NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA SURATHKAL

MINUTES

OF

THIRTIETH MEETING OF BOARD OF STUDIES

Date	:	19.04.2016 (Tuesday)
Time	:	10.00 AM
Venue	:	Seminar Hall,
		N.I.T.K - Surathkal,
		Srinivasnagar, Mangalore
		PIN - 575 025.

Minutes of the Thirtieth combined Board of Studies (UG, PG & Research) Meeting held on 19th April, 2016 in the Seminar Hall, NITK, Surathkal.

MEMBERS PRESENT

1)	Dr. Katta Venkataramana	...	Chairman
2)	Dr. Ashok Babu	...	Member
3)	Dr. Udayakumar R Y	...	Member
4)	Dr. K Chandrasekaran	...	Member
5)	Dr. M. B. Saidutta	...	Member
6)	Dr. A. Mahesha	...	Member
7)	Dr. K.N. Lokesh	...	Member
8)	Dr. M. Govinda Raj	...	Member
9)	Mrs. Vani	...	Member
10)	Dr. U. Sripathi	...	Member
11)	Dr. K. P. Vittal	...	Member
12)	Dr. G. Ram Mohana Reddy	...	Member
13)	Dr. Raj Mohan B.	...	Member
14)	Dr. K. V. Gangadharan	...	Member
15)	Dr. Vijay Desai	...	Member
16)	Dr. Jagannath Nayak	...	Member
17)	Prof. B. Ramachandra Bhat	...	Member
18)	Prof. Santhosh George	...	Member
19)	Prof. H.D. Shashikala	...	Member
20)	Prof. A. H. Sequeira	...	Member
21)	Mr. K. Ravindranath	...	Member
22)	Mr. Kamlabh Kumar Singh	...	Member
23)	Mr. Gaurav Chowdhury	...	Member
24)	Dr. K. Srinivasa Rao	...	External Member
25)	Dr. A. P. Shashikala	...	External Member
26)	Dr. Jaya Kumar Seelam	...	External Member

CONTENTS

Minutes of Thirtieth BOS meeting held on 19.04.2016 (Tuesday)

The Chairman (BOS) and Dean (Academic) chaired the meeting and welcomed all the members to the **Thirtieth BOS meeting.**

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

ITEM No: 30-BOS-1:
 	
Introduction of new UG program Specific Elective Course-
  a) **Department of Electrical and Electronics Engg.,**
    The BOS resolved to recommend two new laboratory courses in the curriculum under Programme Specific Electives:
  i) EE423 - Switchgear and protection laboratory   (0-0-3) 2
    Laboratory exercises and assignments to provide additional support to EE422.
  ii) EE 471- Power System Simulation Laborarory – 2   (0-0-3) 2
    Laboratory exercises and assignments to provide additional support to EE470.
 	
    The BOS resolved to recommend 5 new courses in the curriculum under programme Specific Electives:
  i) EE121 – Electrical machine winding calculations - 1 (0-2-3) 4
  ii) EE122 – Electrical Machine Winding Calculations – 2 (0-2-3) 4
  iii) EE500 – System Analysis in Discrete Time   (3-1-0) 4
  iv) EE501 – Analysis of Nonlinear Circuits   (3-1-0) 4
  v) EE430 – Robot Dynamics and Control   (3-1-0) 4
 	
The BOS resolved to reallocate the course codes.
The details are attached as an **ANNEXURE- I, Page No. 11-12.**
	For Senate Approval

  b) **The Department of Mechanical Engineering :**
    The BOS resolved to recommend an addition of new elective courses as follows:

ME215	Mini Project
ME312	Introduction to Aircraft Structures
ME315	Rotor Dynamics
ME328	Metal Forming
ME 330	Introduction to Robotics
ME 331	Mini Project
ME429	Analytical Mechanics
ME437	Non Linear and Random Vibrations
ME439	Introduction to Laser Processing of Materials

For Senate Approval

The details are attached as an **ANNEXURE-II, Page No. 13-32.**

  c) **The Department of Computer Science & Engineering:**
    The BOS resolved to recommend the following :
  i) There will be three different pools of electives to be taken by second, third, fourth year UG students. They can take any subjects from these pool during respective years.
  ii) To change the B.Tech degree name from Computer Engineering to Computer Science and Engineering from 2017 onwards.
  iii) To include two new UG program specific elective course approved by DUGC, for inclusion in the Curriculum :
    i. CO473 - Algorithmic Graph Theory (3-0-0) 3
    ii. CO317 - Introduction to Graph Theory (3-0-0) 3

