEC-006 RAPID PROTOTYPING

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Classification of manufactering processes, Different Manufacturing Systems, Introduction to Rapid Prototyping (RP), Need of RP in context of batch production. **(5 hrs)**

2. **Basic Principles:**
FMS and CIM and its application; Basic Principles of RP, Steps in RP, Process chain in RP in integrated CAD-CAM environment, Advantages of RP. **(6 hrs)**

3. **Classifications of RP Techniques:**
Classifications of different RP techniques – based on raw material, layering technique (2D or 3D) and energy sources. **(9 hrs)**

4. **RP Modelling:**
Process Technology and Comparative study of :- Stereo-lithography (SL) with photo-polymerisation, SL with liquid thermal polymerization, Solid foil polymerization, Selective laser sintering, Selective powder binding, Ballastic particle manufacturing – both 2D and 3D, Fused Deposition Modelling, Shape Melting, Laminated Object Manufacturing, Solid Ground Curing, Repetitive Masking and deposition, Beam Inference Solidification, Holographic Interference Solidification, Special Topic on RP using metallic alloys, Programming in RP, Modelling, Slicing, Internal Hatching, Surface Skin Fills, Support Structure. **(20 hrs)**

M.TECH. MECHANICAL ENGINEERING

MEC-106 INTERACTIVE COMPUTER GRAPHICS

L	T	P/D	Cr
3	1	-	3.5

1. **Computer Hardware:**
   Introduction to architecture of graphics workstation, Display processors. **(3 hrs)**

2. **Basic drawing algorithms:**
   DDA, Breshnham or mid point line, circle, ellipse algorithms. (3 hrs)

3. **Interactive Graphical Techniques And Tools:**
   Geometric modifiers, dragging, rubber-banding, names, Layers, Colours, Grids, Groups. Interactive computer programming. Graphic User Interface features, design and use. (6 hrs)

4. **Graphic Manipulations And Editing:**
   Object selection methods, manipulation and editing operations. (4 hrs)

5. **Display Description:**
   Screen coordinates, user coordinates; Graphical data structures, Display code generation; Graphical functions. (6 hrs)

6. **Graphics Software Package Design:**
   Primitive (constants, actions, operators, variables), plotting and geometric transformations. Viewing, windowing transformation, line and polygon clipping algorithms. (6 hrs)

7. **Projections:**
   Perspective, parallel. (3 hrs)

8. **3-D Graphics:**
   Hidden line and Surface elimination, Transparent solids, shading, colouring, rendering. (3 hrs)

9. **Computer Animation:**
   Conventional and computer animation, Animation systems, types, and techniques. (3 hrs)

10. **Mechanical Assembly:**
    Assembly modeling, Representation schemes, Assembly sequences, Assembly analysis. (3 hrs)

M.TECH. MECHANICAL ENGINEERING

MEC-008 MANAGEMENT INFORMATION SYSTEMS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
Concepts of Management, Information and Systems, History of Information Systems. Philosophies Governing the development of Information Systems. (3 hrs)

2. **Role of Information Systems in Organizations:**
Local and Global context. Additional perspectives as benefits from Technical Trends and innovations, special characteristics and enigmas of information. (6 hrs)

3. **Information System and Business Processes:**
Analyzing information system from a business perspective using work centred analysis of systems. (4 hrs)

4. **Information System Taxonomies:**
Transaction Processing system, Management Information Systems. Decision support system, Executive Information Systems, Artificial Intelligence, Expert Systems and Office Automation Systems. (6 hrs)

5. **System Analysis And Design:**
Information System Planning, introduction challenges, strategic issues, selecting systems, project management issues, Methodology and implications of system analysis and design, SDLC, Prototyping, End user Development, Off the shelf software, outsourcing and application software. (9 hrs)

6. **Tools for Information System Development:**
Structural tools for analysis and design, tools to represent system data and process, Tools for structured programming, tools to convert programs specification into code. (3 hrs)

7. **Database Design and Management:**
Components of DBMS, Database models, Principles of DBMS. (3 hrs)

8. **Strategic Information Systems:**
Characteristics, and Plan, Business Information Systems, MARIS, Information systems for Manufacturing, Human Resource, Finance and Accounts, and Quality. (3 hrs)

