MINUTES OF THE MEETING OF THE SENATE

MNNIT, ALLAHABAD

HELD ON 18.05.2007

MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY

(Deemed University)

Allahabad – 211004

Minutes of the meeting of the Senate of MNNIT, Allahabad held on 18.05.2007 (Friday) at 3.30 P.M. in the Conference Room of the Institute.

Following members were present:

1.	Prof. A. B. Samaddar	Chairman
2.	Prof. Satish Chand	"
3.	Prof. S.K. Agrawal	"
4.	Prof. Satya Sheel	"
5.	Prof. T.N. Sharma	"
6.	Prof. V. K. Nema	"
7.	Prof. R. K. Srivastava, CED	"
8.	Prof. Raghuvir Kumar	"
9.	Prof. S.C. Prasad	"
10.	Prof. R.C. Mehta	"
11.	Prof. P. K. Mishra	"
12.	Prof. Sudarshan Tiwari	"
13.	Prof. P R Agarwal	"
14.	Prof. Nirjhar Roy	"
15.	Prof. Triloki Nath	"
16.	Prof. Rakesh Mathur	"
17.	Prof. S. K. Duggal	"
18.	Prof. Dinesh Chandra	"
19.	Prof. Vineeta Agarwal	"
20.	Prof. R K Srivastava, MED	"
21.	Prof. Peetam Singh	"
22.	Prof. Rajeev Tripathi	"
23.	Prof. M. M. Gore	"
24.	Prof. K.K. Shukla	"
25.	Prof. Rakesh Narain	"
26.	Prof. Anuj Jain	"
27.	Dr. S S Narvi	"
28.	Dr. Sanjay Chaubey	"
29.	Dr. Geetika	"
30.	Dr. Sunil Gulati	"
31.	Prof. S P Narang	"
32.	Sri R.P. Tiwari	Registrar/Secretary

Special Invitees:

1.	Dr. R. K. Tripathi, Dy. Dean (A.A.)	"
2.	Sri Sarvesh Kr. Tiwari, D.R. (Acad)	"

The Chairman extended welcome to the members of the Senate & thanked them for taking their time out to attend the meeting.

The following resolutions were passed in the Senate:

1. The minutes of the meeting of the Senate held on 21-02-2007 were confirmed.
2. The Senate considered and approved the Action Taken Report of the meeting of the Senate held on 21.02.2007. The members appreciated the improvement of documentation and procedures from the office of the Dean (Academic Affairs) and the way of presentation of agenda items and Action Taken Report was prepared.
3. The Senate approved the modifications in the scheme and syllabi of B.Tech. and M.Tech. programmes of the Civil Engineering Department, however suggested fine tuning before its implementation. The modified scheme is attached herewith in **ANNEXURE-I.**

29.06.07

4. The Senate approved that proposal of Civil Engineering Department to admit students with M.Sc. qualifications in the Ph.D. programme of the department, however it was desired that the Department would specify the branches of M.Sc. for further consideration.

5. The Senate approved the norms for award of merit scholarships with modification. Modified norms for the award of merit scholarships is placed as **ANNEXURE-II**. The Senate also discussed regarding the award of Gold Medals in case of tie and suggested that in case of tie between two students having same CPI, The SPI of the preceding semesters moving backwards, shall be considered. If still the matter is not resolved, then absolute marks of the most recent semester examination will be considered for the award of Gold Medal. It was decided that the faculty members would submit marks along with the grades for all the students.

   In this connection the Senate deliberated at length about the medal awarding on the basis of results of intermediate years (1st, 2nd and 3rd year) and also about the sponsored medals. The following were decided about the disbursement of medals to be awarded to the students not receiving the final degree.

   (i) For these students the medals will be awarded in a separate ceremony to be decided before the convocation.

   (ii) For such students an empowered committee will decide the procedure for arranging such a ceremony.

   (iii) The list of the students will be prepared by the Dean (Students Affairs)/ Dean (Academic Affairs), as the case may be.

6. The Senate deferred the discussion on the Convocation Manual of the Institute. It was decided to send the copy of the Convocation Manual to all the members electronically, so that it can be discussed in the next meeting of the Senate.

7. **Reporting matter :**

   (a) The Senate noted the Change in the subject codes of some of the subjects of B.Tech. (Chemical Engineering) Second Year as approved by the Chairman, Senate.

S. No.	Subject	Code	Department	L-T-P	Credits
1.	Fluid Flow Operations	AM307	AMD	3-1-2	4
2.	Organic and Physical Chemistry	CH401	Chemistry	2-1-2	4

   (b) The Senate noted the Special arrangement for Civil Engineering Department for dealing DPGC matter of the department as approved by the Chairman, Senate. However, little change would be made in the office notification regarding modifying norms, which had been overlooked as informed by the Chairman.

   (c) The Senate noted the Ph.D. Oral Boards of different departments as approved by the Chairman, Senate. The names of students are given below:

S. No.	Name	Enrol. No.	Department
1.	Mr. B K Tiwari	2003RCY02	Chemistry
2.	Ms. Sweta Anand	2002RMS02	School of Management Studies
3.	Mr. Om Pal	2002RME01	Mechanical Engineering

   (d) The Chairman Senate invited further suggesting on the equivalence of grade point and marks as recommended by the Committee and approved by the Chairman, Senate because of some new development. The Senate members deliberated on the matter and decided to refer the matter back to the same committee for review with having more inputs. The Senate advised the committee to get more information on this matter from IITs and other such institutions.

29.06.07

8. **Following matters were discussed with the permission of the Chairman :**

(a) The Senate considered and approved the recommendation of DUGC of Department of Mechanical Engineering for inclusion of *(i) Computer Integrated Manufacturing (CIM) and (ii) Pressure Vessel Design* as professional electives in VIII Semester of Mechanical Engineering and Production & Industrial Engineering.

(b) The Senate considered and approved the recommendations of DUGC of the Department of Electrical Engineering for introduction of a new elective "Virtual Instrumentation for Electrical and Electronics Engineers" as Professional Elective-I in the B.Tech. VII Semester, Electrical Engineering from the session 2007-2008.

(c) The Senate considered and approved the recommendations of DUGC of the Department of Mechanical Engineering regarding the shifting of subjects in VII Semester and VIII Semester of Mechanical Engineering and Production Engineering courses as indicated hereunder:

Existing Code	Course	Subject presently offered in Existing Semester	Subject shifted to Semester	New Code
ME711	MSD	VII (Mechanical)	VIII (Mechanical)	ME811
ME801	CAM	VIII (Mechanical & Production)	~~VIII~~ VII (Mechanical & Production)	ME710
ME 731	Advanced Manufacturing Process	VII (Production)	VIII (Production)	ME810

(d) The Senate considered and approved the recommendations of DPGC of the Department of Applied Mechanics regarding change in the course structure of M.Tech. (Applied Mechanics) and M.Tech. (Materials Science and Engineering). The details are placed as **ANNEXURE-III.**

(e) The Senate considered and approved the recommendations of DPGC of the Department of Electronics and Communications Engineering regarding the addition of following Electives in M.Tech. (Digital Systems).

Semester - I	Elective - I : Solid State Circuit (EC-957)	Credits-4
Semester - II	Elective - II : Embedded Systems (EC-970)	Credits-4
	Elective - III: Hardware Description Languages (EC-971)	Credits-4

For all the electives of M.Tech. (Digital Systems) the Senate recommends the credits as 4 in place of 3.