For Senate Approval

The details are attached as an **ANNEXURE-III, Page No. 33.**

d) **The department of Electronics and Communication Engineering :**
The BOS resolved to recommend the addition of 8 new electives to the
B.Tech Curiculum :

EC451 – Detection and estimation theory	(3-0-0) 3	
EC452 – Dynamical systems, chaos and fractals	(3-0-0) 3	
EC453 – Statistical analysis and applications	(3-0-0) 3	
EC454 – Numerical analysis and applications	(3-0-0) 3	
EC455 – Stochastic processes and applications	(3-0-0) 3	
EC456 – Complex analysis with applications	(3-0-0) 3	
EC457 – Fourier and Wavelet Signal Processing	(3-1-0) 4	
EC458 – Mathematical algorithms for signal processing	(3-1-0) 4	

The details are attached as an **ANNEXURE-IV, Page No.34-37.**

For
Senate
Approval

ITEM No: 30-BOS-2:

**Modification of courses in the curriculum under UG Programme Specific
Electives:**

a) **Department of Electrical and Electronics Engg.,**
The BOS resolved to recommend modification of course EE404 in the
curriculum under Programme Specific Electives.
EE404 – Soft Computing and Applications (3-1-0) 4

The details are attached as an **ANNEXURE-V, Page No. 38.**

For
Senate
Approval

b) **The Department of Mechanical Engineering :**
The BOS resolved to recommend rearranging of elective courses among
200, 300 and 400 series, change in title of some courses and content
revision of some existing courses.
The BOS resolved to recommend to revise the current list (2015 UG
Curriculum) of Programme specific Electives as given below:

Proposed Course No. and Title		Remarks
ME210	Mechanical Behavior of Engg. Materials	Modified course contents attached
ME211	Fuels And Combustion	Same as in 2015 UG curriculum
ME212	Synthesis of Mechanisms	Changed from 300 series to 200 series [ME312 to ME212]
ME 213	Fundamentals of Turbo Machines	Changed from 300 series to 200 series [ME 315 to ME213] Title Change from Turbo Machines to Fundamentals of Turbo Machines
ME 214	Quality Control	Changed from 300 series to 200 series [ME321 to ME214]
ME310	Measurements in Thermal systems	Same as in 2015 UG curriculum
ME311	Hydraulic and Pneumatic Control	Same as in 2015 UG curriculum
ME313	Internal Combustion Engines	Same as in 2015 UG curriculum
ME314	Mechatronics System Design	Same as in 2015 UG curriculum
ME316	Theory of Elasticity	Same as in 2015 UG curriculum

For
Senate
Approval

ME317	Composite Materials	Changed from 400 to 300 series ME418 – ME332	
ME332	Composite Materials	Changed from 400 series to 300 series [ME418-ME317]	
ME318	Manufacturing Technology of Polymers	Change of Title from Manufacturing Technology of Plastics to Manufacturing Technology of Polymers	
ME319	Mechanics of Compressible Fluids	Same as in 2015 UG curriculum	
ME320	Automation Systems	Changed from 400 series to 300 series [ME422 to ME321]	
ME321	Welding Technology	Changed from 400 series to 300 series [ME429 to ME 321]	
ME322	Automatic Control Engineering	Same as in 2015 UG curriculum	
ME323	Production and Operations Management	Changed from 400 series to 300 series [ME437 toME323]	
ME324	Product Development and & Prototyping	Modified course contents attached	
ME325	Manufacturing and Design of MEMS	Same as in 2015 UG curriculum	
ME326	Flexible Manufacturing Systems	Changed from 400 series to 300 series [ME431 to ME326]	
ME327	Metal Cutting and Press Working	Changed from 200 series to 300 series [ME212 to ME327]	
ME329	Basics of Computational Fluid Dynamics	Modified course contents attached	
ME410	Non-Conventional energy Sources	Same as in 2015 UG curriculum	
ME411	Pollution Control & Environmental Management	Same as in 2015 UG curriculum	
ME412	Operations Research	Same as in 2015 UG curriculum	
ME413	Microprocessors and PLC	Same as in 2015 UG curriculum	
ME414	Advanced IC Engines	Same as in 2015 UG curriculum	
ME415	Theories of Engineering Fracture	Change in Title from Fracture Mechanics to Theories of Engineering Fracture	
ME416	Cryogenics	Same as in 2015 UG curriculum	
ME417	Applied Finite Element Method	Same as in 2015 UG curriculum	
ME418	Automobile Engineering	Changed from 300 series to 400 series [ME320 to ME418]	
ME419	Propulsion	Same as in 2015 UG curriculum	
ME420	Mechanical Vibration & Acoustics	Same as in 2015 UG curriculum	
ME421	Theory of Plasticity	Same as in 2015 UG curriculum	
ME422	Human Factors in Engineering Design	Changed from 300 series to 400 series [ME323 to ME 422]	
ME423	Nuclear Energy	Same as in 2015 UG curriculum	
ME424	Industrial Tribology	Same as in 2015 UG curriculum	
ME425	Engineering Acoustics	Same as in 2015 UG curriculum	
ME426	Applied Computational	Same as in 2015 UG curriculum	

