NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA
SURATHKAL

MINUTES

OF

TWENTY SIXTH MEETING OF
BOARD OF STUDIES

Date   :   30.04.2014 (Wednesday)
Time   :   10.30 AM
Venue   :   Board Room,
               N.I.T.K., Surathkal,
               Post Srinivasnagar,
               PIN - 575 025.

Minutes of the Twenty Sixth combined Board of Studies (UG, PG, Research) Meeting held on 30th April, 2014 at 10.30 a.m. in the Board Room, NITK, Surathkal.

Members Present:

1.	Dr. Sumam David	…	Chairman
2.	Dr. A. Kandasamy	…	Member
3.	Dr. M.C.Narasimhan	…	Member
4.	Dr. M.B.Saidutta	…	Member
5.	Dr. G. S. Dwarakish	…	Representative of HOD, Dept. of AM
6.	Dr. Kiran G Shirlal	…	Member
7.	Dr. Katta Venkataramana	…	Member
8.	Dr. Govinda Raj	…	Representative of HOD, Dept. of MN
9.	Dr.Annappa	…	Member
10.	Dr. M. S. Bhat	…	Member
11.	Sri Jora M Gonda	…	Member
12.	Dr. K.P Vittal	…	Member
13.	Dr. Ananthanarayana V S	…	Member
14.	Dr. Vidya Shetty	…	Member
15.	Dr. K.V. Gangadharan	…	Representative of HOD, Dept. of ME
16.	Dr. S.M Kulkarni	…	Member
17.	Dr. Vijay Desai	…	Member
18.	Dr. Jagannath Nayak	…	Member
19.	Dr. A. C. Hegde	…	Member
20.	Dr. B. R. Shankar	…	Representative of HOD, Dept. of MACS
21.	Dr. N. K. Udayashankar	…	Member
22.	Dr. Shashikantha K	…	Member
23.	Mr. Vinaya Kumar	…	Member
24.	Dr. Subhash C. Yaragal	…	Member
25.	Dr. V. Ramachandra	…	External member
26.	Mr. Kamlabh Kumar Singh	…	Member
27.	Mr. Gaurav Chawdhury	…	Member
28.	Mr. K. Ravindranath	…	Secretary/Dy. Registrar (Acad)

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Minutes of Twenty Sixth BOS meeting held on 30.4.2014

The Chairman (BOS) and Dean (Academic) chaired the meeting and welcomed all the members to the **Twenty Sixth BOS meeting** and thanked the outgoing members and introduced new BOS members.

The minutes of **Twenty fifth BOS** meeting was reviewed and approved as there were no comments received from the members.

ITEM No: 26-BOS - 1: **Introduction of New Elective Course for B Tech 2012 Curriculum:-** **a) The Department of Information Technology:** The BOS resolved to approve IT 365 Natural Language Processing (3-0-2) 4 as new Elective Course for B Tech (Information Technology) 2012 Curriculum. The details are attached as an **ANNEXURE- I (a), Page No – 1.** **b) The Department of Mechanical Engineering:** The BOS resolved to approve the inclusion of : 1) ME446 - Theory of Gas Turbine and Jet propulsion (2-1-0) 3 2) ME447 – Multi Body Dynamics and Applications (2-1-0) 3 as new Elective Course for B Tech (Mechanical Engineering) 2012 Curriculum. The details are attached as an **ANNEXURE- I (b), Page No – 2.** **c) The Department of Computer Science and Engineering:** The BOS resolved to approve the inclusion of : 1) CO331 - Bioinformatics (2-1-0) 3 2) CO369 - Quantitative Computer Architecture (2-1-0) 3 as new Elective Course for B Tech (Computer Science and Engineering) 2012Curriculum. The details are attached as an **ANNEXURE- I (c), Page No – 3.** **d) The Department of Civil Engineering:** The BOS resolved to approve the inclusion of : 1) CV373 - Probability Methods in Civil Engineering (3-0-0) 3 2) CV426 - Solid Waste Management (3-0-0) 3 3) CV477 - Seismoresistant Concrete Structures (3-0-0) 3 as new Elective Course for B Tech (Civil Engineering) 2012 Curriculum and inclusion of CV381 - Mini Project II (0-0-3) 2 in MP category The details are attached as an **ANNEXURE- I (d), Page No –4.** **e) The Department of Electrical & Electronics Engineering:** The BOS resolved to approve the inclusion of : 1) EE243 - Mathematics for Electrical Engineers (3-1-0)4 2) EE443 - Mathematical Morphology & Applications to Signal Processing (3-1-0)4 3) EE343 - Statistical Foundation for Electrical Engineers (3-1-0)4 as new Elective Course for B Tech 2012 (Electrical & Electronics Engineering) Curriculum. The details are attached as an **ANNEXURE- 1 (e), Page No – 5-6.**	**For Senate Approval**

f) The Department of Chemical Engineering: The BOS resolved to approve the inclusion of : 1) CH365 - Introduction of Molecular Simulations (2-0-2)3 2) CH366 - Electrochemical Engineering (3-0-0)3 3) CH367 - Energy Conservation and Management in Process Industries (3-0-0)3 as new Elective Course for B Tech (Chemical Engineering) 2012Curriculum. The details are attached as an **ANNEXURE- 1 (f), Page No – 7.**	
ITEM No: 26-BOS - 2: **Incorporating changes in curriculum structure for B.Tech (Comp. Engg.) - 2012 Curriculum:** The proposal of DUGC of Department of Computer Science & Engineering was discussed. The BTech 2012 curriculum structure provides the flexibility to facilitate one semester project work in industry/external organizations. Hence resolved that there was no need to change the curriculum structure.	*Reporting to Senate*
ITEM No: 26-BOS - 3: **Introduction of New Courses for PG programmes** **a) The Department of Information Technology:** The DPGC of the Department of Information Technology was asked to review the title and the contents of the proposed course Natural Language Processing. The Chairman BOS was authorized to approve the same and place it before the Senate The BOS recommend the inclusion of : IT 825 Advanced Computer Networks (3-0-0) 3 IT 826 Topics in Natural Language Processing (3-0-2)4 as new Elective Courses for MTech (Information Technology) Curriculum. The details are attached as an **ANNEXURE- II (a), Page No – 8-9.** **b) The DPGC of the Department of Mechanical Engineering has proposed to include the four new elective courses:** The BOS asked DPGC of Department of Mechanical Engineering to relook the Curriculum ME817 Waste to Energy processes and Technologies. The Chairman BOS was authorized to approve the same and place it before the Senate. The BOS resolved to approve the inclusion of : 1) ME816 - Sustainable Energy Technologies (3-0-0) 3 2) ME817 - Waste to Energy Processes and Technologies (3-0-0) 3 3) ME818 - Artificial Intelligence and its Applications (3-0-0) 3 4) ME819 – Multiphase Flows (3-0-0) 3 5) ME827 - Experiments with Sensors, Actuator and Data Acquisition (2-0-2)3 as new Elective Courses for MTech programs of Department of Mechanical Engineering Curriculum. The details are attached as an **ANNEXURE-II (b), Page No –10-11.**	**For Senate approval**

c) **The DPGC of the Department of Computer Science and Engineering has proposed to include the two new electives:**

The BOS resolved to approve the inclusion of :
1) CS866 - Interconnection Networks   (3-0-0) 3

as new Elective Courses for MTech (Computer Science and Engineering) Curriculum. The details are attached as an **ANNEXURE- II (c) , Page No – 12.**

d) **The DPGC of the Department of Civil Engineering has proposed to include the four new electives:**

The BOS asked DPGC of Department of Civil Engineering to relook the Curriculum CM813 Sustainability in Built Environment. The Chairman BOS was authorized to approve the same and place it before the Senate. The BOS resolved to approve the inclusion of :
1) EN818 - Environmental Hydraulics   (3-0-0) 3
2) EN819 - Modeling Waste Water Treatment Process
    and Plants   (3-0-0) 3
3) CM813 - Sustainability in Built Environment (3-0-0) 3
4) TS816 – Traffic Simulation and Modeling   (3-0-0) 3

as new Elective Courses for MTech Environmental Engg, Construction Technology and Management and Transportation Engg programs of Dept. og Civil Engineering. The details are attached as an **ANNEXURE- II (d) , Page No – 13.**

e) **The DPGC of the Department of Chemical Engineering has proposed to include the one new electives:**

The BOS resolved to approve the inclusion of :
CH 815 - Cavitations and Its Applications in
    Chemical Engineering   (2-1-0) 3

as new Elective Courses for M.Tech (Chemical Engineering) Curriculum. The details are attached as an **ANNEXURE- II (e) , Page No – 14.**

ITEM No: 26-BOS - 4: **Modification of existing courses –** a) **The Department of Mechanical Engineering:** The BOS resolved to approve the modification of existing course: ME803 – Wind Energy Conversion (3-0-0) 3 The proposed changes are attached as on **ANNEXURE- II(b), Page No -10.** b) **The Department of Civil Engineering – MTech (Geotechnical Engineering) modification of Course structure and contents** The DPGC of the Department of Civil Engg. was asked to review the title of the course GT706 Computer Lab and the contents of the course GT807 Selected topics in Geotechnical Engg. The Chairman BOS was authorized to approve the same and place it before the Senate. The BOS resolved to approve the modification of Course structure and Contents of M.Tech (Geotechnical Engineering). The revised course structure and course content of M.Tech (Geotechnical Engineering) is attached as an **ANNEXURE- III, Page No – 15-18.** *To be effective from Academic Session 2014-15*	**For Senate Approval**

c) The Department of Electrical & Electronics Engineering: The BOS resolved to defer the proposal submitted by DPGC of the Department of Electrical & Electronics Engineering. It may be revisited at the during restructuring of MTech programs.	*Reporting to Senate*

ITEM No: 26-BOS - 5: **Inclusion of Additional Guide for M.Tech (by research) student-** The BOS has asked DPGC to give additional information on the research work of the student and the proposal was deferred.	*Reporting to Senate*

ITEM No: 26-BOS - 6:

Introduction of new 900 level courses for the PhD students-

a) **Department of Information Technology:**

The DPGC of the Department of Information Technology was asked to review the title of the courses IT 914, IT 916, IT 918, and IT 922 The Chairman BOS was authorized to approve the same and place it before the Senate.

The BOS resolved to approve the inclusion of new 900 level courses :

IT 913 Modern Cryptography	4
IT 914 Computer Network Security	4
IT 915 Digital Forensic	4
IT 916 Special Topics in Computer Networks	4
IT 917 Vehicular Adhoc Networks	4
IT 918 Special Topics in Wireless Sensor Networks	4
IT 919 Performance Analysis of Local Area Networks and Wide Area Networks	4
IT920 Modeling and Analysis of Networks Protocols	4
IT 921 Packet Forwarding Technologies	4
IT 922 Computer Network System Design	4

The details are attached as an **ANNEXURE- IV(a), Page No – 19-22.**

b) **The Department of Electronics and Communication Engineering:**

The BOS resolved to approve the inclusion of new 900 level courses :

EC906 – Selected Topics in Signal Processing	4
EC907- Applications of Signal Processing	4
EC908 – Selected Topics in Computer Communication Networks	4
EC909 – Advanced Topics in Radar Signal Processing	4
EC910 – Selected Topics in Analog and Mixed Signal Integrated Circuits	4
EC911 – Mathematical Methods for Signal Processing and Communication Engineering	4

The details are attached as an **ANNEXURE- IV(b), Page No –23-24.**

For Senate Approval

ITEM No: 26-BOS - 7:	
Eligibility to admission to PhD programme - Change in regulations – Dept. of Mechanical Engineering The BOS resolved to approve the changes in eligibility to admission to Ph.D Programme proposed by the Department of Mechanical Engineering as follows:	**For Senate approval**

Existing	Proposed
Admission to a Ph.D. Programme shall be open to candidates who passed the prescribed qualifying examination with a Cumulative Grade Point Average (CGPA) of at least 6.5 in the 0-10 scale grading system, or not less than 60% marks in the aggregate (taking into account the marks scored in all the subjects of all the public/ university examinations conducted during the entire prescribed period for the degree programme). However, this prescribed minimum shall be a CGPA of 6.0 or 55% marks in the aggregate for SC/ST candidates.	Admission to a Ph.D. Programme shall be open to candidates who passed the undergraduate and postgraduate degree in relevant field with a Cumulative Grade Point Average (CGPA) of at least 6.5 in the 0-10 scale grading system, or not less than 60% marks in the aggregate (taking into account the marks scored in all the subjects of all the public/ university examinations conducted during the entire prescribed period for the degree programme). However, this prescribed minimum shall be a CGPA of 6.0 or 55% marks in the aggregate for SC/ST candidates.