(f) The Senate considered the application of Sri L.K. Mishra, Assistant Professor, CED regarding his Ph.D. registration with MNNIT in continuation with his earlier registration with Allahabad University. The Senate discussed the matter, and decided that the registration of Sri L K Mishra may be suo moto transferred to MNNIT, Allahabad from University of Allahabad, and information of transfer may be sent to the University of Allahabad. The Senate further decided that his Course Work and Comprehensive Viva are waived off. Further, he is permitted to submit his thesis within one year. State of the Art and Open Seminar would be delivered before the thesis submission.

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

29.06.07
(R P Tiwari)
Registrar/Secretary

Confirmed
17/08/07

Chairman, Senate 29/06/07

Annexure

ANNEXURE - I

Modified Scheme of B. Tech. (Civil Engg.)

Appendix - I

B. Tech. III Semester Civil Engg. (Revised Scheme)

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 301	Environment and Ecology	3	1	--	4
2.	MA 301	Mathematics III	3	1	--	4
3.	CE 302	Building Construction & Materials	3	1	--	4
4.	CE 303	Surveying	3	1	2	4
5.	AM 302	Strength of Materials	3	1	2/2	4
6.	AM 303	Fluid Mechanics I	3	1	2	5
		Total	**18**	**6**	**5**	**25**

B. Tech. IV Semester Civil Engg.

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 401	Computer based Numerical Techniques	3	1	2	4
2.	CE 402	Concrete Technology	3	1	2	5
3.	CE 403	Geoinformatics	3	1	2	5
4.	CE 404	Engineering Geology	3	0	2	4
5.	AM 401	Structural Analysis I	3	1	0	4
6.	AM 403	Fluid Mechanics II	3	1	2	5
		Total	**18**	**6**	**10**	**27**

B. Tech. V Semester Civil Engg.

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 501	Construction Planning & Management	3	1	--	3
2.	CE 502	Transportation Engineering I	3	1	2	4

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
3.	CE 503	Geotechnical Engineering I	3	1	2	4
4.	CE 504	Concrete Structures I	3	1	--	4
5.	CE 505	Estimation, Costing & Evaluation	3	1	--	4
6.	AM 501	Structural Analysis II	3	1	--	3
		Total	**18**	**6**	**4**	**22**

B. Tech. VIII Semester Civil Engg. (Revised Scheme)

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	OE I	Open Elective II	3	1	--	4
2.	CE 801	Steel Structures II	3	1	2	3
3.	CE 802	Water Resources Engineering II	3	1	--	3
4.	CE 803	Earthquake Resistant Design	3	1	--	3
5.	CE 804	Project	--	--	--	10
6.	CE 805	Professional Elective	3	1	--	3
		Total	**15**	**5**	**2**	**26**

B. Tech. III Semester Civil Engg. (Old Scheme)

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 301	Environment and Ecology	3	1	--	4
2.	MA 301	Mathematics III	3	1	--	4
3.	CE 302	Building Construction & Materials	3	1	--	4
4.	CE 303	Estimation, Costing & Evaluation	3	1	--	4
5.	AM 302	Strength of Materials	3	1	2/2	4
6.	AM 303	Fluid Mechanics I	3	1	2	5
		Total	**18**	**6**	**3**	**25**

B. Tech. IV Semester Civil Engg.

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 401	Computer based Numerical Techniques	3	1	2	4
2.	CE 402	Concrete Technology	3	1	--	4
3.	CE 403	Surveying	3	1	2	5
4.	CE 404	Engineering Geology	3	1	2	5
5.	AM 401	Structural Analysis I	3	1	0	4
6.	AM 403	Fluid Mechanics II	3	1	2	5
		Total	**18**	**6**	**8**	**27**

B. Tech. V Semester Civil Engg.

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	CE 501	Construction Planning & Management	3	1	--	3
2.	CE 502	Transportation Engineering I	3	1	2	4
3.	CE 503	Geotechnical Engineering I	3	1	2	4
4.	CE 504	Concrete Structures I	3	1	2	4
5.	CE 505	Geo-informatics	3	1	2	4
6.	AM 501	Structural Analysis II	3	1	--	3
		Total	**18**	**6**	**8**	**22**

B. Tech. VIII Semester Civil Engg. (Old Scheme)

S.No.	Course No.	Subject Name	Period			Credits
			L	T	P	
1.	OE I	Open Elective II	3	1	--	4
2.	CE 701	Steel Structures II	3	1	--	3
3.	CE 702	Water Resources Engineering II	3	1	--	3
4.	CE 703	Earthquake Resistant Design	3	1	--	3
5.	CE 704	Project	--	--	--	10
6.	CE 705	Professional Elective	3	1	--	3
		Total	**15**	**5**	**--**	**26**

CE- 402: CONCRETE TECHNOLOGY(L3 :T1 :P2)

2.1 Concrete as a Building Material and its gradients :

(i) Cement : Manufacture of Portland Cement, its composition, Hydration of cement, physical and chemical properties, concept of strength development. Gel. space Ratio, Powers Law. Gel. structure.

(ii) Testing of Cement for general physical and chemical properties as per BIS specifications.
(iii) Different types of cement such as Slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties.
(iv) Aggregates and Testing of Aggregates:
Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties.

2.2 Production of Fresh Concrete :

(i) Proportioning of concrete, operations involved in concrete production, Workability, Factors Affecting workability, Measurement of workability. Problem of Segregation, bleeding and Laittance.

(ii) Properties of Hardened Concrete.
Strength and durability, Factors affecting strength and durability of concrete.

2.3 Concrete Mix Design: Principle and Methods, Statistical Quality control. Concrete Rheology, Maturity concept.

2.4 Introduction to special concretes :
(i) Admixtures in concrete.
(ii) Special concrete as lightweight concrete.
High Density Concrete, Sulpher Impregmented concrete Polymer concrete, Lime concrete constituents and uses.
(iii) High strength concrete.
(iv) Fibre Reinforced Concrete.

2.5 Material testing and instrumentation :
Conventional vs. Non-Destructive Testing. Methods & Principles of NDT.

Concrete Technology Lab.

List of Practicals/Experiments in Construction Meterials Laboratory.

1. On ordinary portland cement :

(i)To determine the specific gravity of cement using le-chateliar flask and the fineness by

sieve analysis.
(ii) To determine the normal consistency and setting times.
(iii) To assess the soundness of OPC using lechateliar apparatus.
(iv) To determine the compressive strength of ordinary portland cement.

2. On concrete making Aggregate :

(i) (a) To determine the specific gravity, bulk density and water Absorption of Aggregates.
(b) To study the phenomenon of Bulking of sand.
(ii) (a) To draw the grading curves for fine and coarse Aggregates and hence to determine their fineness modules.
(b) To determine the impurities in aggregates.
(iii) To determine the crushing value, impact value

3. On Fresh and Hardened Concrete.

(i) To measure the workability of concrete using slump cone, compaction factor Apparatus, and Vee Bee consistometer.
(ii) To study the effect of W/C Ratio on 28 days compressive strength of concrete.

4. Test on Burnt Clay Bricks :

(a) To determine compressive strength.
(b) To determine water Absorption.
(c) To assess the degree of efflorescence.
(d) To check dimensional tolerance and warpage.