9. **ERP:**
Introduction, concepts, applications, advantages and disadvantages. (3 hrs)

M.TECH. MECHANICAL ENGINEERING
MEC-007 AUTOMATIC CONTROL SYSTEMS

L	T	P/D	Cr
3	1	-	3.5

1. **Introduction:**
   Basic Concepts, types of automation, automation strategies. (3 hrs)

2. **Type of Control Systems:**
   Mechanical, electrical and pneumatic automation devices and controls. (6 hrs)

3. **Classifications:**
   Classifications of automatic transfer machines, analysis of automated flow-lines. (6 hrs)

4. **Robot Programming:**
   NC and CNC machine tools, Machining centers and programmable robots. (12 hrs)

5. **Flexible Automation:**
   Flexible manufacturing systems, Group technology and machining cell design. (4 hrs)

6. **Assembly Automation:**
   Types of assembly systems, automatic transfer, feeding and orientation devices, assembly line balancing, performance and economics of assembly systems. (9 hrs)

M.TECH. MECHANICAL ENGINEERING
MEC-111 MECHATRONICS (Pr.)

L.	T	P/D	Cr
-	-	3	1.5

List of Experiments:

1. To study and conduct exercises on PLC Simulator.
2. Control of Conveyor manually and through Programming also Programming using Sensors and Conveyor.
3. Control of X-Y Position table manually and through Programming.
4. To study and conduct exercises on RoboX.
5. To study and conduct exercises on Pneumatic & Electro-Pneumatic Training System.
6. To study and conduct exercises on Simulation Software for Pneumatic Components (P-Simulator)
7. To study and conduct exercises on Hydraulics and Electro-Hydraulics Training System.
8. To study and conduct exercises on Simulation Software for Hydraulic Components (H-Simulator)
9. To study and conduct exercises on Educational Robot Training System.

M.TECH. MECHANICAL ENGINEERING
MEC-112 COMPUTER AIDED DESIGN (Pr.)

L	T	P/D	Cr
-	-	3	1.5

List of Experiments:

1. To develop a computer program for 2D scaling, reflection, rotation and translation transformations of a geometric entity.
2. To develop a computer program for automatic meshing of an involute profile spur gear.
3. To develop a computer program for 3D scaling, reflection, rotation and translation transformations of a geometric entity and show its application for a unit cube.
4. To develop a computer program for orthographic projections and use it to generate the top, front and side views of a truncated cube.
5. To develop a computer program for single point perspective projection and use it to view a truncated cube.
6. To develop a computer program for joining a set of points in space by Hermite curve segments and demonstrate the manipulation of curve shape by varying the geometric conditions.
7. To develop a computer program to generate a Bezier curve for a given set of control points and demonstrate the manipulation of curve shape by varying the geometric conditions.
8. To develop a computer program to generate a B-Spline curve for a given set of control points and demonstrate the manipulation of curve shape.
9. To develop a computer program to generate and view a ruled surface between two given rails.
10. To develop a computer program to generate and view a Bezier surface for a given mesh of control points.

M.TECH. MECHANICAL ENGINEERING
MEC-113 MACHINE VISION (Pr.)

L	T	P/D	Cr
-	-	3	1.5

List of Experiments:

1. Write a Program to Extract a sub-Image from a given Image.
2. Write an M-function to Compare the Implementation of a 2D Image Function using the Loops and Vectorization.
3. Write a Program to Compute the following Transformation Functions: Negative, Log, Gamma, and Contrast Stretchy.
4. Write a Program to Generate and Plot Image Histograms. Show the Difference between the Original Image and the Histogram Equalized Image.
5. Show the use of Linear Spatial Filters on Image.
6. Show the use of Non-linear Spatial Filters on Image.
7. Compute and Visualize the 2D FFT of an Image.
8. Write a Program to Compute an Image with Noise.
9. Write a Program that Compute the Histogram of a Region of Interest (ROI) in an Image.
10. Write a Program to Flip the Image Vertically, Cropping of Image, and to sub-Sampling of the Image.
11. Write a Program to Display, Show Basic Information, and Write an Image.
12. Write a Program to Find out Neighborhood Average Image.
13. Write a Program to use Median Filtering an Image.

M.TECH. MECHANICAL ENGINEERING
MEC-114 COMPUTER NUMERICAL CONTROL (Pr.)