ITEM No: 26-BOS - 8:	
Increase in number of PhD Scholars / Guide – Department of Chemistry The present ratio of Research scholars per faculty is only around 2.2. The BOS resolved to defer the proposal	*Reporting to senate*

ITEM No: 26-BOS - 9:	
Recognition of Chartered Accountancy qualification for registration to Ph.D. Programme in Department of Humanities, Social Sciences and Management The BOS resolved to approve to recognize Chartered Accountancy along with graduation degree as equivalent to postgraduate degree in Commerce for admission to Ph.D. programme in Dept. of HSSM. The details are attached as an **ANNEXURE- V, Page No – 25-27.**	**For Senate Approval**

ITEM No: 26-BOS - 10: **Constitution of RPAC panel for Department of Information Technology** The BOS resolved to approve the following modification for constitution of RPAC panel for the Research Scholars of Department of Information Technology as the no of members in the DRPC of Dept of IT is only 4. 3 faculty from Dept of IT/CSE/EE/EC instead of 3 faculty from Department The details are attached as an **ANNEXURE- VI, Page No – 28.**	**For Senate Approval**
ITEM No: 26-BOS - 11: **Admission of top 10% of B.Tech students of NITK to Direct PhD programme at IIT Madras-** The BOS resolved to recommend the proposal of IIT Madras to admit top 10% of 3rd Year B.Tech students of NITK to direct PhD programme at IITM. The details are attached as **ANNEXURE- VII, Page No – 29-30.**	**For Senate Approval**
ITEM No: 26-BOS - 12: **Sponsored Ph.D. (External Registration) for contract faculty of other NITs -** The BOS discussed the proposal from NIT Uttarakhand regarding External Registration of Contract faculty Sponsored from NIT Uttarakhand. The contract faculty sponsored from other NITs may apply during the normal PhD admissions under the category External Registration (Sponsored from educational institutions). For such applicants the requirement of two years of service in Sponsoring organization after qualifying degree may be waived. The details are attached as an **ANNEXURE- VIII, Page No – 31.**	**For Senate Approval**
ITEM No: 26-BOS - 13: **Inclusion of Additional guides for PhD Scholars** a) The BOS resolved not to approve additional guide for Mr Giridhara Babu Y (Reg. No ME12P07) as he has already completed his research proposal seminar. b) The BOS has asked DRGC to give additional information on the research profile and publications of the proposed Additional Guide for Mr. J. Felix [Reg. No. ME13P02] and the proposal was deferred.	*Reporting to senate*

c)	The BOS resolved to approve Dr. Srinivasa Pai P. Professor, NMAMIT NITTE as an Additional Guide for Mrs Rashmi [Reg. No. ME13P04] in the Department of Mechanical Engineering.	
d)	The BOS resolved not to approve additional guide for Mr Hiremath Chandrasekharayya (Reg. No ME12P02) as he has already completed his research proposal seminar.	

ITEM No: 26-BOS - 14:

CGPA to Percentage Conversion Formula - Department of Civil Engineering

The BOS resolved to recommend modification of *NITK Regulations General (G.5.13)* a follows:

Existing	Proposed	
There is no equivalence between the CGPA scale and percentage. However, CGPA $\geq$ 6.5 can be considered as equivalent to first class and 5.5 $\leq$ CGPA < 6.5 can be considered as equivalent to second class.	There is no equivalence between the CGPA scale and percentage. However, CGPA $\geq$ 6.5 can be considered as equivalent to first class and 5.5 $\leq$ CGPA < 6.5 can be considered as equivalent to second class. Notionally, (CGPA - 0.5) may be multiplied by a factor of 10 to obtain the numerical percentage.	**For Senate Approval**

The Secretary (BOS) proposed the vote of thanks to the chair and to the members.

04/05.2014

(K. Ravindranath)
Secretary –BOS, NITK

04.05.2014

(Dr. Sumam David S)
Chairman-BOS, NITK

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IT365 NATURAL LANGUAGE PROCESSING (3-0-2) 4

Introduction and Overview, Language Modelling, History and Applications, Basic Text Processing - Word stemming, tokenization, normalization, Part of Speech tagging, Text Classification – basics and process, tools, Information Retrieval, TF/IDF, Ranked IR, Vector Space Models, Query analysis and processing, Basics of Information Extraction, Named Entity Recognition, Maximum Entropy models, Relation Extraction; Introduction to Semantics, word sense and word similarity, Basics of Wordnets, tools, Emerging trends, research issues, challenges, interesting applications in various domains.

Daniel Jurafsky and James H. Martin. "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition". Second Edition. Prentice Hall, 2008
Christopher D. Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing" MIT Press, 1999
Tanveer Siddiqui, U. S Tiwary, "Natural Language Processing And Information Retrieval", 1st Edition

ME446Theory of Gas Turbine and Jet propulsion (2-1-0)3

Analysis of the gas turbine cycles, Design point performance calculations, Intake and propelling nozzle efficiency, Turbofan, turbojet and turboprop engines, Reaction principles, Momentum theory applied to propulsive devices, Augmentation of thrust, Ramjet and Pulse jet engine, The concept of losses and efficiency, Types of combustion system, Combustion process, Detailed component studies on compressors and turbines, Compressibility effects, Vortex theory, Selection of blade profile, chord and pitch, Estimation of stage performance, Limiting factors in design, Off-design performance, Equilibrium running conditions

Cohen, H.; Rogers G.F.C.; Saravanamuttoo, H.I.H : "Gas Turbine Theory" 5th edition, Pearson Education 2001 ISBN:0-13-015847-x and hand-outs regarding combustion.

David Gordon Wilson, TheodosiosKorakianitis "The design of high efficiency turbomachinery and gas turbines"; Prentice Hall, 1998, ISBN 0133120007

P. P. Walsh; Fletcher P.: "Gas Turbine Performance": 2nd edition, Blackwell Publishing Limited 2004, ISBN:0-632-06434-X

Nicholas Cumpsty: "Jet Propulsion: A Simple Guide to the Aerodynamic and Thermodynamic Design and Performance of Jet Engines", 2nd edition, Cambridge University Press 2003, ISBN: 0521541441

Erian A. Baskharone: "Principles of Turbomachinery in Air-Breathing Engines", Cambridge University Press 2006

M.J. Zucrow: Principles of Jet Propulsion and Gas Turbines, John Wiley, 1970

ME447Multi Body Dynamics and Applications (2-1-0)3

Kinematics of particles and rigid bodies, Euler angles, Generalized displacement, velocity and acceleration, Rigid body dynamics, D'Alembert's Principle, Virtual work application in dynamics and Lagrange's equation, Constraints formulation in Multi Body Systems, Formulation of joint constraints for various joints used in practice, Formulations of Constrained Dynamics Equations, Lagrange Multipliers, Multi Body Dynamics Solution, Numerical Integration, Computer simulation of the dynamic behavior of multi-body systems using software tools. Treatment of holonomic and non-holonomic constraints through various elimination and augmentation methods, Application to Vehicle Dynamics, Engine Dynamics, Power Train Dynamics.Tyre models in Vehicle dynamics. Stability Analysis.Deformable Multi Body Dynamic Simulation.

Ahmed A. Shabana, "Dynamics of Multibody Systems", 3rd edition, Cambridge University Press, 2010.

Michael Blundell and Damian Harty., "The Multibody Systems Approach to Vehicle Dynamics", Elsevier Limited, 2004

FaridAmirouche, "Fundamentals of Multibody Dynamics: Theory and Applications", Birkhäuser, 2006

Ahmed A. Shabana, "Computational Dynamics", Wiley InterScience, 2nd Edition. 2001

CO331   BIOINFORMATICS   (2-1-0) 3

Introduction to Bio informatics. Introduction to Algorithms and Complexity. Restriction mapping and motif finding algorithms. Greedy Algorithms in Genome Assembly. DNA Sequence comparison: Dynamic programming approaches. Sequence Alignment - Graph algorithms. Combinatorial pattern matching. Clustering and trees in Gene expression analysis. Randomized algorithms in Bio informatics. Hidden Markov Models.

Neil C. Jones and Pavel A. Pevzner. An Introduction to Bioinformatics Algorithms. MIT Press, 2004.
Marketa Zvelebil and Jeremy Baum. Understanding Bioinformatics. Garland Science, 1st Edition, 2007.
Warren J. Ewens, and Gregory R. Grant. Statistical Methods in Bioinformatics, 2e. Springer, 2005.
David W Mount. Bioinformatics: Sequence and Genome Analysis. Cold Spring Harbor Laboratory Press, U. S. 2nd Revised edition. 2004.

CO369 QUANTITATIVE COMPUTER ARCHITECTURE   (2-1-0)3

Fundamentals of Superscalar processors, Vector processors and Graphical Processing Unit architectures. Interconnection networks in multicore processors. Computer architecture of warehouse computers. Architectural optimizations in Cache Memory. Uniprocessor, Multiprocessor and Full system simulators. Recent, relevant architectural advances from literature.

John L Hennessy and David A Patterson, Computer Architecture - A quantitative approach, 5th edition, Morgan Kaufmann.
Classic papers from literature concerning Computer Architecture.
Rajeev Balasubramonian, Norman Jouppi, Naveen Muralimanohar,Multi-core Cache Hierarchies. Synthesis Lectures on Computer Architecture. Morgan & Claypool Publishers.
Daniel J. Sorin, Mark D. Hill, David A. Wood. A Primer on Memory Consistency and Cache Coherence. Synthesis Lectures on ComputerArchitecture. Morgan & Claypool Publishers. 2012.

CV373   PROBABILITY METHODS IN CIVIL ENGINEERING   (3-0-0) 3

Role of probability in civil engineering problems; Definition of basic random events; Application of set theory in definition of composite event operations; Probability of events and definition of probability axioms; Random variables; Probability definitions; Moments and expectations; Functions of random variables; Common probability models; Statistics and sampling; Regression and correlation analyses; Estimation of distribution parameters from statistics; Hypothesis testing and significance; Bayesian updating of distributions; Uncertainty quantification; Probabilistic analysis; Methods of structural reliability; Applications to design of civil engineering systems.

A.H-S. Ang& W.H. Tang, Probability Concepts in Engineering: Emphasis on Applications to Civil and Environmental Engineering, Wiley, 2006

A. Haldar& S. Mahadevan, Probability, Reliability, and Statistical Methods in Engineering Design, Wiley, 1999

CV426   SOLID WASTE MANAGEMENT   (3-0-0) 3

Characterization of Municipal wastes; Waste Collection, Disposal and Management-Laws and guidelines; Utilization of municipal wastes for bio-gasification and manure; landfill; Recent technological advances in composting and thermal gasification; utilization and management of nonhazardous and hazardous waste; Case studies.

George Tchobanoglous, Frank Kreith, Handbook of Solid Waste Management, McGraw-Hill, 2002.

CPHEEO Manual on Solid Waste Management (2000)

Asian Productivity Organization Report on "Solid-Waste Management: Issues and Challenges in Asia", Environmental Management Centre, 2005

Thomas H. Christensen, Solid Waste Technology & Management: Volume 1 & 2, A John Wiley& Sons, 2010

Michael D. LaGrega, Phillip L. Buckingham, Jeffrey C. Evans. Hazardous Waste Management, Waveland Press Inc., 2010

CV477   SEISMORESISTANT CONCRETE STRUCTURES   (3-0-0) 3

Introduction to dynamic response of structures- Dynamic equilibrium, SDOF and MDOF. Earthquake ground motion and response spectra- Characteristics of ground motion, earthquake response spectra. Seismoresistantarchitecture, IS 1893(Part1):2002 codal provisions, Simplified modal response spectrum analysis- Example problems. Earthquake resistant design of RC elements, Shear walls - Response of concrete and steel to monotonic cyclic loading, Codal provisions of IS 13920:1993. Design example of a multi-storey building. Seismic retrofitting strategies – considerations, classification, case studies. (IS 13935:1993) Base isolation- Isolation system components, Isolator design procedures.(Mini project on analysis and design of a multi storey building)

The Seismic Design Handbook., FarzadNaeim, International code council, Kluwar Academic publishers (USA), 2001

George. G. Penelis and Andreas J. Kappos, Earthquake resistant concrete structures, E& FN Spon Chapman, Hall London, 1997

FarzadNaeim and James M Kelley, Design of seismic isolated structures, John Wiley and sons Inc.1999

IS codes: IS 1893(Part1):2002, IS 13920:1993, IS 13935:1993

A.K. Chopra, Dynamics of structures - Theory and applications to earthquake engineering,Pearson Education, 2001

Pankaj Agarwal, Manish ShrikhandeEarthquake Resistant Design of Structures, Prentice- Hall India, 2006

CV381 Mini Project II   (0-0-3)2

EE243: Mathematics for Electrical Engineers   (3-1-0) 4

Linear Systems: Systems of linear equations and their solution sets. Matrix Algebra: Matrix Operations, Determinants, Properties of Determinants and Linear transformations. Vector Spaces; Linear Maps, Isomorphism and Norms on vector spaces. Eigen Functions: Eigen Values, Eigen Vectors and Their Applications to Differential Equations. Orthogonality and Least squares Problems. Functions of complex variables, Cauchy Reimann equations. Properties of analytic functions. Conformal mapping. Line integrals in complex plane. Cauchy's theorems. Power series, residues. Evaluation of standard real integrals using contour integration.