References

1. Rai Mohan and Jai Singh M.P., Advances in Building Materials and Construction-CBRI Roorkee.
2. Civil Engineering Materials, Technical Teachers Training Institute Chandigarh- Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Spence RJS and Cook D.J., Building Materials in Developing Countries- John Wiley and Sons.
4. Shetty M.S., Concrete Technology, Theory and Practices.- S. Chand & Company Ltd., New Delhi.
5. Neville A.M., Properties of Concrete- Pitman Publishing Company.
6. Gambhir M.L.-Concrete Technology- Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Gambhir M.L.,Concrete Manual - Dhanpal Rai & Sons, Delhi.

CE 503 GEOTECHNICAL ENGINEERING-I

L3 T1 P2

Introduction

Development of soil mechanics, Importance, associated problems and applications, Interdisciplinary nature of geotechnical engg.

Origin and Composition of Soil

Soil formation and types, Colour, Particle shape, Mineral composition. Major soil deposits of India, Structure of clay minerals, Structure of soils.

Phase Relationship, Index Properties and Test for Classification of Soils

Basic definitions, Particle size distribution analysis. Phase diagrams, Useful inter-relationships, Consistency limits of soils, Activity, Sensitivity and Thixotropy

Classification of Soils

Soil classification principles, Field identification of soils, Preliminary descriptive classification of soils, Classification-MIT system, International classification system, Textural classification of fine-grained soils, IS classification system and Plasticity chart.

Capillary water and Permeability of Soil

Occurrence of ground water, Capillary water, Pore pressure and effective stress, Frost action, Permeability and seepage of soils, Flow of water through soils. Coefficient of permeability and its determination in lab. and field, Quick sand phenomenon, Factors affecting permeability, Permeability of layered soils, Flow nets and its construction, Seepage through earthen embankments, Piping and protective filters.

Soil Compaction

Theory of compaction, Laboratory determination of OMC & MDD by standard and modified Proctor test, Factors affecting compaction, Effect of compaction on properties of soils, Field compaction of soils, Compaction control in fields.

Consolidation of Soils

Compressibility of soils, Difference between compaction and consolidation, Initial, preliminary and secondary consolidation, Terzaghi's theory of one-dimensional consolidation, Consolidation test, Basic definitions, Determination of co-efficient of consolidation, Pre-consolidation pressure and its determination, Time rate of consolidation, Computation of settlement, Sand drains.

Shear Strength of Soils

Mechanism of shear resistance, Mohr-Coulomb theory, Shear strength and effective stress principle, Factors affecting shear strength of soils, Different types of test and

drainage conditions, Various shear tests, Pore pressure parameters, Shear characteristics of cohesionless and cohessive soils, Choice of test condition and shear parameters.

Stability of Slopes

Infinite and finite slopes, Factor of safety, Type of slope failure, Stability of infinite and finite slopes, Types of failures, Limit equilibrium method and critical stage instability analysis, Effects of tension crack and submergence, Stability analysis - Swedish Circle method, Friction circle method, Bishop's method , Stability charts, Taylor's stability no.

Ground Improvement Technique

Stabilization of soil, Reinforced earth, Geotextile, Geomembrane and Geogrids.

References

1. Gopal Ranjan and A.S.R. Rao-Basic and Applied Soil Mechanics.
2. B. M. Das - Principles of Geotechnical Engineering
3. R. Whitlone-Basic soil mechanics.
4. D.F. Mc Garthy-Essentials of soil mechanics and foundation.
5. Alam Singh-Modern Geotechnical Engg.
6. C. Venkatramaniah-Geotechnical Engg.
7. K.R. Arora -Soil Mechanics and Foundation Engg.
8. Purushotama Raj – Geotechnical Engineering
9. V. N. S. Murthy: Geotechnical Engineering

Geotechnical Engineering Lab – 1

1. Visual identification and specific gravity
2. Sieve Analysis
3. Hydrometer Analysis
4. Atterberg's Limits
5. Proctor Compaction Test
6. In site Density-Core Cutter & Sand Replacement Method.
7. Permeability Test: Constant and Variable Head
8. CBR Test
9. Consolidation /Odometer test
10. Direct Shear Test
11. Unconfined Compression Test
12. Triaxial test

CE- 504:CONCRETE STRUCTURES-I (L3:T1:P0)

Methods of Design

Working Stress Design Method

Assumption, Distribution of Stresses on the cross section in bending, transformed area, Analysis and Design of a rectangular singly and doubly reinforced section, T and L sections.

Limit State Design Method

Assumptions, Distribution of stresses on the cross section in bending, Analysis and Design of a rectangular singly and doubly reinforced section, T and L sections.

Design of Beam in Shear

Behaviour of RC beam in shear, shear strength of beam with and without shear reinforcement, Minimum and Maximum shear reinforcement, Design of beam in shear using working stress and Limit state methods.

Bond and Development Length

Nature of bond between steel and concrete. Development of bond stress in reinforcement, Concept of development length and anchorage, Design of RC section in bond and calculation of development length using Working stress method and Limit state methods.

Rectangular Slabs

One way solid slabs- simply supported and continuous, two way slabs- simply supported and continuous.

Compression Members

Classification of Compression members into pedestal, long and short column, Effective length, Slenderness ratio and slenderness limit, Axially loaded short column's design using Working Stress and Limit State methods, Increase in permissible load in helically reinforced columns.

Eccentrically loaded columns, Minimum eccentricity, Uniaxially loaded columns, Working stress and Limit State method of design.

CE- 601 : CONCRETE STRUCTURES-II (L3 :T1 :P2)

Flat Slab: Nature of stresses in flat slabs. Flat slabs with and without drops. Co-efficient for design of flat slabs. Reinforcement in flat slabs.

Circular Slabs and Water Tanks: Circular slabs with various edge and loading conditions, and their usages in water tanks; Design criteria, material specifications and Permissible stresses for tanks, Design of circular and rectangular tanks situated on the ground/underground under hoop stresses.

Design of Beams in Torsion: Failure of beam under torsion, interaction between shear and torsion and between moment and torsion, Concept of equivalent sheer and moments. Analysis and design of beam curved in plan.

Spread Footing: Structural behaviour of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.

Retaining Walls: Structural behaviour of retaining wall, stability of retaining wall against over-turning sliding and pressure developed under the base, Design of T-shaped retaining wall, Concept of counterfort retaining wall.

Introduction to Pre-Stressed Concrete: Advantages of prestressing, methods of prestressing, Losses in prestress, analysis of simple prestressed rectangular and T-section.

Introduction to Bridge Design: Loads, forces and I.R.C. bridge loadings. Design of slabs under concentrated loads using effective width and pigeaud's Method. Detailed design of R.C. slab culvert.

Structure Detailing Lab.I

1. Simple Beam/Lintel
2. T-Beam floor
3. Rectangular Slabs
4. Brick wall and Isolated footing
5. Combined Rectangular and Trapezoidal Footing
6. Water tank
7. T. shape Retaining wall

Note - Two hour practical is for drawing work (Manual & computer Aided).