L	T	P/D	Cr
-	-	3	1.5

List of Experiments:

1. To Prepare a part program for CNC Lathe
2. To Prepare a part program for CNC Milling Machine
3. To Prepare a part program for CNC Turning centre
4. Study and demonstration on wire cut EDM
5. Study and demonstration on Ultra Sonic Drilling Machine
6. Estimation of cutting forces for drilled components
7. Demonstration on gear hobbing machine
8. Study of some computerized
9. Demonstration on MIG welding set
10. Introduction to RPT process
11. Demonstration on Advanced Manufacturing System

DEPARTMENT OF MECHANICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

INTRODUCTION OF NEW COURSES:
M.TECH (MECHANICAL – CAD/CAM)

1. Background

Design and manufacturing of components are two essential streams of Mechanical Engineering and product design and development. The gap between design and manufacturing need to be bridged, as product life cycle is getting shorter day by day. Acquiring knowledge of CAD/CAM prepares one to stand competitively in present era.

2. Justification

Due to globalization and opening up of the economy, competition has increased enormously in Indian manufacturing and service sector. A specialized course in M.Tech. (Mechanical – CAD/CAM) becomes important in view of the changing global scenario. Our engineers need to be equipped with latest technologies of product design, analysis, manufacturing and development. The courses in the stream of computer-aided design (CAD), computer-aided manufacturing (CAM), computer-aided engineering (CAE), computer-aided inspection (CAI) etc. are the need of the day for the budding Mechanical engineers. Every product is required to be given a final shape right from the concept, which exists in mind, to a reality in the shortest possible time and that too with minimum efforts and wastage. With more and more emphasis on R&D, postgraduate education in the area of CAD/CAM will prepare engineers with direct applications to industry as well as overall environment. The theory and lab courses would fulfill the need of providing students with practical knowledge in the area.

3. Proposed Sub-activities

a. The proposed PG course will produce engineers with expertise in CAD/CAM. This will help the product design and development sector that is facing the specialized manpower crunch.
b. The students will undertake practical problems faced by the industries in the product design and development sector and suggest remedies.
c. The faculty will be utilizing their expertise and will provide solutions to the problems pertaining to the technologies of design, manufacturing and analysis of new and existing products.
d. The students would strengthen the community, economy and hence, the country to stand tall in globally competitive environment.

4. Resource requirements

1.1 Civil Works

1. The estimates for civil and electrical works are not included in the proposal.
2. Separate space and electrical connection will be required for these proposed equipments.

1.3 Equipments

Equipments for modernization are detailed in Annexure III.

4.3 Furniture

As per centralized purchase policy.

4.7 Human resources

4.7.1 Training: The teaching and supporting staff need training as detailed in Annexure III. Financial requirements are listed there.

4.7.2 Additional staff required: As detailed in Annexure-IV.

5. Financial requirements

The financial requirements of the course have been covered in Annexure III.

7. Impact: The proposed activity will be helpful in enhancing the much-needed expertise in the CAD/CAM sector. More thrust will be given on strengthening the country's knowledge and research base, as well as to uplift the industry to compete with global organizations.

8. Beneficiaries: All the students, faculty and the community will be benefited.

9. Preparedness: The institute has already identified the equipments to be procured.

10.Sustainability: Department proposes one Post Graduate course in CAD/CAM specialization (in addition to one existing). The intake of students will be 20 for the proposed course. The additional equipments and laboratories are proposed keeping in view the state of the art exposure to the students. The technological development will be keeping in mind the service to the community.

The revenue generation from the proposed missions will be as follows:

a) Fee @ Rs. 30,000 per student per annum for two year PG course:	Rs. 12,00,000.00
b) Revenue through facilities offered to the outside students performing dissertation/ project work:	Rs. 1,00,000.00
c) R & D Consultancy services:	Rs. 1,00,000.00
d) Revenue through short-term courses in emerging areas:	Rs. 1,00,000.00
Total Revenue:	Rs. 15,00,000.00

ENHANCEMENT IN POST GRADUATE EDUCATION AND RESEARCH

1. Background:
For meeting the needs of the industries and large numbers of teachers required in engineering colleges, there is need for more number of engineers with post graduation and doctorate degrees.