David C. Lay, Linear Algebra and Its Applications, Third Edition, Pearson
Gilbert Strang, Linear Algebra and Its Applications, , Fourth Edition, Academic Press, Cengage Learning
Kenneth Hoffmann and Ray Kunze, Linear Algebra, , Prentice Hall India
R. A. Horn and C. R. Johnson, Matrix Analysis, Cambridge University Press.
Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern.
Lars V. Ahlfors, Complex Analysis, McGraw Hill Book Co.

EE343: Statistical Foundation for Electrical Engineering   (3-1-0) 4

Probability: Axioms, Sample spaces (continuous & discrete), Density, Distribution and Mass functions and their applications. Random Variable: Single, Multiple, Continuous and Discrete, statistical operations and limit theorems. General Distributions and their practical significance. Functions of random variables: Probability distribution functions of functions of random variables. Random Process: Concept, Classification, Temporal and Spectral characterization, and Statistical Estimation: Estimation of variables, Estimation of parameters. Testing of hypothesis. Analysis of linear systems to Random signals and optimum linear systems, and Optimum Wiener Solutions.

Davenport W.B Jr, Probability and Random Process, An Introduction for Applied Scientists and Engineers, McGraw-Hill.
Peyton Z. Peebles JR, Probability, Random Variables & Random Signal Principles, 4th Edition, McGraw-Hill.
Leon-Garcia, Probability and Random Process for Electrical Engineering, Addition-Wesley.
Viniotis Y, Probability and Random Process for Electrical Engineers, McGraw-Hill.
Papoulis A, Probability, Random Variables and Stochastic Processes, McGraw-Hill.
Mayer P. L., Introductory Probability and Statistical applications, Second Edition, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

EE443: Mathematical Morphology and Applications to Signal processing   (3-1-0) 4

Introduction to Mathematical morphology: Minkowski addition and Minkowski subtraction, Introduction to the lattice theory, Structuring elements and its decomposition. Fundamental Morphological Operators: Erosion, Dilation, Opening, Closing, Binary vs Greyscale Morphological operations. Hit-or-Miss transform, Skeletons, Morphological reconstructions, Thinning, Thickening: Hit-or-Miss transformation, Skeletonization, Coding of binary image Via Skeletonization, Skeletonization by influence Zones(SKIZ), Weighted SKIZ, Medial Axis Transformation(MAT), Skeletonization Via Euclidean Distance Transformation, Partial Skeletons, Morphological Shape Decomposition(MSD), Morphology Thinning, Thinking, pruning, MSD Vs SKIZ. Morphological Filtering and Segmentation:Multi-scale Morphological Transformation, Top -- Hat and Bottom Hat Transformation, Alternative Sequential filtering, Segmentation, Watershed Segmentation, Connected Operators for Segmentation, Hierarchical Segmentation Vs Watersheds, Markers, Hierarchical Segmentation, Geodesic active contours. Geodesic Transformation and Metrics: Geodesic Morphology, Graph – Based Morphology. Euclidean Metric, Geodesic Distance (Shortest path), Dilation distance, Hausdorff Dilation and Erosion distances. Applications of Mathematical Morphology.

J. Serra, Image Analysis and Mathematical Morphology, Academic Press London, 1982.

J. Serra, *Image Analysis and Mathematical Morphology: Theoretical Advance*, Academic Press, 1988.

N. A. C. Cressie, *Statistics for Spatial Data*, John Wiley, 1991.

P. Soille, *Morphological Image Analysis, Principles and Applications*, 2nd Edition, Springer Verlag. 2003.

L. Najman and H. Talbot (Eds.), *Mathematical Morphology*, Wiley, 2010.

B. Chanda and D. Dutta Majumdar, *Digital Image Processing and Analysis*, 2nd edition, New Delhi: PHI Learning Pvt. Ltd., 2011,

B. S. Daya Sagar, *Mathematical Morphology in Geomorphology and GISci*, Chapman & Hall/CRC Press, FL. 2013,

Ch365 Introductionto Molecular Simulations (2-0-2) 3

Introduction and basics of molecular simulations – model systems, interaction potentials, periodic boundaries, minimum image convention, Equations of motion. Elementary statistical mechanics: ensembles, Boltzmann's distribution, and free energy. Measure and control of temperature and stress in molecular systems. Length and time scale limits of simulation methods. Molecular dynamics of simple model fluids such as hard spheres.Structure of a simulation program and introduction to programming methods.Applications in solids, liquids, and biomolecules. Demonstration using LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator).

Allen, M.P., Tildesley, D.J. Computer Simulation of Liquids, Oxford University Press

Frenkel, D., Smit, B., Understanding Molecular Simulations: From algorithm to applications, Academic Press, ISBN-10: 0-12-267351-4

Rapport, D.C., The Art of Molecular Dynamics Simulation, Cambridge University Press. ISBN-13 : 978-0-521-82568-9

Donald Allan McQuarrie,Statistical Mechanics, University Science Books. ISBN-13: 978-1891389153

CH 366 Electrochemical Engineering (3-0-0) 3

Introduction.Galvanic and electrolytic cell.Thermodynamics, electrochemical potential and Nernst equation.Double layer - structure of electrified interface, ionic cloud theory and adsorption.Electrodics - Butler Volmer equation and transport phenomena. Applications- corrosion, fuel cells and biosensors.Impedance spectroscopy.Reaction mechanism and equivalent circuits.

Bockris J.O.M. and Reddy A.K.N.- Modern Electrochemistry - Vol.1,Vol2A and Vol 2B, Springer.

Bard A.J. and Faulkner L.R.-Electrochemical Methods Fundamentals and Applications- John Wiley & Sons, 2001.

Newman. J and Thomas-Alyea K.E.-Electrochemical Systems- John Wiley & Sons, 2004.

CH367 Energy Conservation and Management in Process industries (3-0-0) 3

Energy Outlook, Energy conservation and its importance, Energy intensive industries, Global industrial energy efficiency benchmarking, Engineering fundamentals related to energy efficiency, Principles on energy management, Energy Audit, Detailed thermodynamic analyses of common unit operations,Opportunities and techniques/methods for energy conservation in equipment and utility systems in process industries, Process synthesis, Thermo-economics, Energy Management Information Systems (EMIS).Software tools for industrial energy efficiency and savings, Case studies on energy conservation and management in process industries

W.F. Kenney-Energy Conservation in the Process Industries. Academic Press Inc., 1984.
Vladimir S. Stepanov - Analysis of Energy Efficiency of Industrial Processes. 1st Edition, Springer-Verlag, 1993.
Jakob de SwaanArons, Hedzer van der Kooi, Krishnan Sankaranarayanan-Efficiency and Sustainability in the Energy and Chemical Industries- 1st Edition, Marcel Dekker, Inc., 2004.

IT825 ADVANCED COMPUTER NETWORKS   (3-0-0)3

Overview of computer networks, seven-layer architecture, TCP/IP suite of protocolsetc.MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbor discovery, auto-configuration, routing. Changes to other protocols.Application Programming Interface for IPv6.Mobility in networks.Mobile IP.IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.TCP extensions for high-speed networks, transaction-oriented applications.Other new options in TCP.

Reference Books

1.   W. R. Stevens, "TCP/IP Illustrated, Volume 1: The Protocols", Addison Wesley, 1994.

2.   G. R. Wright, "TCP/IP Illustrated, Volume 2: The Implementation", Addison Wesley, 1995.

3.   W. R. Stevens, "TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols", Addison Wesley, 1996.

4.   R. Handel, M. N. Huber, and S. Schroeder, "ATM Networks: Concepts, Protocols, Applications", Addison Wesley, 1998.

5.   C. E. Perkins, B. Woolf, and S. R. Alpert."Mobile IP: Design Principles and Practices", Addison Wesley, 1997.

Introduction to Language Modelling, History and Applications, Text Processing Systems and architectures, N-grams, Lexical semantics and word-sense disambiguation, part of speech tagging, spelling correction, Text Classification – basics and process, tools, Naïve Bayes classifier, learning algorithms, Probabilistic Similarity Measures and Clustering, Sentiment Analysis, Generating and developing sentiment lexicons, learning lexicons, Information Retrieval, TF/IDF, Vector Space Models, Query analysis and processing, Information Extraction - Maximum Entropy models, Relation Extraction, Stochastic Tagging, and Log-Linear Models, Introduction to Semantics in NLP, Question Answering Models, passphrase analysis and answer generation, summarization, Emerging trends, research issues, challenges, interesting applications in various domains.

Christopher D. Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing" MIT Press, 1999
Daniel Jurafsky and James H. Martin. "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition". Second Edition. Prentice Hall, 2008
Steven Bird. "Natural Language Processing with Python". O'Reilly, 2009
James Allen, "Natural Language Understanding". Benjamin/Cummings, 2ed, 1995

ME803 Wind EnergyConversion (3-0-0)3

Introduction, Sources and characteristics of wind, Power in the wind; Wind resource assessment, Wind measurement, Classification of wind turbines, horizontal and vertical axis wind turbines, Wind turbine aerodynamics, Momentum theory, Blade element theory, Turbine airfoils and rotor wakes, Operational characteristics; Wind turbine design, Component design, Power control, Siting and wind farm design, Electric and control systems, Economic assessment, Environmental and social issues.

Siraj Ahmed, "Wind Energy – Theory and Practice", PHI Learning Private Limited, Eastern Economy Edition, New Delhi, 2010.
Freris, L.L., "Wind Energy Conversion Systems", Prentice Hall.1990
Spera, D.A., "Wind Turbine Technology: Fundamental Concepts of Wind Turbine Engineering", ASME Press. 1994
J.F. Manwell, J.G. McGowan, and A.L. Rogers Wind Energy Explained, Second Edition John Wiley & Sons Inc. 2010
J F Walker, and N Jenkins, Wind Energy Technology, John Wiley and Sons, 1997.
Tony Burton, David Sharpe, Nick Jenkins, Ervin Bossanyi, Wind Energy Handbook, John Wiley & Sons, Ltd, 2001
Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics Springer-Verlag Berlin Heidelberg, 2006
F R Eldridge, Wind Machines, NY: Von Nostrand Reinhold, 1980.
D M Eggleston, and F S Stoddard, Wind Turbine Engg.Design, Von Nostrand, New York, 1987.