Reference Books:

1. Jain A.K.: Reinforced Concrete Design, Limit State Method.
2. Syal I.C. & Goel A.K.: Reinforced Concrete Structures.
3. Malik S.L. and Gupta: Reinforced Concrete.
4. Jaikrishna and Jain: Plain and Reinforced Concrete Vol.I& II.
5. Dayaratnam P.: Reinforced Concrete Design.
6. Park R & Pauley T.: Reinforced concrete structures.
7. IS 456-2000: Code of practice for plain & reinforced concrete.
8. SP-16: Design Aids of Reinforced Concrete to IS: 456-1978.
9. IS 3370-1968: Code of practice for water retaining structures.

CE – 605 ENVIRONMENTAL ENGINEERING – I L3 T1 P2

1. Water Supply - Introduction, Necessity, water demands, design period, population forecasting, variations in water demand, estimation of quantity of water.
2. Sources of Water: Surface sources-river, lake, impounding reservoirs, determination of capacity of impounding reservoirs: Sub-surface sources-springs, infiltration wells, infiltration galleries, jack wells, artesian wells and tube wells; Suitability of surface and subsurface sources; Collection of surface water-Intakes, Design of intake structures.
3. Water Quality Parameters: Necessity of water quality examination, examination of various water quality parameters, water quality standards
4. Pumping and Conveyance of Water: Materials for water pipes, hydraulics of conduits, capacity and sizes including economical size of rising main, pipe laying, corrosion in pipes, appurtenances and valves; types of pumps with fittings, selection of pumps, characteristic curves, design of pumps.
5. Storage and Distribution of water: Distribution systems, methods of water supply and storage, Principles of analysis of distribution network-Hardy Cross method, Equivalent pipe method.
6. Plumbing system- Layout, plumbing equipments and operation, plumbing fixtures and fittings for water supply, their installation and maintenance
7. Wastewater Collection: Systems of sanitation, sewerage systems with their relative merits and demerits, quality examination of wastewater, effluent discharge standards.
8. Estimation of wastewater flows – Estimation of Dry weather flow and its variations; estimation of storm run off by Rational formula and other formulae applicable to Indian catchments
9. Flow in Full and partially full sewers, Design of sewers and storm water drains
10. Flow in sewer transitions, length of transition, laying of sewers, testing and ventilation of sewers.
11. Sewer appurtenances-Manholes, drop manhole, catch pits, street inlets, flushing systems, storm relief works etc., House drainage and Sanitary fixtures and fittings.

Reference books:

1. McGhee: Water supply and sewerage
2. Peavy, Rowe and Techbanoglous: Environmental Engineering
3. Masters: Introduction to Environmental Engineering & Science
4. Kshirsagar: Water Supply Engineering
5. Kshirsagar: Sewerage and Sewage Treatment
6. Sawyer and McCarty: Chemistry for Environmental Engineering
7. Kotaigh: Environmental Engineering Laboratory Mannual
8. Garg S. K.: Water Supply Enginering
9. Garg S. K.: Sewage disposal and Air pollution Engineering
10. Raju: Water Supply and Wastewater Engineering

CE 606 GEOTECHNICAL ENGINEERING-II

L3 T1 P2

Stresses in Soils

Causes of stress in soil, Geostatic stress, Boussinesq's equation, Stress distribution diagrams, Vertical stress in soils under different types of loading, Newmark's influence chart, Westergard's equation.

Earth Pressure and Retaining Walls

Types of lateral earth pressure, Rankine's and Coulomb's earth pressure theory and their application for determination of lateral earth pressure under different conditions, Graphical methods of determination of lateral earth pressures, Types of retaining walls, Design Principles. Stability conditions and factors of safety, Sheet pile walls.

Bearing Capacity

Definitions, Methods of determining bearing capacity, Bearing capacity from building codes, Analytical methods of determining bearing capacity – Rankine's method, Terzaghi's theory, Meyerhof's method, Brinch – Hansen's method, Skempton's analysis, Factors affecting bearing capacity, Settlement of foundation, Differential settlement, Causes of settlement, Settlement analysis, Bearing capacity based on tolerable settlement, SPT, SCPT, DCPT and Plate load test.

Shallow Foundation

Types of foundation, Requirements of design of foundation, Location and depths of foundation, Design of spread footing.

Pile Foundation

Necessity of pile foundation, Types, Pile driving, Pile capacity from (a) Static analysis (b) Dynamic analysis, Pile load tests, In-situ penetration tests for pile capacity, Negative skin friction, Group action of piles, Settlement of pile groups, Under – reamed piles – analysis and design.

Well Foundation

Types, Shape of wells, Component of wells, Depth of well foundation, Bearing capacity of well foundation, Forces acting on well foundation, Construction and sinking of well foundation, Measures to prevent and rectify tills and shifts.

Machine Foundation

Definition, Design criteria, Principles of soil dynamics, Free and forced vibration, Natural frequency, Code of practice for design of Reciprocating, Impact and Rotary type of machine foundation.

References

1. J.E. Bowels: Foundation Analysis and Design.
2. G. A. Leonards: Foundation Engineering
3. M.J. Tomilsion : Foundation Design and Construction.
4. W. C. Teng : Foundation Design.
5. C. Venkatramaiah : Geotechnical Engg.
6. Gopal Rajan and A.S.R. Rao : Basic and Applied Soil Mechanics.
7. K.R. Arora : Soil Mechanics and Foundation Engg.
8. P. C. Varghese: Foundation Engineering
9. S. P. Brahma: Foundation Engineering
10. S. R. Kani Raj: Design Aids in Foundation Engineering
11. V. N. S. Murthy: Geotechnical Engineering

GEOTECHNICAL ENGINEERING-LAB II

1. Methods of Soil Exploration
2. Static / dynamic cone penetration test
3. Standard penetration test
4. Free swell and swell potential
5. Swelling pressure test
6. Plate load test.
7. Field vane shear test
8. Geophysical methods
9. Planning of site investigations for a real life problem.

CE 702 WATER RESOURSES ENGINEERING I

L3 T1

1. Introduction : Definition, Scope of subject, Advantage, Lift and flow irrigation, Development of irrigation in India.

2. Water Requirement of Crops : Functions of water in plant growth, Soil moisture, consumptive use of water, Irrigation frequency, irrigation methods, crops season, Weather in relation to crops, Important crops.

3. Canal Irrigation : Classes of irrigation canal, Parts of a canal system, Preliminary survey, Detailed survey, Commanded areas, Channel alignment, Curves, Assessment of water requirement, Channel losses, Kennedy?s Theory, Lacey?s Theory, Longitudinal section, Schedule of area statistics and channel dimension cross-section of irrigation channel.

4. Water-Logging : Definition, Effect, Causes and Anti-water logging measure, concrete lining, shotcreate lining, Asphaltic lining, Brick tile lining of earth material, Sections of lined channel. Drainage of Water logged land, Types of Drains, Open Drains, Closed Drains, Spacing of closed Drains.

5. Irrigation Outlet : Definition, requirement, classes of outlet, Non-modular outlet, Semi-module, Rigid module, Selection of outlet.

6. Regulation and Control of Canal System : Regulation, Measurement of discharge, Assessment of canal Revenue, Efficient Management of irrigation water.

7. Hydrology : Definition, Hydrologic cycle, Application to engineering problem, Measurement of rainfall, rain gauge, Peak flow, Flood frequency method, catchment area formulae, Flood Hydrograph, Rainfall analysis, Infiltration, Run off, Unit Hydrograph and its determination, Estimation of Runoff, Hydrologic Routing.