	Methods in Mechanical Sciences	
ME427	Collaborative Manufacturing	Same as in 2015 UG curriculum
ME428	Air Conditioning Technology	Same as in 2015 curriculum
ME429	Analytical Mechanics	New course proposed. Content attached
ME430	Theory of Fatigue Analysis	Change in Title from Advanced Machine Design to Theory of Fatigue Analysis
ME431	Contemporary Product Design	New course proposed. Content attached
ME432	Design of Solar Energy Systems	Same as in 2015 UG curriculum
ME433	Energy Audit and Management	Same as in 2015 UG curriculum
ME434	Experimental Stress Analysis	Same as in 2015 UG curriculum
ME435	Modeling & simulation of Engineering Systems	Same as in 2015 UG curriculum
ME436	Data Base Management Systems	Same as in 2015 UG curriculum
ME438	Polymer Nano Composites	Same as in 2015 UG curriculum

The details are attached as an **ANNEXURE-II, Page No. 13-32.**

c) **The Department of Computer Science & Engineering:**

The BOS resolved to recommend that,

i) Revision of syllabus for the electives of UG courses:
   CO460 – High Performance Computing   (3-0-0)3
   CO471 – Parallel Programming   (1-0-3)3
ii) To change the course code of elective CO423 – Machine Intelligence to CO472.

For Senate Approval

The details are attached as an **ANNEXURE-VI, Page No. 39-40.**

ITEM No: 30-BOS-3:

Introduction of New PG Level Elective Courses-

a) **Department of Electrical and Electronics Engg.,**
   The BOS resolved to recommend the introduction of PG level elective courses in to the curriculum as follows:
1. PS867 – Power System Simulation Laboratory   (0-0-3) 2
2. PS818 – Advanced Semiconductor Devices   (3-0-0) 3
3. PS820 – Analysis of Faulted Power Systems   (4-0-0) 4
4. PS868 – Switched Electric Network–Power Electronics Perspective   (4-0-0) 4
5. PS869 – Tensors   (4-0-0) 4
6. PS870 – Tensor Analysis of Networks   (4-0-0) 4
7. PS809 – DC-AC System Interaction (Content Modification   (3-1-0) 4

For Senate approval

The details are attached as an **ANNEXURE-VII, Page No. 41-43.**

b) **Department of Mechanical Engg.,** The BOS resolved to recommend the inclusion of two new courses as follows: DP850 – Design of Aircraft Structures ME850 – Modern Control Engineering The details are attached as an **ANNEXURE-VIII, Page No. 44-47.**	For Senate Approval
c) **The Department of Electronics and Communication Engineering:** The BOS resolved to recommend the addition of nine new electives to the curriculum of M.Tech in Communication Engineering. The details are attached as an **ANNEXURE-IX, Page No.48-52.**	For Senate Approval
d) **The Department of Information Technology :** The Department has recommended to include the Grades of Major Project (IT898: Major Project I – 6 Credits and IT899: Major Project II – 14 Credits) for CGPA Calculation of M.Tech (IT) students. The BOS resolved to recommend the inclusion of Major Project Grades for CGPA Calculation in all the M.Tech programs. The details are attached as an **ANNEXURE-X, Page No. 53.**	For Senate Approval