ME816Sustainable Energy Technologies (3-0-0)3

Sustainability Concept for Energy, Water and Environmental Systems, Efficient Production and Use of Energy, Sustainability indicators, Challenges in Energy system Design, Product innovation, Distributed Energy Generation, , Multi-Criteria Decision making in Energy Systems and Environment, Simulation tools, Biomass into Liquid Fuels, Energy from algae, Fuel Cell and Hybrid Systems, Carbon Emission Credits, Carbon Capture and Storage technology: status and future, Integrated Multi-generation Energy Systems, Advanced Steam Generator Concepts for Oxy-Fuel Processes, Climate change and thermal energy storage, Sustainable Nuclear Energy, Industrial Catalysis for Energy Production, Environmental impact of renewable energy systems. Energy Economics - Simple Payback Period, Time Value of Money, IRR, NPV, Life Cycle Costing, Cost of Saved Energy, Cost of Energy generated, Examples from energy generation and conservation, Energy Chain, Primary energy analysis, Life Cycle Assessment, Net Energy Analysis

IbonGalarraga, Mikel González-Eguino, Anil Markandya (Editors), Handbook of Sustainable Energy, Edward Elgar Publishing Limited 2011
Ibrahim Dincer and CalinZamfirescu, Sustainable Energy Systems and Applications, Springer Science+Business Media, LLC 2011
Ekko C. van Ierland and Alfons Oude Lansink (Editors), Economics of Sustainable Energy in Agriculture (2003) Kluwer Academic Publishers New York, Boston, Dordrecht, London, Moscow
FaustoCavallaro (Editor), Assessment and Simulation Tools for Sustainable Energy Systems Theory and Applications, Springer-Verlag London 2013
Halime O. Paksoy (Editor) Thermal Energy Storage for Sustainable Energy Consumption Fundamentals, Case Studies and Design, 2007 Springer
Ronald E. Hester and Roy M. Harrison (Editors) Sustainability and Environmental Impact of Renewable Energy Sources, The Royal Society of Chemistry, Thomas Graham House, 2003
NairnHarndiaAfgan and Maria da GracaCarvalho, Sustainable Assessment Method For Energy Systems Indicators, Criteria and Decision Making Procedure, springer science+business media, LLC, 2000

ME817 Processes and Technologies for energy harvesting from waste(3-0-0)3

Abundance of Waste and Energy Scarcity, Biomass and Waste as Sustainable Resources, Anaerobic Digestion, Biomass and Waste Gasification, Digesters, Gasifiers and Biorefineries, Garbage to Electricity, Liquid Fuels , , MSW Processes to Energy, MSW Gasifiers and Process Equipment, Thermodynamic Approach to Design and Optimization of Biomass Gasifier, Modelling Waste Characteristics and WtE Plants as a Tool for Optimum Operation Conditions, Waste Incineration and Waste Prevention. Environmental and social impacts of waste to energy (WTE) conversion plants, Lifecycle assessment (LCA) and its application to sustainable waste management, Pollution control systems for waste to energy technologies, Fuel Cells in the Waste-to-Energy Chain, Molten Carbonate Fuel Cells, Solid Oxide Fuel Cells, Fuel Gas Clean-up and Conditioning, High-Temperature Fuel Cell Plants and Applications, Biomethane and Natural Gas, Prospects of Hydrogen as a Future Energy Carrier, Market and Feasibility Analysis of Non-conventional Technologies

Gary C. Young, Municipal Solid Waste to Energy Conversion Processes Economic, Technical, and Renewable Comparisons, John Wiley &Sons, Inc, 2010.
Industrial Plasma Technology Applications from Environmental to Energy Technologies , Edited by Yoshinobu Kawai, Hideo Ikegami, Noriyoshi Sato, Akihisa Matsuda,Kiichiro Uchino, Masayuki Kuzuya, and Akira Mizuno, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2010.
Waste to Energy Opportunities and Challenges for Developing and Transition Economies, Edited by AvraamKaragiannidis, Springer-Verlag London Limited 2012
Waste to energy conversion technology, Edited by Naomi B. Klinghoffer and Marco J. Castaldi, Woodhead Publishing Limited, 2013

ME818 ArtificialIntelligence and its Applications (3-0-0)3

Computational Techniques for representing and solving problems; Perceptions; Representation, production system & search; Heuristics; Fuzzy Logic and control, Artificial Neural Networks techniques; Back propagation

Algorithm,Adaptive Resonance Theory, Case studies in the field related to manufacturing, thermal, design and mechatronics applications.

George F. Luger, Artificial Intelligence, Pearson Pub.6th edition (2009)

VVS Sharma, B.Yajnanarayan and Deekshitalu, Artificial Intelligence & Expert System Technologies, Tata McGraw Hill.

Bart Kosko, Neural Networks and Fuzzy Systems.Prentice-Hall; Har/Dis edition (23 May 1991)

Stuart Russell, Peter Norvig Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall; December 11, 2009

ME819 Multiphase Flows(3-0-0)3

Introduction to multiphase flows, Properties of Dispersed flows, Concept of continuum, density and volume fraction, multiphase flow notations, Particle or droplet spacing, Response times, Stokes number, Phase coupling-mass, momentum and energy coupling, Size distribution and size distribution functions, Particle-Fluid interaction, one way coupling, two way coupling, Particle-flow turbulence interaction, Particle-Particle interaction, Atomisation, Sprays, Types of Spray formation- Ocean spray, Wind Shearing and Jet impingement methods. Droplets Atomization, Evaporation and spray combustion, Granular Flows, Particle erosion, Experimental methods, Numerical modelling of multiphase flows.

Clayton T Crowe, John D. Schwarzkopf, Martin Sommerfeld, Yutaka Tsuji ,Multi-phase flows with droplets and particles CRC Press, second edition, 2012.

Christopher E Brennen, Fundamentals of multi-phase flows, Cambridge University Press, 2005.

Nikolay Ivanov Kolev, Multiphase Flow Dynamics 1: Fundamentals, Springer 2007.

Nikolay Ivanov Kolev, Multiphase Flow Dynamics 2: Mechanical interactions, Springer 2011.

Nikolay Ivanov Kolev, Multiphase Flow Dynamics 3: Thermal interactions, Springer 2011.

Guan HengYeoh, JiyuanTu, Computational techniques for multiphase flows, Elsevier 2010.

Andrea Prosperetti and GretarTryggvason, Computational methods for multiphase flows, Cambridge university press 2007.

A.A. Mammoli and c.A.Brebbia, Computational methods in multiphase flows, Series Editors: WIT Press 2011.

Arthur H Lefebvre, Atomization and Sprays, Taylor and Francis, 1989.

Nasser Ashgriz, Handbook of Atomization and sprays: Theory and Applications, Editor: Springer 2011.

ME827 Theory and practice of Sensors and Actuators   (2- 0-2) 3

Physics of sensing, sensor specification & dynamics; experimental error analysis; measurement uncertainty, signal conditioning, Actuators and its control, modeling of sensing and actuation systems, Fundamentals of Signal processing. Lab components: Measurement of Temperature, RH, Pressure, strain, force,torque, displacement, velocity, Acceleration, rotation, and rpm– use of different sensors, signal conditioners, signal acquisition and digitization, Actuators: Solenoids, DC motor and its control, stepper motor and its control, servo motorsPWM generation and control, Implementation of control systems using sensors and actuators

Sanjay Gupta, Joseph John Virtual Instrumentation Using Lab VIEW Tata MaGraw-Hill (2005)

D Patranabis, Sensors and Transducers, PhI3nd Edition (2013)

J.P. Holman Experimental Methods for Engineers McGrawHill, 8th Edition(2010)

James H McClellan, DSP First A Multimedia Approach ,Printice Hall International (1999)

Richard Crowder, Electric Drives and Electromechanical Systems: Applications and Control Elsevier publication(2010), ISBN: 978-0-7506-6740-1

CS866   INTERCONNECTION NETWORKS   (3-0-0)3

Introduction to Interconnection networks. Network specifications. Traffic patterns. Butterfly Networks, Torus, Mesh vs. Torus. Express cubes. Non-Blocking Networks - Non-blocking vs. Non-interfering, Crossbars, Clos, Benes, Sorting networks. Concentrators and distributors. Slicing multistage networks. Routing Taxonomy, Deterministic routing. Oblivious routing. Randomized routing, Adaptive routing. Flow control - Resources and allocation units, bufferless flow control. Buffered flow control Packet-buffer flow control, Flit-buffer flow control, buffer management and backpressure, flit-reservation flow control. Router architecture, router datapath. Arbitration. Network interfaces. Error control Buses. Performance analysis. Simulation of interconnection networks. Case studies and current NoC proposals.

William Dally and Brian Towles, Principles and Practices of Interconnection Networks. Morgan Kaufmann, 2004.

John L Hennessy and David A Patterson, Computer Architecture A quantitative approach. Appendix F. 5th edition, Morgan Kaufmann.

Recent publications from NQCS, ISCA, MICRO and other leading conferences.

Li-Shiuan Peh and Natalie Enright Erger. On Chip Networks. Synthesis Lectures on Computer Architecture. Morgan and Claypool Publishers.

EN818   ENVIRONMENTAL HYDRAULICS   (3-0-0)3

Basic equations for fluid flow analyses, Reynolds transport theorem, Fundamental Relationships for Flow and Transport, Diffusion and dispersion, Derivation of diffusion equation, Solution of diffusion equation, Advective diffusion, Turbulent diffusion, Transport Processes in Rivers, Modelling the movement of pollutants in ground water, Treatment Plant Hydraulics, Hydraulic profiles, Distribution networks.

Clark, M.M., Transport Modeling for Environmental Engineers & Scientists, John Wiley & Sons, 1996.
Martin J.L. and McCutcheon S.C. Hydrodynamics and Transport for Water Quality Modeling, CRC Press, 1999.
Chapra, S.C. Surface Water Quality Modeling McGraw Hill Book Co, 1997.
Ranga Raju K G, Flow through Open Channels, Second edition, Tata McGraw-Hill Company Ltd, 1997.
Singh, Vijay, Hager, Willi H. (Eds.), Environmental Hydraulics, Kluwer Academic Publishers, 1996.
Tsanis, I.K., Wu, J., Shen, H and Valeo, C. Environmental Hydraulics, Elsevier Publications, 2007.
Bhave P R, Analysis of Flow in Water Distribution Network, Technomic Publishing, 1996.

EN819   MODELLING WASTE WATER TREATMENT PROCESSES AND PLANTS (3-0-0)3

Basis of wastewater modeling (kinetics, stoichiometry, mass balances, hydraulics, mixing and matrix notation) - An introduction of existing International water Association Quality (IWAQ) models (ASM1, ASM2, ASM3, ASM2d) - Selection of computer programs in which the models can be built in; Procedures for characterization of wastewater and sludge and the protocol for the development of calibrated activated sludge models- Case studies on modeling wastewater treatment plants. Applications of computer programs viz. ASIM, AQUASIM, SIMBA, WEST, SCADA as a tool of modeling wastewater treatment processes.

Henze, M., Gujer, W., Mino, T and M.C.M. van Loosdrech, Activated Sludge Models ASM1, ASM2, ASM2d and ASM3, IWA publishing, 2002
D. Brdjanovic, S.C.F Meijer, C.M. Lopez-Vazquez, C.M. Hooijmans, M.C.M. van Loosdrecht, Applications of Activated Sludge Models, IWA Publishing, 2014.
Leiv Rieger, Sylvie Gillot, Guenter Langergraber, Takayuki Ohtsuki, Andy Shaw, Imre Takacs, Stefan Winkler, Guidelines for Using Activated Sludge Models, IWA Publishing, 2012

CM813   SUSTAINABILITY IN BUILT ENVIRONMENT   (3-0-0)3

Basic concepts: terminology, international developments, national developments, green building foundation and its systems, building assessment, building process and ecological design, sustainable sites and landscaping, building hydrologic system, indoor environmental quality, sustainable water use, economic analysis of green building, principles and practices of sustainable building design and construction, alternate building materials & technologies, energy conservation, waste utilization and waste management in construction sites.

Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery, John Wiley & Sons, 2008.
Ann Marie VanDerZanden, Thomas W. Cook, Sustainable Landscape Management: Design, Construction, and Maintenance, John Wiley & Sons, 2010.
Craig, A. Langston., and Grace, K. C. Ding., Sustainability practices in Built environment, Springer Publications, 2001.
Jagadish K S et al, Alternative Building Materials and Technologies, New Age International, 2011.

TS816   TRAFFIC SIMULATION AND MODELING   (3-0-0)3

Introduction to Traffic Simulation; simple Probability Concepts; Different Probability Distribution (discrete and continuous distribution); Random Number Generation; Macroscopic Traffic Simulation: concepts of macroscopic models, first order traffic flow models (LWR Model), second order traffic flow models, Macroscopic Traffic Simulator: NETSIM; Mesoscopic Traffic Simulation: Concepts of mesoscopic models, application of mezzo models. Mesoscopic Traffic Simulator: DynaMIT; Microscopic Traffic Simulation: Concepts of microscopic models, Different types of car following models, lane changing and overtaking models, Different types of traffic simulation models; Microscopic Traffic Simulator: MITSIM, VISSIM; Traffic simulation models for mixed traffic conditions.