2. Justification:

a. With ever increasing number of Engineering Colleges there is a big demand of postgraduate engineers.
b. Industries are also in search of specialized technical manpower.
c. A lot of MNC's have setup then R&D centers &Indian ventures are also keen to go for in house R&D. There is a big demand for Doctoral and Postgraduate in emerging areas.

3. Sub activities:

In addition to existing Postgraduate course in Mechanical Engineering other postgradumte course is being introduced with intake of 20. Thus the total no of Postgraduate seats will be increased to 30. We may also introduce Part-time Post graduate courses to meet the needs of in service personnel.

EFFECTIVE INTERACTION WITH INDUSTRY

1. Background:
For overcoming the technical problems faced by the industries there is a need for providing consultancy to the industries by the experts in Engineering College. This will also expose our students and faculty to latest equipments in the industry.

2. Justification:
Industry is the end user of the product of engineering colleges. Both industry and institute need to have a meaningful interaction with each other on regular basis to sort out problems being faced by the industry.

3. Sub-activities:

a. The faculty of the institute may use their expertise in solving the technical problems being faced by the industry.
b. With increased interaction with industry, a better feed back of our product can be ascertained and accordingly remedial measures may be taken.

ADDITIONAL STAFF REQUIREMENT

Sr. no	Category of staff	Designation / Level	Gross Annual Emoluments (Rs. In Lacs)	No. to be added in different Project year					To Sta to l adc
				1	2	3	4	5	
		Technical Support Staff	(Sup) @ 01.50 (Asstt) @ 00.60 (Network Admn,)@ 01.50		05 05 01				11
2	Admn. And Finance	Sr. Admn. Staff							
		Sr. Finance Staff							
		Sr. other Staff	@ 01.25		01				01
		Support Staff							

Funds Required for Salaries of Additional staff Appointed under project

Sr. no.	Category of Staff	Annual Fund requirement of Salaries (Rs. in lacs)					Total Sal Funds re
		1	2	3	4	5	
2	Technical Support Staff	-	12.00	12.00	12.00	12.00	048.00
3	Sr. Administration, Finance and other Staff.						
4	Non-technical support staff		01.25	01.25	01.25	01.25	005.00
TOTAL							053.00

M.Tech. (Mechanical – CAD/CAM)

Name of the Program	Level (UG/PG)	Proposed Annual Intake	Proposed Year of Starting	Additional Teaching Staff Required
M.Tech(Mechanical CAD/CAM)	PG	20	2nd Year	1 Professor, 2 Assistant Professo

Staff Requirement:

Sr. no	Category of staff	Designation / Level	Gross Annual Emoluments (Rs. In Lacs)	No. to be added in different Project year				
				1	2	3	4	5
1	Academic	Professor	@ 03.60	-	01	-	-	-
		Assistant Professor	@ 02.70	-	02	-	-	-
		Lecturer	-	-	-	-	-	-
		Technical Support Staff	(Sup) @ 01.30 (Asstt) @ 00.60		01 01			
2	Admn. And Finance	Sr. Admn. Staff						
		Sr. Finance Staff						
		Sr. other Staff	@ 01.25		01			
		Support Staff						

Funds Required for Salaries of Additional staff Appointed under project

Sr. no.	Category of Staff	Annual Fund requirement of Salaries (Rs. in lacs)					Tot Fun
		1	2	3	4	5	
1	Teaching Staff	-	9.00	9.00	9.00	9.00	36
2	Technical Support Staff	-	2.10	2.10	2.10	2.10	08
3	Sr. Administration, Finance and other Staff.						
4	Non-technical support staff		01.25	01.25	01.25	01.25	00
	TOTAL						44

ANNEXURE V

SCHEME FOR NEW M.TECH. COURSE

Title: M.Tech. (Mechanical – CAD/CAM)

Subjects:

Theory Courses:	12
Lab Courses:	06
Seminars:	03
Project:	03
Dissertation:	01

List of theory Courses:

Computer Aided Design
Computer Aided Manufacturing
Finite Element Method
Optimization Techniques
Product Design and Development
Advanced Machine Design
Advance Manufacturing Technology
Numerical Analysis and Computer Programming
Computer Integrated Manufacturing Systems
Robotics
Machining Science
Machine Tool Design
Tool Design
Advance Metrology
Modeling and Simulation
Soft Computing
Mechatronics
Instrumentation

Note: The students will be offered twelve theory courses out of the courses mentioned above.