8. Wells and Tube Wells : Introduction, Specific yield, Deep and shallow wells, Comparative advantage of well and canal irrigation, Duty of well water, Determination of discharges through confined & unconfined aquifer, Types of Tube wells, Boring methods.

9. Water Resources Development : Planning, design and economics of water resources development.

References

1. Singh, Dr. Bharat - Fundamentals of Irrigation Engineering.

2. Varshney, Dr. R.S., Gupta & Gupta - Theory and Design of Irrigation Structures Vol. I & II.
3. Punamia, Dr. B.C. and Pandey B.B. Lal, Irrigation and Water Power Engineering.
4. Bedient and Huber- Hydrlogy and Flodplain Analysis
5. Todd and Mays- Groundwater Hydrology
6. K. Subramanya - Engineering Hydrology
7. Modi, P.N. – Irrigation Water Resources and Water Power Engineering
8. Asawa, G.L. – Irrigation and Water Resources Engineering

CE – 704 ENVIRONMENTAL ENGINEERING – II L3 T1 P2

1. Water Treatment – Objectives of water treatment, water treatment units, processes and process flow sheets.
2. Sedimentation: Theory of sedimentation, determination of terminal settling velocity, efficiency of ideal settling tank, short-circuiting, design of primary and secondary sedimentation tank, settling and removal efficiency of discrete and flocculent particles.
3. Coagulation: Mechanisms of coagulation, coagulants and their chemical reactions, determination of optimum dose of coagulants, design of rapid mixer.
4. Flocculation : Theory of flocculation, criteria for good flocculation, design of hydraulic and mechanical flocculator.
5. Filtration: Theory and mechanisms of filtration, hydraulics of filtration and back-washing including Carmen-Cozeny's equation, Slow sand and rapid sand filter, design of rapid sand filter, brief introduction to dual and multi-media filters.
6. Disinfection: Theory and kinetics of disinfection, methods of disinfection, chlorination, types of chlorination, Various forms of chlorine application and equipments, testing of chlorine residuals.
7. Water Softening: Methods of water softening-boiling, lime soda process, Soda ash process and ion-exchange process, estimation of dose of chemicals.
8. Wastewater Treatment: Unit operations and unit processes, primary, secondary and tertiary treatments, process flow sheets, BOD kinetics and analysis of BOD data, microbial growth kinetics and relationships
9. Primary treatment: Screens, grit chambers, primary sedimentation tank and their design.
10. Secondary treatment: chemical treatment of wastewater
11. Secondary treatment:Biological treatment- its principle, Activated sludge process-Flow sheet, aeration tank, design of activated sludge process units and modifications, trickling filter-theory and design using NRC equation, design of oxidation ponds and oxidation ditches
12. Principles of Anaerobic Treatment, anaerobic digestion of sludge, design of anaerobic digester and septic tank.
13. Disposal of wastewater on land and in water bodies, stream sanitation

Reference books:

1. Peavy, Rowe and Techbanoglous: Environmental Engineering
2. Masters: Introduction to Environmental Engineering and Science
3. Davis: Introduction to Environmental Engineering
4. McGhee: Water Supply and Sewerage
5. Rao, C.S.: Environmental Pollution Control Engineering
6. Qasim,S.R..: Wastewater Treatment Plants-Planning, design and operation
7. MetCalf & Eddy.: Wastewater Engineering- treatment, disposal and reuse
8. Raju: Water Supply and Wastewater Engineering

CE 801 STEEL STRUCTURE-II (L3 :T1 :P2)

Loads on Industrial structures and Configuration of various Industrial buildings, Various types of Roofs and Roof coverings. Design of Roof trusses, sag rods and purlins. Single and two bay industrial frames, Gantry girders, Wind bracings, Industrial columns and their foundations.

Design of steel stacks. Design of Elevated Rectangular, Circular and Pressed tanks and their staging. Riveted and Welded Plate Girders : Design of cross-section, curtailment, bearing stiffener, intermediate stiffeners, splices. Introduction to steel bridges. Introduction to light gauge steel structures.

Structure Detailing Lab.II

1. Rolled sections and connections.
2. Build-up columns and beams
3. Plate girder, Gantry girder
4. Water tanks
5. Industrial building

Note - Two hour practical is for drawing work(Manual & computer Aided).

PROFESSIONAL ELECTIVE

Plumbing Engineering L3 T1 Cr3

1. Plumbing: Introduction, necessity of plumbing,
2. Building water supply –Water requirements for various types of buildings, water supply system in a building, design of water supply network inside the building, Service connections for main, design of water distribution system for a group of buildings in a colony, Sizing of pipes, water meters.
3. Hot water Supply – Plan, size and layouts of hot and cold water services/systems, water heaters, Geysers, Hot water supply in high rise buildings, determination of sizes of pipes, solar system of heating, insulation of hot water supply
4. Water Supply fixtures and fittings:
5. Fire protection systems
6. Pumps and pumping systems installations, accessories
7. Building drainage systems- Rainwater/Storm drainage – plan, size and layouts of storm water/ roof drainage systems, design of pipes, drains, anti-siphon, vent pipe, installation of pipes, testing of drains and pipes.
8. Fire protection system design and maintenance-Types of fire protection systems, fire extinguishers, layout of sprinkler system, fire detection and signaling systems
9. Sanitary fixtures and fittings:- soil drainage fixtures, bathroom accessories, special accessories, fittings, venting and layouts of soil pipes
10. Plumbing maintenances

Reference books:

1. Panchdhari, A.C.- Water Supply and Sanitary Installations
2. Patil, S. – Plumbing Engineering, Theory & Practice
3. Duggal, K.N.- Elements of Public Health Engineering
4. Garg S. K.: Water Supply Enginering
5. Garg S. K.: Sewage disposal and Air pollution Engineering

PROFESSIONAL ELECTIVE

Engineering Hydrology
(Credit 3)

Precipitation, Infiltration and Evapotranspiration, Forms of precipitation, measurement, depth-area-duration and intensity-duration frequency relations, Evaporation - process, measurement, and estimation, Infiltration process, measurement, and estimation, Evapotranspiration measurement and estimation, Runoff and Hydrographs, Rainfall Runoff correlations, Flow duration curve, Mass curve, Droughts and floods, Factors affecting flow hydrograph, Unit hydrograph, its analysis, and S-curve hydrograph, Synthetic and instantaneous unit hydrographs, Statistical analysis, Hydrologic Routing, Risk, reliability, and safety factor, Flood frequency studies, Flood forecasting, Rational method, Time Area curves, Design flood Channel and flood routing, Flood control measures Groundwater hydrology, Flow equations and Numerical solutions, Confined and unconfined flow, Well hydraulics Steady and unsteady flow, Well losses, Specific capacity, Groundwater recharge.

References:

1. Applied Hydrology by Chow, Maidment and Mays.
2. Engineering Hydrology by K. Subramanya
3. Groundwater Hydrology by Todd and Mays
4. Hydrology and Floodplain Analysis by Bedient and Huber.