J. Barcelo, Fundamentals of Traffic Simulation, Springer, 2010.
A. M. Law and W. David Kelton, Simulation Modeling and Analysis, 4th edition, McGraw Hill, 2006
T. Toledo, Integrated Model of Driving Behavior, VDM Verlag Dr. Müller, Saarbrucken, Germany, 2008.
M. Treiber and A. Kesting, Traffic Flow Dynamics: Data, Models and Simulation, Springer, 2013.

CH815 Cavitation and its Applications in Chemical Engineering (2-1-0) 3

Cavitation physics; hydrodynamic and acoustic cavitation; cavitation bubble dynamics – Rayleigh–Plesset equation; Cavitation assisted physicochemical and biological transformations – mixing, leaching and extraction, dyeing, waste water treatment, atomization, crystallization, coal washing, enzyme harvesting by cell disruption; Cavitation in nanotechnology – Production of nanomaterials; precision cleaning of surfaces.

Brennen Christopher),Cavitation and Bubble Dynamics, Oxford University Press, New York,1996.ISBN: 0195094093

T.J. Mason, J.P. Lorimer, Applied Sonochemistry: Uses of Power Ultrasound in Chemistry and Processing, Wiley-VCH Verlag, 2002.ISBN: 3-527-30205-0

HaoFeng, GustavoBarbosa-Cánovas, JochenWeiss (Editors) Ultrasound Technologies for Food and Bioprocessing, Springer,2011. ISBN-13: 978-1441974716.

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

M.Tech. in Geotechnical Engineering (GT)

Suggested Plan of Study:

Sl. No.	Semester			
	I	II	III	IV
1	GT700	GT703	GT891/ GT897	GT899
2	GT701	GT704	GT898	
3	GT702	GT705		
4	MA704	GT706		
5	Elective 1	GT890		
6	Elective 2	Elective 3		
7	------	Elective 4		

Credit Requirements:

Category	Minimum Credits to be Earned
Programme Core (Pc)	24
Elective Courses (Ele)	12
Mandatory Learning Courses (MLC)	04
Major Project (MP)	20
Total	60

Programme Core (Pc)
GT700   Basic Geomechanics   (3-1-0) 4
GT701   Shallow Foundations   (3-0-0) 3
GT702   Geotechnical Engineering Lab   (0-0-3) 2
GT703   Earth & Earth Retaining Structures   (3-0-0) 3
GT704   Pile Foundations   (3-1-0) 4
GT705   Ground Improvement Techniques   (3-0-0) 3
GT706 Computational Lab for Geotechnical Engineers
                                 (0-0-3) 2
MA704   Numerical Analysis   (3-0-0) 3

Elective (Ele) Courses
GT801   Rock Mechanics   (3-0-0) 3
GT802   Soil Dynamics & Machine Foundations (3-0-0) 3
GT803   Advanced Engineering Geology   (3-0-0) 3
GT804   FEM for Geotechnical Engineers   (3-0-0) 3
GT805   Earth & Rockfill Dams   (3-0-0) 3
GT806   Geotechnical Instrumentation   (3-0-0) 3
GT807   Selected Topics in Geotechnical
            Engineering   (3-0-0) 3
GT808   Soil Reinforcement & Geosynthetics   (3-0-0) 3
CV800   Environmental Geotechnology   (3-0-0) 3
ST801   Earthquake Engineering   (3-0-0) 3
TS701   Pavement Design   (3-0-0) 3
MS703   Marine Geotechnical Engineering   (3-1-0) 4
RG807   Tunnel Engineering   (3-0-0) 3
ST803   Soil-Structure Interaction   (3-0-0) 3

Mandatory Learning Courses (MLC)
GT890   Seminar   2
GT891/GT897   Practical Training/Minor Project   2
(to be completed during vacation between 2nd & 3rd sem.)

Major Project (MP)
GT898   Major Project *(3rd sem.)*   6
GT899   Major Project *(4th sem.)*   14

DEPARTMENT OF CIVIL ENGINEERING

GT700   **Basic Geomechanics**   (3-1-0) 4

Concepts of failure and yield in soil, Failure theories, Effective stresses in soils, Microstructural considerations, Stress-path concepts and their applications. Shear Strength of soils and rocks, Mohr-Coulomb strength theory, Shear strength tests, Stress-deformation characteristics. Critical state concepts and their application, constitutive relationships. Deformation analysis, components of settlement, permissible settlements, consolidation settlements .Flow through soils.

Mitchell, J.K. Principles of Soil Behavior, John Wiley
Lambe, T.W. and Whitman, R.V. Soil Mechanics, Wiley Eastern.

GT701   **Shallow Foundations**   (3-0-0) 3

Assessments of foundation loads, Choice of foundation types,Determination of bearing capacity by theoretical approaches, penetration tests and plate load tests, Proportioning of footings by conventional and uniform settlement methods,, Structural design(limit state) of shallow foundations, Expansive soils- Problems and remedial measures. Footings on layered soils and sloping grounds.

Bowles, J.E., Foundation analysis and design, McGraw Hill.
Swamisaran S., Design of substructures, Oxford and IBH publishers
Winterkorn and Fang, Foundation Engineering handbook, Von NostranReenhold Co.

GT702   **Geotechnical Engineering Lab**   (0-0-3) 2

Identification of soils, Index properties, Hydraulic properties, Shear strength properties, Settlement characteristics, parametric studies.Rock testing, Demonstration of SPT and Pressuremeter.

Lambe, T.W.,Soil testing, Wiley International.
Relevant latest IS Codes.
Head,K.H., Manual of soil laboratory testing, Volumes 1-3.

GT703   **Earth & Earth Retaining Structures**   (3-0-0) 3

Introduction, Rankine and Coulomb theories, Graphical method, Passive earth pressure by curved rupture surface, Stability analysis of gravity type, Cantilever type, Counterfort type retaining walls, Design of Soil reinforced retaining walls. Braced excavations, Analysis and design of sheet piles, Stability of slopes, Finite and infinite slopes, Swedish circle method, Taylor's modified Swedish circle method, Taylor's stability charts and Bishop's method of analysis.

Terzaghi K, and Peck,R.B., Soil Mechanics in engineering practice, McGraw Hill.
Bowles, J.E., Foundation analysis and design, McGraw Hill.

GT704   **Pile Foundations**   (3-1-0) 4

Shallow vs. deep foundations, Classification of pile foundations, axial load carrying capacity of a single pile by different methods, negative skin friction, pile group efficiency, distribution of load to piles in groups, Design of piles and pile cap; settlement analysis of single pile and pile groups; Laterally loaded piles, batter piles, under-reamed piles; Construction of pile foundation, pile driving equipments and Pile load tests; durability and protection of piles, economics of pile foundations.

Tomlinson, M.J., Pile Design and Construction Practice, E and FN Spon.
Poulos, H.G and Davis, E.H., Pile Foundation Analysis and Design, John Wiley
IS 2911

GT705   **Ground Improvement Techniques**   (3-0-0) 3

Introduction to engineering ground modification, need and objectives, Soil stabilization techniques; Mechanical modifications (shallow and deep compaction methods); Hydraulic modification, Dewatering systems, use of Geosynthetics and Prefabricated vertical drains, Preloading and Vertical drains; Chemical Modifications, Modification by admixtures, grouting, deep jet mixing methods, stabilization using industrial wastes; Modification by inclusion and Confinement.

Hausmann, M.R.,Engineering Principles of Ground Modification, McGraw-Hill.
Purushotham Raj, Ground Improvement Techniques, Laxmi Publications, New Delhi.

GT706   **Computational LabforGeotechnical Engineers**   (0-0-3) 2

Slope stability analysis by different methods, Analysis and design of single pile and pile groups. Use of FEM software(Plaxis) to Geotechnical problems.

Bowles J.E, Foundation analysis and design, McGraw Hill.
Iqbal H. Khan , A text book of Geotechnical Engineering, Prentice-Hall

GT801   **Rock Mechanics**   (3-0-0) 3

Engineering classification of rocks, Engineering properties of intact rocks, Determination of insitu properties - shear strength, deformation, insitu stress, strength of jointed rocks, stability of rock slopes, Bearing Capacity determination, Ground improvement techniques in rock masses, Rock blasting.

Jaegar and Cook, Foundation of rock masses.
Goodman, Introduction to rock mechanics, Wiley international

GT802   Soil Dynamics & Machine Foundations   (3-0-0) 3
Dynamic loads, Types of machine foundations, Theory of free and forced vibrations, Dynamic soil properties, mass spring dash pot model, elastic half space model, damping in soils, Design of machine foundations, Foundations under reciprocating engines, Foundations for machines producing impact loads, Vibration Isolation.
Barkan, Dynamics of Bases and Foundations, McGraw Hill.
Richart R.E., Hall Ward Woods, Vibrations in soils and foundations, Prentice Hall.
Prakash S., Soil Dynamics, McGraw Hill

GT803   Advanced Engineering Geology   (3-0-0) 3
Introduction, interior of the earth, weathering, Earthquakes, soils, mineralogy, petrology, study of igneous, sedimentary, metamorphic rocks, Engineering properties of rocks and their assessment, structural geology, geological structures, Dip and strike, folds, faults, joints, unconformities and their importance, clay mineralogy, stratigraphy, Hydrogeology, geophysical exploration, applied geology, geological investigations in dam projects, tunnel projects and in landslides, control measures.
Blyth, F.G.H & de Freitas, H.H., Engineering Geology, ELBS
Krynine& Judd, Principles of Engineering Geology and Geotechnics, McGraw Hill
Robert F. Legget, Geology and Engineering, McGraw Hill

GT804   FEM for Geotechnical Engineers(3-0-0) 3
Introduction; Single element - various shapes, displacement models, isoparametric elements, stresses and strains, stiffness matrices; The overall problem - an assemblage of elements; Techniques for nonlinear analysis; Application of FEM to soil and rock mechanics
Desai, C.S. & Abel, J.F., Introduction to Finite Element Method, CBS
Publishers.Gudehus, R.D., Finite Element in Geomechanics, John Wiley.

GT805   Earth &Rockfill Dams   (3-0-0) 3
Introduction, site selection and exploration; Factors influencing design and design details; Treatment of rock foundations and abutments; Foundation treatment of Earth dams on pervious soils, controlling underseepage and relief wells; stability analysis; special design problems and details; measurements of porewater pressure and movements; Embankment construction procedures, equipments, quality control.
Sherard, J.C., Woodward, R.J., Gizienski, S.F. and Clevenger, W.A., Earth and Earth Rock Dams, John
Wiley.Sowers, G.P. and Sally, H.L., Earth and rockfill Dam Engineering, Asian Publ. House.

GT806   Geotechnical Instrumentation   (3-0-0) 3
Requirements of a good instrumentation; Theory, Design, Methods of analysis of data; laboratory and field instrumentation; Planning an instrumentation program; transducers, hydrometers, strain measuring devices, load cells, LVDTs, pH meter etc, measuring rock and rock mass properties; settlement gauges, inclinometers, earth pressure cells, piezometers, instruments used in geophysical exploration methods, ground probing radar and instruments used in field tests such as SPT, SCPT, DCPT etc., nuclear moisture meter/densitometer, frequency analyzer, role of electronics in instrumentation; calibration, maintenance and installation of instruments, uncertainty analysis
Hanna, T.H., Field Instrumentation in Geotechnical Engineering, Trans-Tech Publ.
Bowles, J.E., Engineering Properties of Soils and their Measurements, McGraw Hill.

GT807   Selected Topics in Geotechnical Engineering   (3-0-0) 3
Recent advances and current trends in Geotechnical Engineering

GT808   Soil Reinforcement &Geosynthetics   (3-0-0) 3

Historical background, RCC, Vidalean concept of reinforced earth, Mechanisms, Types of reinforcements, Backfill soil properties, soil-reinforcement interaction studies, Internal and external stability criteria, Design principles of steep reinforced soil slopes, reinforced earth walls, MSE walls, reinforced soil footings, pavements, embankments on soft soils, geosynthetic clay liners, construction details; geosynthetic materials, functions, property characterization, testing methods for geosynthetics. Recent research & developments.
Koerner, R.M., Designing with geosynthetics, Frentice Hall Inc.
Jones, C.J.F.P., Earth Reinforcement and Soil Structures, Butterworths, Lodon.