List of Lab Courses:

Computer Aided Design Lab
Computer Programming Lab
Computer Numerical Control Lab
Product Design and Development Lab
Advance Production Lab
Robotics and Machine Vision Lab
Mechatronics Lab.
CIMS Lab

Justification for the Proposed Labs/ Centers of Excellence and Equipments

The equipments are proposed with the intention for the following proposed courses as well as centers of excellence as follows:

1) B.Tech. in Mechanical Engineering with specialization in CAD/CAM
2) M.Tech. in Manufacturing Technology
3) M.Tech. in CAD/CAM

2. In addition to imparting engineering education, these labs will act as common platform for effective industry-institute interaction helpful for

a. Students in bringing awareness about real industrial problems and

b. Industries in getting advantage of research and infrastructure facilities.

3. The equipments are proposed taking into consideration the changes incorporated and additions made in the recently revised syllabus. Further, new labs in the area of CAD/CAM are introduced both in B.Tech. and M.Tech. curricula.

4. To conduct short-term skill development courses for unemployed youths in community for encouraging them for self-employment.

5. Machines and equipment will state-of-the-art technologies can be useful for conducting industrial research for the surrounding industries.

6. These facilities with subsequent project and research work can provide consultancy to small scale industries in clusters like Machine tools at Ludhiana, Foundary at Samalkha, Scientific Instruments at Ambala, Utensil industy at Jagadhari etc. in removing obsolence for their sustainable development and growth.

3.1.1. Improvement in Teaching, Training and Learning Facilities:

a) The proposed laboratories and modernization to the workshop will be helpful in developing a platform for practical exposure to the UG students, project work to the PG students and research to the research scholars. The awareness of the students with modern equipments with the state of the art technology can be useful to enhance their competency and employability in the national as well as international market.

b) The proposed new M Tech programs are in the emerging areas with the aim to expose the post graduate students to specializations that are going to form the backbone of the technology in the times to come. The courses are designed to encourage self-employment.

Name of the Program	Level (UG/PG)	Proposed Annual Intake	Proposed Year of Starting	Additional Teaching Staff Required
M.Tech CAD/CAM	PG	20	2nd Year	1 Professor, 2 Assistant Professors

9. Sustainability Plan

DEPARTMENT PROPOSES FIVE POST-GRADUATE COURSES WITH AN INTAKE OF 20 STUDENTS IN EACH PROGRAM. THE ADDITIONAL EQUIPMENTS AND LABORATORIES ARE PROPOSED KEEPING IN VIEW PROVIDING PRACTICAL AND STATE-OF-ART EXPOSURE TO THE STUDENTS. THE PROJECTS AND R&D WILL BE INDUSTRY-ORIENTED/NEED-BASED AND WILL HAVE THE BILATERAL BENEFITS AT BOTH THE ENDS. THE TECHNOLOGY DEVELOPMENT WILL BE KEEPING IN MIND THE SERVICE TO COMMUNITY.

The revenue generation from the proposed missions will be as follows:

1. Fee @ Rs. 30,000/- per student per annum for two-year Post graduate courses
   Intake: 20 students per course per annum
   40 students per course (Total: 200 students) = Rs. 6,000,000/-
2. Fee @ Rs. 30,000/- per student per annum for three-year Doctoral programs
   Intake: 10 students per annum
   30 students = Rs. 900,000/-
3. Revenue through facilities offered to the outside students performing dissertation/project works = Rs. 100,000/-
4. R&D and Consultancy services = Rs. 500,000/-
5. Revenue through offering short-term courses in specialized/emerging areas to industries = Rs. 200,000/-

Total Revenue = Rs. 77,000,000/- (Rs. 77 Lacs)

ANNEXURE-I

NEW COURSE TO BE STARTED

Name of the Course:	M. Tech. CAD/CAM
Starting Year:	Semester I, 2005-06
Total Intake of Students:	25 (15 seats for regular students through GATE + 10 seats for in-service / part-time candidates. The seats of both categories are interchangeable.) The candidates will be allowed to join the M.Tech. at different points of time at the start of each semester.
Qualifications for M.Tech.:	B.Tech. in Mechanical/ Production/ Industrial Engineering / Computer Science and Engineering
Proposed Fee Structure:	Same as for the other M.Tech Courses presently running in the Institute.
Duration of the P.G. Course:	Multi-level entry is proposed with 2 Years duration for regular students and maximum of 5 years duration for the students joining the M.Tech. at different points of time. The students will be allowed to join the M. Tech. at the start of each semester. The students shall be free to select any number of courses in a semester subject to the condition that the duration of M.Tech. shall be minimum 2 years and maximum of 5 years.