PROFESSIONAL ELECTIVE

Solid Waste Management
(Credit 3)

Evolution of solid waste management; legislative trends and impacts; sources, composition and properties of solid waste; Engineering principle- solid waste generation and collection rates; waste handling, separation and processing at the source; Recycling and transformation of waste materials; Transfer and transport of solid waste; disposal of solid wastes- landfills; closure, restoration and rehabilitation of landfills; Indian and global solid waste management and planning issues

References:-

1. Integrated Solid Waste Management by George Technobanglous, Hilary Theisen and Samuel A. Vigil. (McGraw-Hill International Editions)
2. Geotechnology of Waste Management by Issa S. Oweis and Raj P. Khera (Butterworths)
3. Final Covers for Solid Waste Landfills and Abandoned Dumps by Robert M. Koerner and David E. Daniel (ASCE Press)
4. Modern Landfill Technology and Management by Masataka hanashima (Ed.); Proceedings of the Asian Pacific Landfill Synposium, Fukuoka, Japan, Oct. 11-13, 2000.
5. Integrated Solid Waste management: A Lifestyle Inventory by P. White, M. Franke and P. Hindle (Chapman & Hall)
6. A Text Book of Solid Waste Management by Iqbal H. Khan and naved Ahsan (CBS Publishers & Distributors)
7. Waste disposal in engineered landfills by manoj Datta (Ed.) (Narosa Publishing House)
8. Landfilling of Waste barriers by T. H. Christensen (E & FN Spon, London)
9. Waste containment systems waste stabilization & landfills: Design & Evaluation by H. D. Sharma & S. P. Lewis SP.

PROFESSIONAL ELECTIVE

Transport Asset Management

(Credits: 3)

Course Objectives: To develop a working knowledge of the concepts of asset management; to provide students with tools and organizational concepts that will asset them in managing infrastructure, which might be utilities, roads, bridges, or rolling stock; and to help place these ideas into an overall structure of facility design, construction, maintenance and operations.

Course Contents:

Introduction –Transport Infrastructure: Roads, Railways and Airways, Asset Management Concept, Management Systems: Components, objectives, designs, role. Performance : Measures of performance, defining performance, common characteristics of infrastructure, alternative approaches. Condition assessment, alternative technologies, for assessing condition including surface and subsurface condition, and the limitations of technologies, Transport Economics: Parameters used in Transport economic analysis, Life Cycle Cost Analysis, Cost and benefit components in Transportation Systems, Economic Evaluation of Transportation Project. Techniques and importance of inventories, GIS as a data integration and analytic tool, Diagnostics and data, The collection and use of data, Discussion of the use of data., example application for road and rail infrastructure management.

Books:

- "Measuring and Improving Infrastructure Performance," National Academy Press, Washington DC 1995
- Grigg, Neil, "Infrastructure engineering and management," Wiley, 1988. (On reserve in library)
- Haas, Hudson, Zaniewski, *Modern Pavement Management*, Krieger, Malabar, 1994.
- Hudson, Haas, Uddin, *Infrastructure management : integrating design, construction, maintenance, rehabilitation, and renovation,* McGraw Hill, 1997. (On reserve in library)
- Munnell, Alicia, Editor, *Is There a Shortfall in Public Capital Investment?* Proceedings of a Conference Held in June 1990. (On reserve in library)
- World Development Report 1994: *Infrastructure for Development*
- *Chakroborty, P. and Das A.,Principles of Transportation Enineering, Prentice Hall of India, New Delhi 2003*

CE 688 Numerical Computation and Simulation
(Credit 4)

Introduction to MATLAB, C++, FORTRAN 90 and basic difference of each programme. MATLAB: Advantages and disadvantages of MATLAB, Input and Output statement, loops, Iteration and floating types, Construction of arrays and matrices, MATLAB functions, plotting, debugging programs.

Solutions to the systems of linear equations and nonlinear equations; Numerical and curve fitting; Finite difference techniques; Numerical Integration and differentiation- applied engineering problems and solving using MATLAB programming; Ordinary differential equations- applied engineering problem and solving using MATLAB programming; Engineering problems solving with MATLAB tools.

References:-

1. Computer Oriented Numerical Methods by V. Rajaraman (Prentice Hall of India)
2. Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale (Tata McGraw Hill).
3. Computational Methods for Partial Differential Equations by M. K. Jain, S. R. K. Iyenger and R. K. Jain (New Age International (P) Limited)
4. Basics of MATLAB and beyond by Andrew Knight (Chapman & Hall/CRC)
5. MATLAB Programming for Engineers by Stephen J. Chapman (Thomson Asia Pte. Ltd.)
6. Engineering Problem solving with MATLAB by Delores M. etter (Prentice Hall, New Jersy).
7. Advanced Engineering Mathematics with MATLAB by Dean G. Duffy (Chapman & Hall/ CRC)
8. An Introduction to Programming and Numerical Methods in MATLAB by S. R. Otto and J. P. Denier (Springer: New Age International)
9. Applied Numerical Methods using MATLAB by Won Y. Yang, Wenwe Cao,, Tae Sang Chung, and John Morris (Wiley)

PROFESSIONAL ELECTIVE

CE 566: Repair and Retrofitting of Structures

(Credits: 4)

Course Content:

Review of principles of structural analysis; Modelling of structures – Linear modelling, Non-linear modelling, Modelling of soil and foundations

Introduction to dynamic loading; Demand Capacity Ratio Method; Non-linear Pushover Analysis, Non-linear Time-History Analysis

Introduction to Performance Based Engineering

Principles of structural repair, retrofit; Terminology

Nondestructive testing (NDT) methods

Rapid visual screening and simplified evaluation of buildings

Material Properties; In-situ testing methods for RC and masonry structures

Retrofitting Materials

Retrofitting of Structures: Buildings and Bridges

Techniques of repair and retrofitting of masonry buildings

Seismic safety of building equipment and services

Design for durability

Life cycle cost estimation of structures

List of Practicals:

1. In-situ testing of concrete using rebound Hammer and USPV Method
2. In-situ testing of concrete using Pull-out Test
3. In-situ testing of concrete using Pull-off Test
4. Location of reinforcement and measurement of cover using Rebar Locator

References:

1. FEMA 356, 2000, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*, Federal Emergency Management Agency, Building Seismic Safety Council, Washington, D.C.
2. FEMA 440 / ATC 55, 2005, *Improvement of Nonlinear static Seismic analysis Procedures*, Federal Emergency Management Agency, Building Seismic Safety Council, Washington, D.C.
3. ATC 40, 1996, *Seismic Evaluation and Retrofit of Concrete Buildings*, Applied Technology Council, California.
4. FEMA 273, 1997, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings*, Federal Emergency Management Agency, Building Seismic Safety Council, Washington, D.C.

5. FEMA 310, 1998, *Handbook for the Seismic Evaluation of Buildings – A Prestandard*, Federal Emergency Management Agency, Building Seismic Safety Council, Washington, D.C.
6. J. H. Bungey, 1989, *The Testing of Concrete in Structures*, Surrey University Press.
7. Penelis, George G., and Kappos, Andreas J., 1997, Earthquake Resistant Concrete Structures, E & FN Spon.
8. Paulay, T. and Priestley, M.J.N., 1992, *Seismic Design of Reinforced Concrete and Masonry Buildings,* John-Wiley & Sons, Inc.
9. Priestley, M.J.N., Seible, F. and Calvi, G.M., 1996, *Seismic Design and Retrofit of Bridges,* John-Wiley & Sons, Inc.
10. Steven L. Krammer, 2003, *Geotechnical Earthquake Engineering*, Prentice-Hall International Series.