CV800 Environmental Geotechnology(3-0-0) 3
Perspectives of Environmental Geotechnology, Soil - Environment water Interaction, Mass transport, Energy Gradient & Conductivity, Sources of water, Contamination - under ground, ground water, Flow conditions, Contaminate migration, Disposal and Containment of Solid water, Remediation.
Donald P. Coduto, Geotechnical Engineering Principles and Practices, Prentice-Hall

Daniel, D. E. Geotechnical Practice for Waste Disposal, Chapman and Hall, London.
Reddi, L. N., and Inyang, H. F., Geoenvironmental Engineering- Principles and Applications, Marcel Dekker, Inc.

ST801   Earthquake Engineering   (3-0-0) 3

Earthquakes Magnitude and intensity, earthquake waves, seismic zoning maps, seismic risk and hazard, ground response spectrum, site amplification, liquefaction, selection of design earthquakes, peak ground acceleration. Earthquake analysis of structures, idealization, equivalent force concepts, response spectrum analysis, concepts of earthquake resistant design: ductility, lateral stiffness, strong column-weak beam design. Seismic retrofitting and repair. Concepts of base isolation and structural response control. Introduction to IS codes -IS 1893, IS 4326, IS 13935, IS 13920.

Newmar.N.. M. and Rosen Bluethe, Fundamentals of Earthquake Engineering, Prentice Englewood cliffs.
Dowrick D. J, Earthquake Resistant Design, A marval for Engineers & Architects, John Wiley.

ST803   Soil Structure Interaction   (3-0-0) 3

Soil-Foundation Interaction.Soil response model, Elasto-plastic behaviour, Time dependent behaviour.Beams on Elastic Foundations, Analysis of beams of finite length. Plates on Elastic medium, Infinite plates, thin and thick plates. Elastic analysis of piles, Analysis of pile groups, Interaction analysis.

A.P.S. Selvadurai, Elastic Analysis of Soil-Foundation Interaction.
H.G.Poules and E.H. Davis, Pile-Foundation Analysis and Design, John Wiley & Sons
R.F.Scott, Soil Mechanics and Engineering, McGraw Hill.

TS701   Pavement Design   (3-0-0) 3

Introduction to Pavement - types-factors affecting design and performance of pavements. Highway and Airport Pavements, Subgrade and climate, Stresses and deflections in Flexible Pavements, Flexible Pavement Design Methods for Highways and Airports, Stresses in Rigid Pavements, Rigid Pavement Design, Use of advanced computer software for the design of flexible and rigid pavements

Yoder, E.J., Principles of Pavement Design, John Wiley & Sons
Yoder &Witczak, Principles of Pavement Design, John Wiley & So Sharma and Sharma, Principles &Practise of Highway Engg., Asia Publishing House.
Teng, Functional Designing of Pavements, McGraw , Hill.

IT913 MODERN CRYPTOGRAPHY   4

Classical Encryption Techniques and their Cryptanalysis :Symmetric cipher modelsSymmetric-Key Encryption Schemes: Data Encryption Standard and Advanced Encryption Standards, RC4, Attacks on DES, AES. Number Theory: Prime numbers and factoring, modular arithmetic, computations in finite fields, Discrete logarithms. Public-Key (Asymmetric) Cryptography. Hash Functions: Design of Collision-Resistant Hash Functions, Popular Uses of Collision-Resistant Hash Functions, Random Oracle Model. Hash algorithms: MD5, SHA-256. Message Authentication: Message Authentication Codes Definitions, Constructions of Secure Message Authenticate Codes, Practical Constructions of Message Authentication Codes. Digital Signatures and Applications:.

William Stallings, Cryptography & Network Security, Pearson Education Asia. 2006
Schiner Bruce, Applied Cryptology, John Wiley & Sons, 2001.
Wade Trappe & Lawrence C Washington, Introduction to Cryptography with Coding Theory, Pearson Education, 2006.
Kahate A, Cryptography & Network Security, Tata Mc Graw Hill, 2004.
Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", Prentice Hall of India Private Limited.
Behrouz A. Forouzan, "Cryptography and Network Security", Mc Graw Hill.
Jonathan Katz and Lindell, "Introduction to Modern Cryptography: Principles and Protocols",Chapman and Hall/CRC.
Jonathan Katz and Yehuda Lindell, "Introduction to Modern Cryptography", CRC Press.
A. Menezes, P. Van Oorschot and S. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1996.

IT914 COMPUTER NETWORK SECURITY   4

Security at the Application Layer: Email architecture, PGP (Pretty Good Privacy), S/MIME.Security at the Transport Layer (SSL and TLS): SSL architecture, Four protocols, SSL message formats, Transport Layer Security, Secure Electronic Transaction. Security at the Network Layer (IPSec) : Two modes, Two Security protocols, Security Association, Security Policy, Internet Key Exchange, ISAKMP. Intruder: Intruder, Intrusion Detection, Password Management. Malicious Software : Viruses and Related Threats, Virus Countermeasures, Distributed Denail of Service Attack. Firewall : Firewall Design Principles, Trusted systems, Common Criteria for Information Technology SecurityEvaluation. Authentication : Kerberos V4 and V5, X.509 Authentication Service, Public Key Infrastructure. Physical Layer Security:Shannon's perfect secrecy, Secure Communication over Noisy Channel, Channel Coding for Secrecy, Secret Key Agreement from noisy observation, Active attacks, Physical Layer Security and Classical Cryptography.

William Stallings, "Cryptography and Network Security", Third Edition.
William Stallings, "Network Security Essentials", Third Edition.
Behrouz A. Forouzan, "Cryptography and Network Security", McGraw Hill.
Jie Wang, "Computer Network SecurityTheory and Practice", Springer Berlin Heidelberg New York.
William Stallings, "Cryptography and Network security Principles and Practice" ,Fifth Edition.

Kwok T. Fung, "Network Security Technologies", Second Edition, Auerbach Publications, A CRC Press Company.
Joseph MiggaKizza, "A guide to Computer Network Security", Springer Publications.

IT915 DIGITAL FORENSIC   4

Introduction to legal issues, context, and digital forensics; Stages of Forensic: acquisition or imaging of exhibits, analysis and reporting standards. Computer forensics.Network forensics: monitoring and analysis of Computer Networks, Social Network analysis for Online Forensics. Database forensics: forensic study of databases and their metadata. Investigative use of database contents, log files and in-RAM data in order to build a time-line or recover relevant information.Mobile device forensics: recovery of digital evidence or data from a mobile device. Media Analysis: disk structure, file systems (NTFS, EXT 2/3, HFS), and physical layer issues; Tools for digital forensics. Analysis Techniques: keyword searches, timelines, hidden data; Application Analysis; Network Analysis; Analysis of Cell phones, PDAs, etc.; Binary Code Analysis; Evidence: collection, preservation, testimony.

Kanellis, Panagiotis, "Digital Crime and Forensic Science in Cyberspace", IGI Publishing", ISBN 1591408733.
Jones, Andrew (2008), "Building a Digital Forensic Laboratory. Butterworth-Heinemann", ISBN 1856175103.
Marshell, Angus M. (2008), "Digital Forensics: Digital Evidence in Criminal Investigation", Wiley-Blackwell, ISBN 0470517751.
Philip Craiger, SujeetShenoi, "Advances in Digital Forensics in", Springer, 2007.
Paul Crowley Dave Kleiman, "CD and DVD Forensics", Syngress Publishing Inc, 2007.
Chris Prosise, Kevin Mandia, "Incident Response & Computer Forensics", McGraw-Hill, 2nd Edition, 2003.

IT916   SPECIAL TOPICS IN COMPUTER NETWORKS   4

Voice Packetization: Quality of Service, Distributed Network Architecture. Packet Transport Technologies: Voice over the Internet Protocol, Voice over ATM, Voice Over Frame Relay, Comparison among other technologies. Broadband Access and Evaluation Networks: Voice over cable, Voice over DSL. Fast access technologies. (For example, ADSL, Cable Modem, etc.)IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, routing. Changes to other protocols.Application Programming Interface for IPv6.Mobility in networks.Mobile IP.IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.TCP extensions for high-speed networks, transaction-oriented applications.Other new options in TCP.

David J. Wright, "Voice over Packet Networks", Wiley Publisher.
W. R. Stevens, "TCP/IP Illustrated, Volume 1: The Protocols", Addison Wesley,   1994.
G. R. Wright, "TCP/IP Illustrated, Volume 2: The Implementation", Addison   Wesley, 1995.
W. R. Stevens, "TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP,   NNTP, and the Unix Domain Protocols", Addison Wesley, 1996.
R. Handel, M. N. Huber, and S. Schroeder, "ATM Networks: Concepts,   Protocols, Applications", Addison Wesley, 1998.

C. E. Perkins, B. Woolf, and S. R. Alpert."Mobile IP: Design Principles and Practices",
Addison Wesley, 1997.

IT917 VEHICULAR ADHOC NETWORKS 4

Introduction to Vehicular Networks.Vehicular Network Applications and Services.Medium Access Control Protocols for Vehicular Networks.Heterogeneous Wireless Communicationsfor Vehicular Networks.Routing in VehicularNetworks.Routing in Vehicular Networks: A User's Perspective. Data Dissemination in Vehicular Networks .

HassnaaMoustafa, Yan Zhang (Ed), "Vehicular Networks Techniques, Standards, and Applications", CRC Press.
Hannes Hartenstein, "VANET:Vehicular Applicationsand Inter-NetworkingTechnologies", A John Wiley and Sons, Ltd., Publication.
RaduPopescu-Zeletin, IljaRadusch, Mihai Adrian Rigani, "Vehicular-2-X Communication", Springer publisher.

IT918 SPECIAL TOPICS IN WIRELESS SENSOR NETWORKS 4

Motivation for a Network of Wireless Sensor Nodes.Sensor Network Architecture andSensor Devices, Physical Layer in Sensor Networks, MAC Layer in Sensor Networks, Higher Layer Issues in Sensor Networks, Time Synchronization in Wireless Sensor Networks. Software Issues in Wireless Sensor Networks.Sensor Networks' Integration.Mobility Aspects in WSN.Medical Applications of Wireless Sensor Networks. Vehicular Sensor Networks: General Aspects and Implementation Issues

WaltenegusDargie, "Fundamentals of Wireless Sensor Networks Theory and practice",
A John Wiley and Sons, Ltd., Publication.
"Application and Multidisciplinary Aspects of Wireless Sensor Networks Concepts, Integration, and Case Studies, Springer Publisher.
KavehPahlavan and Prashant Krishnamurthy, "Networking Fundamentals Wide, Local and Personal Area Communications", A John Wiley and Sons, Ltd., Publication

IT919 PERFORMANCEANALYSIS OF LOCAL AREANETWORKS AND WIDE AREA NETWORKS 4

Transmission systems: Introduction, Subscriber Loop Design, Unigauge Design for Telephone Customer Loop Plants Signal Multiplexing, Digital Transmission Systems, Optical Fiber Transmission Systems.Switching systems:Centralized Switching, Switching Techniques, Congestion in Space-Division Switching Networks, AND Time-Division Switching Networks,Nonblocking Networks.Modeling of traffic flows, service times and single-server queues:Distribution for Number of Arrivals in a Fixed Time Interval, The Interarrival Time Distribution, The Service Time Distribution, The Residual Service Time Distribution, The Birth and Death Process, Erlang Loss System and Erlang Delay System.Engset loss and delay systems.Local area networks.Polling networks.Token ring networks.Random access networks

Wah Chun Chan, Kluwer, "Performance Analysis of Telecommunications and Local Area Networks", Academic Publishers, New York, Boston, Dordrecht, London, Moscow.

IT920 MODELLING AND ANALYSIS OF NETWORKS PROTOCOLS 4

Introduction and Overview. Introduction to Queuing Theory. Layered Architectures in Data Networks. Data Link Layer: Examples and Performance Analysis. Network Layer: Flow Control and Congestion Control. Network Layer: Routing Function Transport Layer. Polling and Random Access in Data Networks. Local Area Networks. Introduction to Circuits Switching. Call Processing in Digital Circuit-switching Systems. The Evolution toward Integrated Networks

Mischa Schwartz, "Telecommunication Networks: Protocols, Modeling and Analysis", Addison-WesleySeries in Electrical & Computer Engineering.