ITEM No: 30-BOS-4: **Modification of courses in the curriculum under PG Programme:**	
a) **Department of Electrical and Electronics Engg.,** The BOS resolved to recommend the correction of the typographical error for the course for which the word "System" is missing. PS859 – Computational Methods for Large Power System The details are attached as an **ANNEXURE-VII, Page No. 41.**	For Senate Approval
b) **Department of Mechanical Engg.,** The BOS resolved to recommend the modification of the following subjects at PG level: MF704 Manufacturing Systems Lab I MF707 Manufacturing Systems Lab II MF705 Metrology and Instrumentation	For Senate Approval
PG Major Project **BOS discussed in the Item No. 30-BOS-3.** Request for increase in PG students intake to 30 in all the department PG programs **BOS resolved to defer the proposal.**	*Reporting to the Senate*
Uniform course code for all courses offered by different departments at PG level **BOS resolved to recommend individual departments to decide as per DPGC recommendations.**	For Senate Approval
The details are attached as an **ANNEXURE-VIII, Page No. 44-47.**	

c) **The Department of Applied Mechanics and Hydraulics :** The BOS resolved to recommend the re-orientation of postgraduate courses offered by the Department of Applied Mechanics & Hydraulics from the academic year 2016-17. It has proposed to have two electives in each semester instead of one and three. The details are attached as an **ANNEXURE-XI, Page No. 54-57.**	For Senate Approval
d) **The Department of Computer Science & Engineering:** The BOS resolved to recommend that, i) There will be one pool of electives for PG courses which are to be taken in respective years which are to be taken in respective years by PG students independent for different PG program. Apart from these there will be one open elective group. The details are attached as an **ANNEXURE-III, Page No. 33.**	For Senate Approval
ii) A faculty must be free to offer any elective of his choice even though the subject is offered by other departments. **BOS resolved to defer the matter.**	*Reporting to the Senate*

iii)   Revision of syllabus for the electives of PG courses to be approved by DPGC.
      i)   CS866 – Interconnection Networks   (3-0-0) 3
      ii)   IS860 – High Performance Computing for Security   (3-0-0) 3
 The details are attached as an **ANNEXURE-XII, Page No. 58.**
	For Senate Approval

ITEM No: 30-BOS-5: **The Department of Electronics and Communication Engineering:** The BOS resolved to recommend the following : i) Awarding credits for the short courses conducted jointly with MoU partners.	For Senate Approval
ii) Comprehensive test for Research Scholars (Ph.D. students) **BOS resolved to defer the matter.** iii) Increasing the course requirements for M.Tech (R) from existing 12 to 18. **BOS resolved to defer the matter.**	*Reporting to the Senate*
iv) Proposal to hold Curriculum conclave with the participation of NIT Tiruchirappalli, NIT Warangal and NIT Calicut during June – Jan 2017. The details are attached as an **ANNEXURE-XIII, Page No. 59-60.**	For Senate Approval

ITEM No: 30-BOS-6: **Amendment in the admission policies are suggested for industry sponsored part time Research Scholars both at Ph.D. and M.Tech (Research)** The BOS resolved to recommend that the certain Amendment in the admission policies are suggested for industry sponsored part time Research Scholars both at Ph.D. and M.Tech (Research). Self-study courses are for only PhD Scholars and from 900 level only. The details are attached as an **ANNEXURE-IVX, Page No. 61.**	For Senate Approval

ITEM No: 30-BOS-7: **Introduction of new 900 level courses for PhD-** **Department of Electrical and Electronics Engg.,:** The BOS resolved to recommend that a new 9 level course in the curriculum : EE9xx Selected Topics in Control Systems 4 Credits The details are attached as an **ANNEXURE-IVX, Page No. 61.**	For Senate approval
ITEM No: 30-BOS-9: **Inclusion of External Research Guides-** a) The BOS resolved to recommend that Prof. Michel Kocher, Signal & Image Processing, University of Applied Science, HEIG-VD, Yverdon, Switzerland be considered as Additional Research Guide for Ms. Anu Shaju Areeckal. [Reg. No. EC13F06] in the Department of Electronics & Communication Engineering. b) The BOS resolved to recommend that Dr. Reji Philip, Professor, Light & Matter Physics Group, Raman Research Institute, Sadashiva Nagar, Bangalore be considered as Additional Research Guide for Ms. Pranitha Sankar [Reg. No. PH15P02] in the Department of Physics.	*Reporting to Senate*
ITEM No: 30-BOS-10: The BOS resolved that the items have already been discussed under Item No. 30-BOS-3 and 30-BOS-4.	*Reporting to Senate*
ITEM No: 30-BOS-11: **Items related to Registration fee (backlog courses / Tuition fee / Stipend / Application fee.** a) **Registration fee to be paid by the students for registering backlog subjects of the corresponding semesters beyond normal duration of the programme.** The BOS resolved to recommend that, student (FF/FA) in subjects beyond normal duration of the programme, i.e. after 4 years B.Tech, 2 years M.Tech, MBA, MSc & 3 years of MCA program, have to register the course on payment of Registration fee @ **Rs. 3000** per subject at the maximum of Tuition fee. This may be applicable for all the students including SC/ST.	For Senate Approval
b) **Discontinuation of disbursement of GATE Stipend on receipt of FF / FA Grade and subsequent revival on clearing the courses.** As of now, students who get FF/ FA Grade, the GATE Stipend is permanently discontinued. It is proposed that if the students clear the subjects, the GATE Stipend will be revived at the Full rate if CGPA is more than or equal to 6.0 or 50% of the stipend if CGPA is less than 6.0.	For Senate Approval