SCHEME FOR NEW M.TECH. COURSE

Title: **M.Tech. (Mechanical – CAD/CAM)**

Subjects:

Theory Courses:	12
Lab Courses:	06
Seminars:	03
Project:	03
Dissertation:	01

List of theory Courses:

Computer Aided Design
Computer Aided Manufacturing
Finite Element Method
Optimization Techniques
Product Design and Development
Advanced Machine Design
Advance Manufacturing Technology
Numerical Analysis and Computer Programming
Computer Integrated Manufacturing Systems
Robotics
Machining Science
Machine Tool Design
Tool Design
Advance Metrology
Modeling and Simulation
Soft Computing
Mechatronics

Note: The students will be offered twelve theory courses out of the courses mentioned above.

List of Lab Courses:

Computer Aided Design Lab
Computer Programming Lab
Computer Numerical Control Lab
Product Design and Development Lab
Advance Production Lab
Robotics and Machine Vision Lab
Mechatronics Lab
CIMS Lab

Project Courses:

One in each semester

Dissertation

In Fourth Semester

- **Flexibility of Timings and Selection of Subjects**

  The proposed P. G. Programme is made highly flexible in the choice of subjects and timings of attending the classes to facilitate their pursuit by in-service personnel. The classes for in-service persons can be conducted on Saturdays / Sundays / holidays, or in the evening hours as per the feasibility and convenience of the faculty and students.

- **Existing Faculty**

  1. Dr. T.K. Garg, Professor
     Ph.D.
  2. Dr. Puneet Tandon, Assistant Professor
     Ph.D. (CAD), M.Tech. (CAM)
  3. Dr. Ajai Jain, Lecturer
     Ph.D. (CAM), M.Tech. (CAM)
  4. Sh. Parveen Kumar Saini
     Pursuing Ph.D. in CAD

- Highly qualified faculty is available from other specializations of Mechanical Engineering / other disciplines to teach subjects of interdisciplinary nature.

- **Additional Load**

56 hours per week for both years of M.Tech. (@ 28 periods per week per semester)

Additional Staff Requirement

1-Professor (12 hours) + 2- Assistant Professors (14 hours each) + 1 Lecturer (16 hours each) + 1-Lab Tech. + 1Lab Attendant / Peon

Staff Designation	Gross Annual Emoluments (Rs.)	Numbers to be added in years		Total Staff to be added
		2005-06	2006-07	
Professor	3,60,000/-	1	-	1
Assistant Professor	3,00,000/-	1	1	2
Lecturer	2,40,000/-	-	1	1
Lab. Technician	96,000/-	1	-	1
Lab Attendant	72,000/-	1	-	1
			Total	6

2. STAINABILITY OF THE COURSE

Same fee structure as being followed for the other M.Tech courses presently running in the Institute is proposed to be followed. However, after funding from the TEQIP project is over and the proposed M.Tech Course is not given funds from any other source, a fee of Rs 15000/- per semester (Rs. 2500/- p.m.) may be charged from the students. In that case the funds position will be:

- Total funds generated through fee per month:

  2500 x 50 (25 first-yr + 25 second yr students) = 125,000/-

- Total funds needed to meet the salary requirement of the above staff per month:

  1- Professor (30,000) + 2-Asstt Prof (25,000 x 2) + 1 Lectuer (20000) 1-Lab Tech (8000) + 1 Lab Attendant / Peon (6000) = 1,14,000/-

- As multi-level and multi-back-background entry has been proposed with full flexibility in the timings and selection of the subjects, it is believed that the programme will be able to attract a large number of students including the in-service personnel.

- From the above, it is hoped that the proposed P.G. programme will be able to sustain even after the funding from the project is over.