IT921 PACKET FORWARDINGTECHNOLOGIES   4

Basic Functionalities of Routers, Evolution of Router Architecture, Key Components of a Router, Network Processor, IP-Address Lookup and Routing Table, Construction of Optimal Routing Tables, Matching Techniques, Difficulty of the Longest-Prefix Matching Problem, , Multibit Tries. Pipelined Multibit Tries. Efficient Data Structures for Bursty Access Patterns. Caching Technologies: Suez Lookup Algorithm, Host Address Range Cache, Prefix Caching Schemes, Multi-Zone Caches, Hashing Schemes: Binary Search on Hash Tables, Parallel Hashing in Prefix Length, Multiple Hashing Schemes, Using Bloom Filter. TCAM-BasedRouting-Table Partitioning, Technologies Forwarding Engine

Reference Book
1. *Weidong Wu, "Packet Forwarding Technologies", Auerbach Publications Taylor & Francis Group.*

IT922 COMPUTER NETWORK SYSTEMS DESIGN   4

Traditional Protocol Processing Systems, Conventional Computer Hardware Architecture, Basic Packet Processing: Algorithms And Data Structures, Packet Processing Functions, Protocol Software On A Conventional Processor, Hardware Architectures For Protocol Processing, Classification And Forwarding,   Switching Fabrics, Network Processor TechnologyThe Complexity Of Network Processor Design, Network Processor Architectures, Issues In Scaling A Network Processor, Examples Of Commercial Network Processors, Design Tradeoffs And Consequences ability, Overview Of The Intel Network Processor, Embedded RISC Processor (XScale Core), Packet Processor Hardware (Microengines).

Version Douglas E. Comer. "Network Systems Design Using Network Processors (Intel2XXX)".

EC906   **Selected topics in Signal Processing**   4

Statistical Signal Processing - Autocorrelation and power spectrum, Filtering, Linear estimation, Spectrum estimation, Adaptive filters. Multirate Systems – Multirate operations, Filter banks, PR systems, Tree structured and cosine modulated filter banks. Wavelet analysis – Localization and uncertainty, Orthogonal wavelets, biorthogonal wavelets, Block transforms, frames, approximation and denoising in frames. Sparse signal processing -- Sparsity and redundant dictionaries, Matching pursuits.

Sophocles J. Orfanidis, Optimum Signal Processing An Introduction, McGraw-Hill, 2007.
P.P. Vaidyanathan, Multirate Systems and Filter Banks, Pearson Education India, 2006.
Stephane Mallat, A Wavelet Tour of Signal Processing - The Sparse Way, AP, 2009.
Jelena K., Vivek K Goyal, and Martin Vetterli, Fourier and Wavelet Signal Processing, EPFL Press, 2013.

EC 907   **Multi-dimensional Signal Processing**   4

Speech Fundamentals, Perception and Production, Analysis, Lossless and Perceptually lossless compression, Recognition, Speaker recognition and identification, Image Fundamentals, Transforms, Segmentation, Restoration, Enhancement, Compression standards, Medical Imaging Video analysis, MPEG standard of coding, Segmentation and tracking. Biometrics.

Anil K .Jain, Fundamentals of Digital Image Processing, PHI, 2010
R.C.Gonzalez and R.E.Woods, Digital Image Processing, Pearson, 2008
Douglas O'Shaughnessy, Speech Communication, Human and Machine, IEEE Press, 1999
L.R. Rabiner and R.W. Schafer, Digital Processing of speech signals, Prentice Hall, 2013
Fundamentals of Medical Imaging , Paul Suetens, Cambridge Press, 2009

EC908   **Selected Topics in Computer Communication Networks**   4

Introduction to network resilience problems & solutions, Wireless beyond 3G, Performance modeling of (Wireless) networks & Formal Methods, Network design algorithms and Network design using Network Processors, Wireless Ad-hoc Networks, Security Issues in control, Management, routing and other areas of networks, Distributed control in Wireless network and Middleware, Distributed Mobile Computing, Embedded Systems in Mobile/ Wireless/ Network Systems – Hardware & Software Design/ Development issues, Standardization in Wireless / Mobile Network Systems. Wireless Sensor Networks & Protocol, Queuing Theory in Networking, Network Management

Feng & Leonidas, Wireless Sensor Networks, Elsevier India, 2005
Kumar D. Manjunath and J. Kuri Communication Networking, An analytical approach, Elsevier, 2004
Subramanian M., Network Management: Principles and Practice, Addson – Wesley, 2000
Burke J., Network Management Concepts and Practice, A Hands- On Approach, Pearson Education, 2000.

EC909   **Selected Topics in Radar Signal Processing**   4

Elements of a Radar, statistical models of radar cross section (RCS), probability density functions (PDFs) for RCS, RCS Correlation, Swerling models, range and Doppler ambiguities,

Radar waveforms, Matched filter for continuous waveforms, Matched filtering for moving targets, ambiguity functions of single pulse and pulse burst of waveforms, The Linear FM(LFM) Waveform, Vector matched filter, Tracking principles, Detection principles, Space time adaptive processing (STAP).

Fundamentals of Radar Signal Processing, Mark A Richards, Tata McGraw Hill, 2005
Radar Signals, Nadav Levanon, Wiely-IEEE Press, 2004
Radar Hand Book, Edited by M.I Skolnik, Second Edition, McGraw Hill Publication, 1990

EC910   Selected topics in Analog and Mixed Signal Integrated Circuits   4

Trade-offs in mixed signal design, Data converters and Switched Capacitor circuits, Calibration and Digital error correction.

R. Jakob Beker, CMOS: Mixed Signal Circuit Design, 2nd Ed., Wiley-IEEE, 2009
Behzad Razavi, Principles of Data Conversion System Design, Chand & Company Ltd (IEEE Press), 2000.
Gabriele Manganaro, Advanced Data Converters, Cambridge Univ. Press, 2012
Mingliang (Michael) Liu, Demystifying Switched capacitor Circuits, Elsevier, 2006
Analog Devices Inc. (edited by Walt Kester), The Data Conversion Handbook, Newnes, 2005

EC911 Mathematical Methods for Signal Processing and Communication Engg   4

Selected Topics in **Vector spaces**: Vectors, Vector norms, vector algebra, subspaces, basis vectors, Gramm-Schmidt orthonormalization. Matrices, matrix rank, matrix norms, determinant, inverse, condition number. Hermitian and symmetric matrices, positive definite matrices unitary matrices, projection matrices and other special matrices. LDU decomposition, QR decomposition, Eigenvalue decomposition, singular value decomposition. Solving linear system of equations using matrices. Least-Squares approach, total least squares approach. Numerical issues. Perturbation theory of matrices. Differentiation of scalar functions of vectors and matrices. Matrix functions of scalar variables, Kronecker product of matrices.
Analysis: Review of real and complex number systems, topology of metric spaces. Continuity and differentiability. Construction of the Lebesgue measure, measurable functions, limit theorems. Lebesgue integration. Different notions of convergence and convergence theorems. Product measures and Fubini's theorem. Signed measure and the Radon-Nikodym theorem, change of variables.
Optimization Techniques: Need for unconstrained methods in solving constrained problems. Necessary conditions of unconstrained optimization, structure of methods, quadratic models. Methods of line search, Armijo-Goldstein and Wolfe conditions for partial line search. Global convergence theorem, steepest descent method. Linear and Quadratic Programming. Duality in optimization.
Stochastic Models: Review of Random variables, Stochastic processes, Markov chains, stationary distribution of Markov chains, Poisson and birth and death processes.

Todd K Moon, Striling, " Mathematical Methods and Algorithms for Signal Processing",
Prentice Hall, 2000.
Stephen Boyd, Lieven Vandenberghe, " Convex Optimization" , Cambridge University Press
Ross S.M, Introduction to Probability Models, (6th Edition), Academic Press and Hardcourt Asia, 2000.
Rudin, W., Principles of Mathematical Analysis, McGraw-Hill, 1986.

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

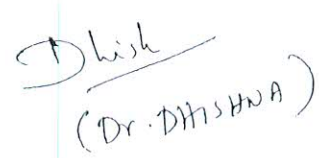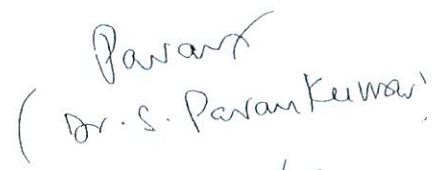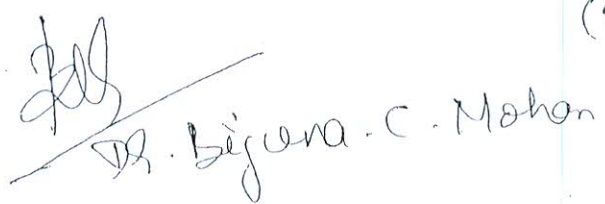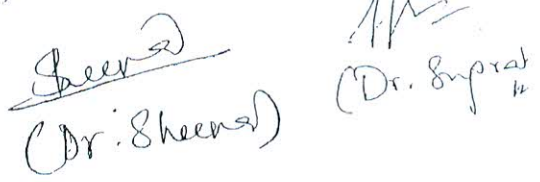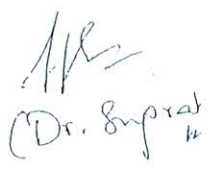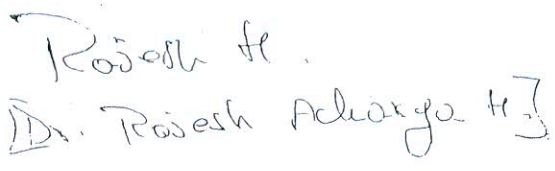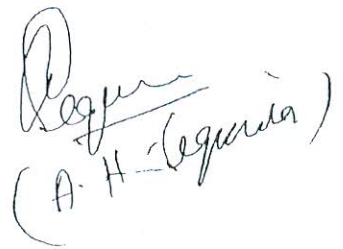## DEPARTMENT OF HUMANITIES, SOCIAL SCIENCES AND MANAGEMENT

Proceedings of the DRPC Meeting Held on 9 January 2014 at 4.00 PM.

The following agenda item was discussed:

Considering Chartered Accountants for Ph.D. programme: The communication from Southern India Regional Council of the Institute of Chartered Accountants of India that was forwarded by the Director and the Dean regarding considering Chartered Accountants for the Ph.D. programme in the department was deliberated upon. The Institute in its communication had provided documents to indicate that such a practice was already in vogue in a number of Indian universities and also that the Association of Indian Universities had recognised the candidacy of Chartered Accountants for registration to Ph.D. programme. After deliberations, it was resolved to consider the communication in the affirmative. Hence, the DRPC recommends to the BOS to consider the candidacy of Chartered Accountants for admission to Ph.D. programme.

The meeting concluded with the above resolution.

The Members present:

(Dr. K. B. Kiran)

(Dr. DHISHNA)

(Dr. S. Pavan Kumar)

Dr. Bijuna. C. Mohan

(Dr. Sheena)

(Dr. Suprat..)

Dr. Rajesh Acharya H.]

(A. H. Sequeira)

Gopalakrishna B.U.

- 25 -

CHAIRMAN

23rd December 2013

The Vice-Chancellor
National University of Technology
NH 66, Srinivas Nagar, Surathkal,
Mangalore - 575025
Karnataka State

Dear Sir

Sub: Recognition of Chartered Accountancy qualification for registration to Ph.D Programme

As you are aware, the Institute of Chartered Accountants of India is the premier Accounting Body in India for regulating the profession of Chartered Accountants (CA) and is established by an Act of Parliament viz., The Chartered Accountants Act, 1949. The Institute registers students for pursuing the Chartered Accountancy Course for various levels (CPT, IPCC and Final level) of the course, provides theoretical education, practical training, conducts examinations and thereafter confers Membership to the successful students to be known as "Chartered Accountant".

The Syllabus of Chartered Accountancy course includes various contemporary topics like

- IFRS based Financial Reporting
- US GAAP based Financial Reporting
- Risk Management
- Strategic Planning and Analysis
- Functional Strategies
- Derivative, JIT Costing, Activity Based Costing, Foreign Exchange, Revised ScheduleVI, XBRL etc.

As you are aware Accounting, Auditing and Direct & Indirect Taxation are very specialized field of the Institute and students of this course are require to undergo in-depth study of these subjects. It may not be far –fetched to share that we have maintained very stringent standards as far as developing course curriculum and maintaining the impeccable examination system is concerned. The course offers an excellent opportunity to "earn while you learn". The Institute also offers post -qualification and certificate courses to its members.

On the International front, the Institute is following all the International Education Standards (IES) issued by the International Federation of Accountants (IFAC) and founder Member of the Confederation of Asian and Pacific Accountants (CAPA), the International Federation of Accountants (IFAC) and South Asian Federation of Accountants (SAFA).