c) **Relaxation in refund of scholarship (GATE / Institute Fellowship) in the case of discontinuation / Termination from M Tech / M Tech (R)/PhD programme.** As of now, students are being asked to refund the full scholarship amount on discontinuation / termination. However, considering the fact that they are assisting in teaching and other academic activities of the departments, it is proposed to treat the scholarship as teaching assistantship and exempt them from refunding the availed scholarship. Also no refund is required for conversion from fulltime to part time student status.	**For Senate Approval**
d) **Exemption of Application fee for Women candidates for applying to PG / PhD programmes of the Institute.** It is proposed that to strengthen women participation in higher education, the application fee for applying to PG / PhD programme of the Institute may be considered same as for SC/ST/PWD candidates for all women applicants.	**For Senate Approval**

ITEM No: 30-BOS-12: **Any Other Matter :** a) NITK Student Council has forwarded the requests, through the Director, related to academic issues. The items were discussed in BOS. It was resolved to deliberate on the issued at the Departmental level Committees. HODs are requested to consolidate the feedback and submit to Dean (Academic) for forwarding to the Director.	*Reporting to the Senate*
b) With reference to the proposal from the DUGC of the Department of Mechanical Engineering, joint project guidance of UG projects from different Departments, it was resolved that present regulations and curriculum are sufficient and no changes are required.	*Reporting to the Senate*
c) With regard to the recognition of Institute faculty as Research Guides, BOS resolved to recommend that newly joined faculty possessing PhD degree will be eligible for serving as Research Guides from the date of joining to the Institute, and there is no need for submitting formal request to Dean (A) in this regard.	**For Senate Approval**

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

Secretary –BOS, NITK

(Dr. Katta Venkataramana)
Chairman-BOS, NITK

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

Agendum: Approval addition / updating of courses as an agenda items to BoS meeting scheduled on 19th APRIL 2016

Preamble :

It is found necessity of adding or updating the following Programme Specific Elective Courses, to the curriculum of UG Programme for B.Tech in EEE.

EE423	SWITCHGEAR AND PROTECTION LABORATORY	(0-0-3)2	addition
EE471	POWER SYSTEM SIMULATION LABORARORY- 2	(0-0-3)2	addition
EE121	ELECTRICAL MACHINE WINDING CALCULATIONS – 1	(0-2-3)4	addition
EE122	ELECTRICAL MACHINE WINDING CALCULATIONS – 2	(0-2-3)4	addition
EE500	SYSTEM ANALYSIS IN DISCRETE TIME	(3-1-0)4	addition
EE501	ANALYSIS OF NONLINEAR CIRCUITS	(3-1-0)4	addition
EE430	ROBOT DYNAMICS AND CONTROL	(3-1-0)4	addition
EE404	SOFT COMPUTING AND APPLICATIONS:	(3-1-0)4	updation

So the FC (EE) has decided to add OR update the above mentioned courses, and following is the conclusion arrived at:

Resolution :

Faculty Council has approved the following agenda items:

Agenda item-EED-DUGC -1:
Introduction of 2 new laboratory courses in the curriculum under Programme Specific Electives:

1) EE423   **SWITCHGEAR AND PROTECTION LABORATORY**   (0-0-3)2
     Laboratory exercises and assignments to provide additional support to EE422.

2) EE471   **POWER SYSTEM SIMULATION LABORARORY-2**   (0-0-3)2
     Laboratory exercises and assignments to provide additional support to EE470.