ANNEXURE-II

Norms for award of Merit Scholarships

1. Merit Scholarship shall be awarded every year to ten percent of the total number of the students admitted in a year, as per the guidelines issued by Govt. of India.

2. In case of fractional digit the number of Merit Scholarships to be awarded shall be rounded off to the next highest value i.e. if 10% of the total number of students admitted in a year works out to be 8.1, the number of scholarships to be given would be equal to 9, as approved by the Senate in its meeting held on 28-08-2005 vide Clause No. 4.

3. For the purpose of calculation of 10% of the total students 10% students of each branch shall be given the Merit Scholarship.

4. If the number of the students to be given Merit Scholarship works out to be less than the total number students who could be given the Merit Scholarship (i.e. 10% of the students admitted), then this extra scholarship shall be given to a student who is having a tie, i.e. having the same CPI.

5. In case of more than two students having same CPI, the SPI of the preceding semesters, moving backwards, shall be considered. If still the matter is not resolved only then the All India Rank (AIR) shall be considered. However if there are many students on the tie, a case may be put before the Director who may approve and sanction for the grant of additional merit scholarships depending upon availability of funds and other factors relevant to the case.

6. In case no tie is there and still there is scope to give one more scholarship, based on the calculation of 10% of the total number of students admitted, then this may be given to a student from that branch of B.Tech. which has the highest fractional value for example if the figures appear as 10.3, 10.2, 5.2, 2.1 etc. the extra scholarship would go to the branch where the number is 10.3 i.e. the one having highest digit after the decimal point.

ANNEXURE - III

M.Tech (Applied Mechanics)

Proposed Course Structure

Ist Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM901	Theory of Elasticity and Plasticity	4	0	0	4	20	20	20	40
AM902	Theory of Plates and Shells	4	0	0	4	20	20	20	40
AM903	Composite Materials	4	0	0	4	20	20	20	40
AM904	Experimental Stress Analysis	4	0	0	4	20	20	20	40
AM905	Advanced Fluid Mechanics	4	0	0	4	20	20	20	40
AM906	Finite Element Method	4	0	0	4	20	20	20	40

Total Credits= 24

IInd Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM907	Theory of Stability	4	0	0	4	20	20	20	40
AM908	Mechanical Behavior of Materials &Fracture Mechanics	4	0	0	4	20	20	20	40
AM909	Dynamics of Structures	4	0	0	4	20	20	20	40
AM	Elective-I	4	0	0	4	20	20	20	40
AM	Elective-II	4	0	0	4	20	20	20	40
AM996	Seminar/Minor project	0	0	2	2	40	0	0	60

Total Credits = 22

Third Semester:

- AM997 Special Study/ Seminar : 4 Credits
- AM998 Thesis-I : 12 Credits

Total Credits = 16

Fourth Semester:

- AM999 Thesis : 16 Credits

Total Credits of Course : 78

M.Tech. (Material Science & Engineering)

Proposed Course Structure and Evaluation Scheme

Ist Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM911	Characterisation of Materials	4	0	0	4	20	20	20	40
AM912	Thermodynamics of Materials	4	0	0	4	20	20	20	40
AM913	Polymer Science and Engineering	4	0	0	4	20	20	20	40
AM914	Ceramics and Ceramic Technology	4	0	0	4	20	20	20	40
AM915	Metallurgy	4	0	0	4	20	20	20	40
AM903	Composite Materials	4	0	0	4	20	20	20	40
	Total	**24**			**24**	**120**	**120**	**120**	**240**

2nd Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM908	Mechanical Behaviour of Materials & Fracture Mechanics	4	0	0	4	20	20	20	40
AM916	Electrical, Electronic, Magnetic and Optical Behaviour of Materials	4	0	0	4	20	20	20	40
AM917	Computational Material Science	4	0	0	4	20	20	20	40
AM	Elective-I	4	0	0	4	20	20	20	40
AM	Elective II	4	0	0	4	20	20	20	40
AM996	Seminar/Minor Project	0	0	2	2	40			60
	Total	**20**		**2**	**22**	**140**	**100**	**100**	**260**

3rd Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM997	Special Study/Industrial Training	-	-	-	4				
AM998	Thesis-I	-	-	-	12				
	Total				**16**				

4th Semester

Course No.	Subject Name	L	T	P	Credits	Distribution of marks out of 100			
						TA	I Mid Exam	II Mid Exam	End Sem. Exam
AM999	Thesis	-	-	-	16				
	Total	-	-	-	**16**				

MECHANICAL ENGINEERING DEPARTMENT

B. TECH. VII SEMESTER
Professional Elective – I
ME – 702 Pressure Vessel Design

L	T	P
3	1	0

1. General Introduction and Classification of pressure vessels on the basis of shape and method of fabrication. 3
2. Definition of membrance stresses,stress analysis of pressure vessels. Derivation of General Membrance Equation and its particular cases for different shapes of vessels. 4
3. Different factors influencing the design of vessels and vessel materials. 3
4. Stress consideration in the selection of different types of end closures of cylindrical vesels like flat,semispherical,ellipsoidal and dished heads. 4
5. Discussion of different vessels for pressure vessel design. 3
6. Design of cylindrical vessels and different end closures subjected to internal pressure. 4
7. Stress analysis of supports of pressure vessels. 2
8. Design of supports as per code. 4
9. Design of cylindrical vessels operating under external pressure. 3
10. Design and selection of standard flanges, gaskets and flange facings and their selection. 5
11. Stress analysis of vertical placed vessels. 5

References:

1. Design of Pressure Vessels- Harvey.
2. Design of Process Equipments- Brownell & Young.
3. Code for Unfired Pressure Vessels IS- 2825.

MECHANICAL ENGINEERING DEPARTMENT

B. TECH. VIII SEMESTER
Professional Elective – III
ME – 802 Computer Integrated Manufacturing

L	T	P
3	1	0

1.	Introduction and a brief review of Computer Aided Manufacturing.	(2)
2.	Flexible Manufacturing Systems and Computer Integrated Manufacturing.	(10)
3.	Concurrent Engineering.	(5)
4.	Group Technologies and Cellular Manufacturing.	(8)
5.	Computer Aided Process Planning.	(4)
6.	Just-in-Time Manufacturing.	(4)
7.	Materials Requirement Planning and Aggregate Planning.	(4)
8.	Agile Manufacturing and Lean Manufacturing.	(4)

References:

1. Automation, Production System & Computer Integrated Manufacturing by M.P. Groover, Prentice Hall of India.
2. Computer Integrated Design & Manufacturing by David D. Bedworth, Mark R. Henderson & Philip M. Wolfa, McGraw Hill Inc.
3. Computer Integrated Manufacturing Technology & Systems by U. Rembold & C. Blume, R. Dilman, Marcel & Dekker.
4. Production & Operations Management by Russell & Taylor, PHI.
5. Production & Operation Management by Heizer & Render.

Department of Electrical Engineering
MNNIT Allahabad

Proposed New Course by the Department for B. Tech VII Semester (Electrical)

Course Title:	**VIRTUAL INSTRUMENTATION**
Course Code:	**EE710**
No. of Credits:	**4**
Contact Hours:	**L: 3 T: 0 P: 2**
Course Type:	**Professional Elective**
Examination Pattern:	Mid-Sem.-I (20 Marks), Mid-Sem.-II (20 marks), End-Sem (40 Marks), Teachers Assesment (20 Marks). All the examination will be laboratory based.
Pre-requisits:	Computer Programming (CS201) & EMMI (EE 302)
Objective of the Course:	To provide the knowledge of computer based instrumentation and data acquisition.