The Board of Studies educational wing of the Institute is responsible for providing theoretical education, formulating and implementing the policies and programmes relating to the education of students pursuing Chartered Accountancy course. It imparts education mainly through distance education mode. The Board of Studies provide a strong foundation of knowledge, skills and professional values that enables students to continue to learn by lifelong learning and adapt to change throughout their professional lives.

CHAIRMAN

SOUTHERN INDIA REGIONAL COUNCIL OF
THE INSTITUTE OF CHARTERED
ACCOUNTANTS OF INDIA (Set up by an Act of Parliament)
ICAI Bhawan, P.B. No. 3314, No. 122, Mahatma Gandhi Road
Nungambakkam, Chennai - 600 034.
Telephone : 044-30210302 / 320 / 321 / 323
Telegram   : SIRCAM-Chennai - 600 034, Fax : 044-30210355
email   : sirc@icai.in Web : www.sircoficai.org

To serve the needs of students it performs numerous functions; some of the scholastic functions include the preparation and continuous revision of comprehensive study materials, suggested answers, Revision Test Papers, Periodical supplements, mock test papers, students journal(2,75,595) etc.

The Chartered Accountants (CAs) are spread all over the country and are generally gainfully engaged either in rendering professional services to the public or to their respective employing bodies. Many of them are interested in undertaking research work for Ph.D. degree. Given an opportunity, we believe, many members of the Institute will be able to contribute their intrinsic worth to the society by producing valuable research studies. There is no doubt that CAs with their sound practical and technical knowledge can contribute very significantly to the world of academics in the field of Accountancy and Commerce, if allowed to pursue their Ph.D.

In this context, we may apprise you that the Association of Indian Universities (AIU) (copy attached) has already recognized Chartered Accountancy qualification along with graduation degree, as equivalent to postgraduate degree in commerce or allied discipline for the purpose of pursuing Ph.D programme of various universities. Accordingly, 90 Indian Universities and 6 IIMs (list enclosed) in the country have recognized Chartered Accountancy qualification for the specific purpose of registration to Ph.D programme of respective universities.

We would, therefore, request you to kindly accord recognition to Chartered Accountancy Course for the purpose of enrolling Chartered Accountants as research scholars for the doctoral degree of your university.

We would also be pleased to meet you in this regard on hearing from you to make a presentation.

Looking forward to an early response.

With regards,
Yours sincerely,

CA. D. PRASANNA KUMAR
Chairman, SIRC of ICAI
chairmansirc@gmail.com
Mobile: 098481 92636

Encl: 1. Syllabus of CA Course.
        2. AIU Letter
        3. List of Universities recognized CA Qualification.

Chairman, DRPC, HSSM
Please discuss in DRPC meeting of Dept of HSSM and
send the DRPC resolutions on the matter
7/1/14.

Department of Information Technology
NITK – Surathkal

Ref. No.: NITK/IT/F17/Correspond/80/2014   Date: 11-03-2014

From

     Dr. Ananthanarayana V S
     Prof. & Head, Dept. of IT

To

     The Director
     NITK – Surathkal.

Through

     Dean (Academic)
     NITK – Surathkal.

Dear Sir / Madam,

     Sub: Constitution of RPAC-IT - Reg.

With reference to ITEM No.24-BOS-10, dated 28/10/2013 the constitution of RPAC by the guide includes

     (i)   3 members within the department
     (ii)   3 members outside the department

However the human resources are very limited (i.e. only 4 PhD holders) in our department and the same members will be repeated for each research scholar of department of IT. In view of this, the DRPC recommends to include

     (i)   3 faculty members with PhD qualification from branches of CSE/EE/EC/ IT as part of the panel, instead of 3 PhD holders within the department.
     (ii)   3 faculty members with PhD qualification outside the four departments i.e. CSE/EE/EC/ IT departments of NITK, Surathkal

to constitute the RPAC panel of IT department.

Thanking you,

Yours faithfully,

(Ananthanarayana V S)
Dr. Ananthanarayana V. S.
Professor & Head
Department of Information Technology
National Institute of Technology Karnataka, Surathkal
Srinivasnagar P.O., Mangalore - 575 025, INDIA

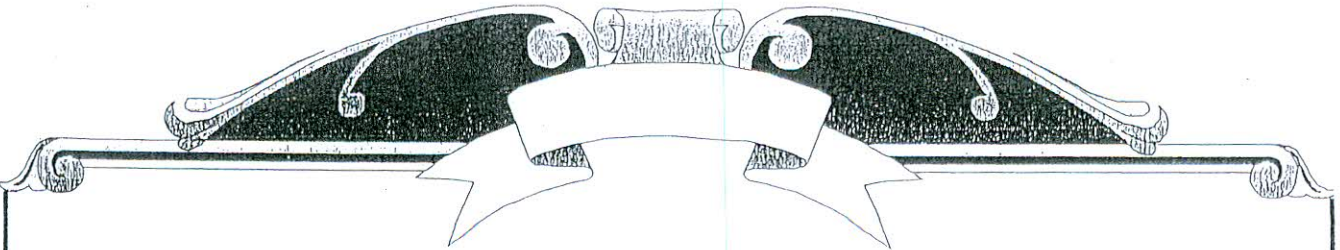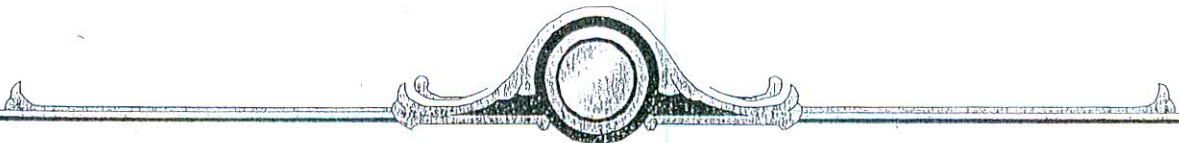Encl: Proceedings of DRPC-IT meeting held on 10/3/2014

Annexure 3

Admission of top 10% of BTech students of NITK to Direct PhD programme at IITM

Extract of Senate Norms for top 10% of BTech students of NITK seeking admission to PhD programme at IITM

a) Top 10% of the B.Tech students from other Institutions (which agree to participate in the programme) who are in their 3rd year will be eligible to apply for Direct Ph.D. This provision will be applicable to the institutes who enter into a specific MoU with IITM in this regard.

b) Selected students will move to IIT Madras in the 4th year.

c) Credits earned during first year of Ph.D programme at IIT Madras shall have equivalence to the credit needed for the 4th year of the B.Tech programme. The credits will be transferred to their parent institution to award B.Tech degree.

d) The candidate would complete the comprehensive viva within 5 semesters after joining IIT Madras.

e) The students selected for admission to PhD programme are eligible for HTRA for five years, after completing their first year of stay successfully at IIT Madras. Students from CFTIs having a CGPA of 8 and above, will be eligible for award of HTRA without the requirement of GATE. Students admitted from Non-CFTIs, are required to qualify in GATE for becoming eligible for the award of HTRA.

f) If a student does not perform well in the courses at IIT Madras, the student will be transferred back to the parent institution along with credits earned.

g) If a student is not found fit to continue in the PhD programme, he/she will be allowed to drop out any time after the 5th year, at which point the B.Tech credits will be transferred to the parent institute.

Specific Operational aspects agreed to by NITK and IITM

1. NITK will make an internal announcement to all the students who are in the top 10% of their class at the end of their 5th semester (based on the CGPA calculated over the 5 semesters), and encourage such students to apply for admission into a Direct PhD program at IIT Madras to those Department(s) in which they meet the eligibility norms for regular PhD program, through online portal between 1st March and 30th March every year.

2. NITK will encourage and recommend such students to opt for summer fellowship of IITM at the end of their 6th semester.

3. NITK also will disseminate the contact details of such eligible students to the Dean (Academic Research), IITM to enable the Dean to bring the PhD application schedule to these students.

4. NITK will forward the list of students who are within top 10% of their class soon after the 6th semester results is declared.

5. Dean (AR), IIT Madras will forward the list of students selected for direct PhD admission and also inform the respective students.

6. NITK will permit these students (selected for direct PhD programme) to pursue their final year of their BTech programme (7th and 8th semester) at IIT Madras.

7. NITK will provide some flexibility in the curriculum for these students to facilitate them to complete the credits to be earned towards the award of the B.Tech degree. Detailed planning of the courses to be taken at IITM will be jointly decided by the faculty advisor of the student at NITK and the guide-designate at IITM.

8. The student will pay the tuition fee to NITK during their 1st year of stay at IITM. After successful completion of the B.Tech requirement, the student will pay the tuition fee appropriate for PhD scholars as per regulations of IITM.

9. With the concurrence of the guide-designate at IITM and the Doctoral Committee, faculty members from NITK may serve as co-guides for these students, whenever possible. IITM encourages such a practice, but the decision is left to the discretion of the Guide-designate.

10. These students should earn a minimum CGPA of 7.5 in each of the first two semesters at IITM, to become eligible to continue in the direct PhD programme. Otherwise, the student will be transferred back to NITK along with credits earned.

11. These students are not eligible for campus placement through IITM at the end of their first year of stay at IIT Madras.

12. These students shall come under the purview of the guidelines given in the PhD ordinances and Regulations once they complete the requirements for the B. Tech degree.

13. For candidates who fail to complete the Comprehensive viva-voce exam, the option to convert to an MS program as per regulation R.21 in the PhD ordinances and regulations, will be available.

14. Credits earned by the students at the end of the first year of stay at IITM will be transferred to NITK. NITK will accept the credits transferred and award the B.Tech degree to such successful students.

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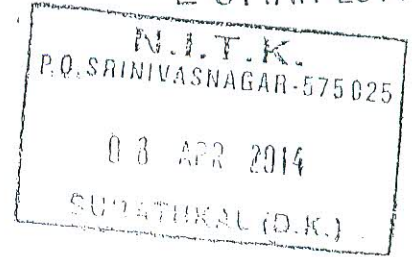उत्तराखण्ड

National Institute of Technology,
Uttarakhand

Dr. H. T. Thorat
Director

Ref. No.-NITUK/2014/.8061

Date- 2 6 MAR 2014

To,
The Director
National Institute of Technology Surathkal

Sub.- Request for Ph.D registration.

As you are aware, the minimum qualification for Assistant Professor according to Four-Tier structure is PhD with minimum 3 years' experience after PhD. NIT Uttarakhand being located in remote area, our recruitment advertisements rarely get response from Ph.D qualified candidates. This forces us to recruit M. Tech. qualified teachers on contract for five years with a condition of completing PhD within 5 years.

These Assistant Professors on contract for five years have to complete PhD from outside NITUK, as inbreeding needs to be avoided. Only option for them is to register for PhD as Part Time research scholar. The BoG of our Institute has approved the scheme of deputation for one semester for completion of course work and reimbursing the expenses for PhD including travel from CPDA. In addition to this a research grant of Rs. 10 Lakh is also admissible for every individual faculty for conducting research at NITUK and offsetting some disadvantages of Part Time enrolment.

In addition to getting qualified teachers, this scheme will initiate research in our newly established NIT and we shall develop strong bonds with other Institutes for joint research.

I am expecting that in 2014 we shall recruit around 40 such teachers and their PhD registration is a major reason of concern. I am writing this letter to seek your support to our Institute. I propose and urge you to grant our non-PhD faculty some special privileges as mentioned below, at least for five year period.

1. Sponsored Part-time PhD seats preferably 5-10 (1-2 each in Civil, Computer Science, Electrical, Electronics and Mechanical Engineering)
2. Preference in admission subject to acceptance by the supervisor.
3. No concession in academic qualification but any concessions that can be offered in the admission procedure.
4. Relaxation in condition of experience after M. Tech for Part-Time PhD registration if any.
5. Relaxation of minimum registration period for submission of thesis to allow award of degree in five years if necessary.
6. No concessions in standard and quantum of work are sought. Condition of publication of 1-2 SCI Journal paper can be added if required.

I assure you that there will not be any compromise in quality of work done by our faculty as the continuation of their contract shall largely depend upon their performance in PhD programme judged on the basis of evaluation report provided by the PhD supervisor.

I humbly request you to consider our proposal positively and be our saviour by helping us not only in overcoming the crisis but also giving us a strong foundation by training our faculty of start-up phase.

With regards,

Yours sincerely,

(H. T. Thorat)