Agenda item-EED-DUGC -2:
Introduction of 5 new courses in the curriculum under Programme Specific Electives:

1) EE121   **ELECTRICAL MACHINE WINDING CALCULATIONS – 1**   (0-2-3)4
An exposition of the magnetic and electric circuits of commutator-wound machines. Exercises involving: the geometrical layout of the armature windings, brush placement, interpoles, equalizing rings. Detailing of the process of commutation and of armature reaction. Calculations in respect of winding design and of estimation of machine parameters from design data.
Originated by J R Rao
References:

1. Clayton A.E., Hancock N.N., "The Performance and Design of Direct Current Machines", 3rd Edition, Oxford & IBH, 1986 (Indian Reprint).
2. Taylor O.E., "The Performance and Design of AC Commutator Motors", A.H. Wheeler & Co., 1988 (Indian Reprint).

2) **EE122   ELECTRICAL MACHINE WINDING CALCULATIONS – 2   (0-2-3)4**

An exposition of the magnetic and electric circuits of open-wound (AC) machines. Salient- and non-salient-pole windings. Exercises involving: the geometrical layout of armature windings, armature reaction, harmonics and their quantification, cage rotor, and damper windings. Estimation of machine parameters from design data. *Originated by J. R. Rao*

References:

1. Say M.G., "The Performance and Design of Alternating Current Machines", 3rd Edition, CBS, 1983 (Indian Reprint).
2. Langsdorf A.S., "Theory of Alternating Current Machinery", 2nd Edition, Tata McGraw-Hill, 1974.

3) **EE500   SYSTEM ANALYSIS IN DISCRETE TIME   (3-1-0)4**

The calculus of finite differences; Operators and their properties; Inverse operators. Difference equations and their solutions. Linear difference equations with constant coefficients, general and particular solutions. Discretization of differential equations. Modeling and analysis of LTI lumped-parameter systems in discrete time. *Originated by J. R. Rao*

References:

1. Kelley W.G., Peterson A.C., " Difference Equations: An Introduction with Applications", 2nd Edition, Elsevier, 2001.
2. Goldberg S., "Introduction to Difference Equations", 2nd Edition, Dover, 1986.
3. Elaydi S., "An Introduction to Difference Equations", 3rd Edition, Springer International Edition, 2008.

4) **EE501   ANALYSIS OF NONLINEAR CIRCUITS   (3-1-0)4**

Nonlinear circuit elements, v-i characteristics, energy and power considerations. Time-varying elements, multiterminal elements. Resistive nonlinear circuits, graphical analysis. Dynamic nonlinear networks, autonomous and non-autonomous networks. Analysis of memristive circuits.

References: *Originated by J. R. Rao.*

1. Chua L.O., "Introduction to Nonlinear Network Theory", McGraw-Hill, 1969.
2. Chua L.O., Desoer C.A., Kuh E.S., "Linear and Nonlinear Circuits", McGraw-Hill, 1987.

5) **EE430   ROBOT DYNAMICS AND CONTROL   (3-1-0) 4**

Prerequisite: EE326-LINEAR AND DIGITAL CONTROL THEORY

Introduction to robotics: History of robots, components and structures of robots, rigid motion and homogeneous transformations: representing position and rotation, rotational transformations, composition of rotations, parameterization of rotation, homogeneous transformations, Forward Kinematics, Inverse kinematics, velocity kinematics- the manipulator Jacobian, Dynamics: Euler-Lagrange equations, generalized expression for potential and kinetic energy, properties of robot dynamic equations, equation of motion, Independent joint control: set point tracking using classical PID control, force control, feedback linearization control. Computer vision: geometry of image formation, camera calibration, segmentation by thresholding, connected components, position and orientation of the object. Introduction to path planning and collision avoidance.

References:

1. M.W. Spong, S. Hutchinson and M. Vidyasagar, *Robot Dynamics and Control* by, John Wiley & Sons, 2008.
2. Craig, John J. *Introduction to robotics: mechanics and control*. Vol. 3. Upper Saddle River: Pearson Prentice Hall, 2005.
3. Sciavicco L, Siciliano B. *Modelling and control of robot manipulators*. Springer Science & Business Media; 2012 Dec 6.