Details of the Course:

Sl. No.	Topics to be Covered	Contact Hours
1.	Introduction, Virtual Instrumentation (VI) advantages	2
2.	Graphical programming techniques, data flow programming, VI's and sub VI's	12
3.	Structures, Arrays and Clusters	10
4.	Data acquisition methods, File I/O, DAQ hardware, PC hardware; operating systems, Instrumentation buses, ISA, PCI, USB, PXI	8
5.	Instrument control, Data communication standards, RS-232C, GPIB	4
6.	Real time operating systems, Reconfigurable I/O, FPGA	4
	Total	**40 Hrs.**

Virtual Instrumentation Lab:

1 **Familiarization with LabVIEW Programming:** Creating simple VI, navigation and editing, developing VI, converting VI into Sub-VI, boolean switch action.

2 **LabVIEW Functions & Debugging:** Use of WHILE-loop, FOR-loop, IF-THEN, CASE structure, shift registers, local variables and debugging.

3 **Advance LabVIEW Functions:** Mathematical functions, arrays, clusters, waveforms and charts, formula node, global variables.

4 **Data Acquisition:** Analog I/O, digital I/O, application of measurement & automation explorer (MAX).

5 **VI Applications:** Temprature measurement, signal analysis (RMS, FFT, DFT, etc.), PLL, PWM output etc.

References:

1. Virtual Instrumentation Using LabVIEW
   S. Gupta & J. John.
   Tata McGraw-Hill, New Delhi INDIA
   ISBN – 0-07-059099-0

2. Labview 7 Express Student Edition.
   Robert Bishop, PHI
   ISBN - 0-13-123926-0

3. LabVIEW User Manual, National Instruments, Texas Instruments, USA
   available at www.ni.com

4. LabVIEW RT User Manual, National Instruments, Texas Instruments, USA April 2000, available at www.ni.com

5. LabVIEW FPGA Module User Manual, National Instruments, Texas Instruments, USA, March 2004, available at www.ni.com

6. Application LabView
   Leonard Sokoloff, PHI
   OSBN – 0-13-833949-X

7. LabVIEW For Electrical Circuits, Machine Drives and Labs
   Nesimi Ertugrul, PHI
   ISBN – 0-13-0618860-1

8. Advanced LabVIEW Labs,
   John Essick, PHI
   ISBN – 0-13-833949-X

9. LabVIEW Graphical Programming.
   Garry Johnsons, Mc Graw Hill.

Electives to be added in M.Tech (Digital Systems)

Elective I

SOLID STATE CIRCUITS (EC957) **4 Credits**

OPAMP design techniques and performance characteristics; opamp instrumentation in low and high power circuits; Phase lock techniques; PLL design parameters and systems; Analog multipliers and modulators; Switched Capacitor circuits; Bipolar, CMOS and BIMOS logic; CVSL, domino, C2MOS, pass transistor logic and PLAs; low voltage low power circuits.

Elective II & III

EMBEDDED SYSTEMS (EC970) **4 Credits**

UNIT I: AN INTRODUCTION TO EMBEDDED SYSTEMS: An Embedded system, processor in the system, other hardware units, software embedded into a system, exemplary embedded systems, embedded system – on – chip (SOC) and in VLSI circuit. Processor and memory organization – Structural Units in a Processor, Processor selection for an embedded system, memory devices, memory selection for an embedded systems, allocation of memory to program cache and memory management links, segments and blocks and memory map of a system, DMA, interfacing processors, memories and Input Output Devices.

UNIT II: DEVICES AND BUSES FOR DEVICE NETWORKS: I/O devices, timer and counting devices, serial communication using the "I2 C" CAN, profibus foundation field bus. and advanced I/O buses between the network multiple devices, host systems or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advanced buses.

UNIT III: DEVICE DRIVERS AND INTERRUPTS SERVICING MECHANISM: Device drivers, parallel port and serial port device drivers in a system, device drivers for internal programmable timing devices, interrupt servicing mechanism

UNIT IV: PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++, VC++ AND JAVA: Interprocess communication and synchronization of processes, task and threads, multiple processes in an application, problem of sharing data by multiple tasks and routines, interprocess communication.

UNIT V: HARDWARE – software co-design in an embedded system, embedded system project management, embedded system design and co-design issues in system development process, design cycle in the development phase for an embedded system, use of target systems, use of software tools for development of an embedded system, use of scopes and logic analysis for system, hardware tests. Issues in embedded system design.

HARDWARE DESCRIPTION LANGUAGES (EC971) **4 Credits**

UNIT I: HARDWARE MODELING WITH HDL : Hardware Encapsulation – The Verilog/VHDL Module, Hardware Modeling Verilog/VHDL Primitives, Descriptive Styles, Structural Connections, Behaviral Description In Verilog, Hierarchical Descriptions Of Hardware, Structured (Top Down) Design Methodology, Arrays Of Instances, Using Verilog For Synthesis, Language Conventions, Representation Of Numbers.

UNIT II: LOGIC SYSTEM, DATA TYPES AND OPERATORS FOR MODELING IN VERILOG & VHDL :User-Defined Primitives, User Defined Primitives – Combinational Behavior User-Defined Primitives –Sequential Behavior, Initialization Of Sequential Primitives. Verilog/VHDL Variables, Logic Value Set, Data Types, Strings. Constants, Operators, Expressions And Operands, Operator Precedence Models Of Propagation Delay; Built-In Constructs For Delay, Signal Transitions, Verilog/VHDL Models For Gate Propagation Delay (Interila Delay), Time Scales For Simulation, Verilog/VHDL Models For Net Delay (Transport Delay), Module Paths And Delays, Path Delays And Simulation, Inertial Delay Effects And Pulse Rejection.

UNIT III: BEHAVIORAL DESCRIPTIONS IN VERILOG/VHDL HDL : Verilog/VHDL Behaviors, Behavioral Statements, Procedural Assignment, Procedural Continuous Assignments, Procedural Timing Controls And Synchronization, Intra-Assignment, Delay-Blocked Assignments, Non- Blocking Assignment, Intra-Assignment Delay: Non-Blocking Assignment, Simulation Of Simultaneous Procedural Assignments, Repeated Intra Assignment Delay, Indeterminate Assignments And Ambiguity, Constructs For Activity Flow Control, Tasks And Functions, Summary Of Delay Constructs In Verilog/VHDL, System Tasks For Timing Checks, Variable Scope Revisited, Module Contents, Behavioral Models Of Finite State Machines.

UNIT IV: SYNTHESIS OF COMBINATIONAL LOGIC : HDL-Based Synthesis, Technology-Independent Design, Benefits Of Synthesis, Synthesis Methodology, Vendor Support, Styles For Synthesis Of Combinational Logic, Technology Mapping And Shared Resources, Three State

Buffers, Three State Outputs And Don't Cares, Synthesis Of Sequential Logic Synthesis Of Sequential Udps, Synthesis Of Latches, Synthesis Of Edge-Triggered Flip Flops, Registered Combinational Logic, Shift Registers And Counters, Synthesis Of Finite State Machines, Resets, Synthesis Of Gated Clocks, Design Partitions And Hierarchical Structures.