JUSTIFICATION AND NEED FOR STARTING M.TECH COURSE IN CAD/CAM

1. Background

Design and manufacturing of components are two essential streams of Mechanical Engineering and product design and development. The gap between design and manufacturing needs to be bridged, as product life cycle is getting shorter day by day. Acquiring knowledge of CAD/CAM prepares one to stand competitively in present era.

2. Justification

Due to globalization and opening up of the economy, competition has increased enormously in Indian manufacturing and service sector. A specialized course in M.Tech. (Mechanical – CAD/CAM) becomes important in view of the changing global scenario. Our engineers need to be equipped with latest technologies of product design, analysis, manufacturing and development. The courses in the stream of computer-aided design (CAD), computer-aided manufacturing (CAM), computer-aided engineering (CAE), computer-aided inspection (CAI) etc. are the need of the day for the budding Mechanical engineers. Every product is required to be given a final shape right from the concept, which exists in mind, to a reality in the shortest possible time and that too with minimum

efforts and wastage. With more and more emphasis on R&D, postgraduate education in the area of CAD/CAM will prepare engineers with direct applications to industry as well as overall environment. The theory and lab courses would fulfill the need of providing students with practical knowledge in the area.

3. Impact:

The proposed activity will be helpful in enhancing the much-needed expertise in the CAD/CAM sector. More thrust will be given on strengthening the country's knowledge and research base, as well as to uplift the industry to compete with global organizations. All the students, faculty and the community will be benefited. The impact of the proposed course can be realized as:

(i). The proposed PG course will produce engineers with expertise in CAD/ CAM. This will help the product design and development sector that is facing the specialized manpower crunch.
(ii). The students will undertake practical problems faced by the industries in the product design and development sector and suggest remedies.
(iii). The faculty will be utilizing their expertise and will provide solutions to the problems pertaining to the technologies of design, manufacturing and analysis of new and existing products.
(iv). The students would strengthen the community, economy and hence, the country to stand tall in globally competitive environment.

5. Enhancement in Post Graduate Education and Research

a. With ever increasing number of Engineering Colleges there is a big demand of postgraduate engineers.
b. Industries are also in search of specialized /technical manpower.
c. A lot of MNC's have setup their R&D centers &Indian ventures are also keen to go for in house R&D. There is a big demand for Doctoral and Postgraduate in emerging areas.

EFFECTIVE INTERACTION WITH INDUSTRY

For overcoming the technical problems faced by the industries there is a need for providing consultancy to the industries by the experts in technical institutes. This will also expose our students and faculty to latest equipments in the industry. As industry is the end user of the product of engineering colleges, both industry and institute need to have a meaningful interaction with each other on regular basis to sort out problems being faced by the industry. Different planned out activities are:

1. The faculty of the institute may use their expertise in solving the technical problems being faced by the industry. With increased interaction with industry, a better feed back of our product can be ascertained and accordingly remedial measures may be taken.

2. In addition to imparting engineering education, these labs will act as common platform for effective industry-institute interaction helpful for
   a. Students in bringing awareness about real industrial problems and
   b. Industries in getting advantage of research and infrastructure facilities.

3. The equipments are proposed taking into consideration the changes incorporated and additions made in the recently revised syllabus. Further, new labs in the area of CAD/CAM are introduced both in B.Tech. and M.Tech. curricula.
4. To conduct short-term skill development courses for unemployed youths in community for encouraging them for self-employment.
5. Machines and equipment will state-of-the-art technologies can be useful for conducting industrial research for the surrounding industries.
6. These facilities with subsequent project and research work can provide consultancy to small scale industries in clusters like Machine tools at Ludhiana, Foundary at Samalkha, Scientific Instruments at Ambala, Utensil industy at Jagadhari etc. in removing obsolence for their sustainable development and growth.

EXISTING INFRASTRUCTURE AND PHYSICAL FACILITIES

1. **CAD Labs** – In the process of development under TEQIP.
2. **CAM Lab** - In the process of development as Equipment Shop of Workshop Extension under TEQIP.
3. **Mechatronics Lab** – Setup in the department.
4. **Machine Vision and Image Processing Lab** – Existing in the department.
5. **Advance Production Lab** – Under development.
6. **Computer and Automation Center** – Existing in the department.