National Institute of Technology Karnataka Surathkal

Department of Mechanical Engineering

BOS Agenda for UG program

Following points regarding Program specific electives were discussed in DFC held on 4th April 2016 and subsequently in DUGC meeting held on 08/04/2016

1. Rearranging of elective courses among 200, 300 and 400 series
2. Addition of New elective courses
3. Change in Title of some courses
4. Content revision of some existing courses

DUGC resolved to revise the current list (2015 UG curriculum) of Programme specific Electives as given below

Proposed Course No and Title		Remarks
ME210	Mechanical Behavior of Engg. Materials	**Modified course contents attached**
ME211	Fuels And Combustion	Same as in 2015 UG curriculum
ME212	Synthesis of Mechanisms	Changed from 300 series to 200 series [ME312 to ME212]
ME 213	Fundamentals of Turbo Machines	Changed from 300 series to 200 series [ME 315 to ME213] **Title Change from Turbo Machines to Fundamentals of Turbo Machines**
ME 214	Quality Control	Changed from 300 series to 200 series [ME321 to ME214]
ME215	Mini Project	**New course proposed. Content attached**
ME310	Measurements in Thermal systems	Same as in 2015 UG curriculum
ME311	Hydraulic and Pneumatic Control	Same as in 2015 UG curriculum
ME312	Introduction to Aircraft Structures	**New Course proposed. Contents attached**
ME313	Internal Combustion Engines	Same as in 2015 UG curriculum
ME314	Mechatronics System Design	Same as in 2015 UG curriculum
ME315	Rotor Dynamics	**New Course proposed. Contents attached**
ME316	Theory of Elasticity	Same as in 2015 UG curriculum
ME317	Composite Materials	Changed from 400 series to 300 series [ME418-ME317]

ME318	Manufacturing Technology of Polymers	Change of Title from Manufacturing Technology of Plastics to Manufacturing Technology of Polymers
ME319	Mechanics of Compressible Fluids	Same as in 2015 UG curriculum
ME320	Automation Systems	Changed from 400 series to 300 series [ME422 to ME321]
ME321	Welding Technology	Changed from 400 series to 300 series [ME429 to ME 321]
ME322	Automatic Control Engineering	Same as in 2015 UG curriculum
ME323	Production and Operations Management	Changed from 400 series to 300 series [ME437 toME323]
ME324	Product Development and & Prototyping	Modified course contents attached
ME325	Manufacturing and Design of MEMS	Same as in 2015 UG curriculum
ME326	Flexible Manufacturing Systems	Changed from 400 series to 300 series[ME431 to ME326]
ME327	Metal Cutting and Press Working	Changed from 200 series to 300 series[ME212 to ME327]
ME328	Metal Forming	New Course proposed. Contents attached
ME329	Basics of Computational Fluid Dynamics	Modified course contents attached
ME 330	Introduction to Robotics	New Course proposed. Contents attached
ME 331	Mini Project	New Course proposed. Contents attached
ME410	Non-Conventional energy Sources	Same as in 2015 UG curriculum
ME411	Pollution Control & Environmental Management	Same as in 2015 UG curriculum
ME412	Operations Research	Same as in 2015 UG curriculum
ME413	Microprocessors and PLC	Same as in 2015 UG curriculum
ME414	Advanced IC Engines	Same as in 2015 UG curriculum
ME415	Theories of Engineering Fracture	Change in Title from Fracture Mechanics to Theories of Engineering Fracture
ME416	Cryogenics	Same as in 2015 UG curriculum

ME417	Applied Finite Element Method	Same as in 2015 UG curriculum
ME418	Automobile Engineering	Changed from 300 series to 400 series [ME320 to ME418]
ME419	Propulsion	Same as in 2015 UG curriculum
ME420	Mechanical Vibration & Acoustics	Same as in 2015 UG curriculum
ME421	Theory of Plasticity	Same as in 2015 UG curriculum
ME422	Human Factors in Engineering Design	Changed from 300 series to 400 series [ME323 to ME 422]
ME423	Nuclear Energy	Same as in 2015 UG curriculum
ME424	Industrial Tribology	Same as in 2015 UG curriculum
ME425	Engineering Acoustics	Same as in 2015 UG curriculum
ME426	Applied Computational Methods in Mechanical Sciences	Same as in 2015 UG curriculum
ME427	Collaborative Manufacturing	Same as in 2015 UG curriculum
ME428	Refrigeration and Air Conditioning Technology	ME 317 and ME 428 merged as R&AC Technology with ME 428 code. Modified Course contents attached
ME429	Analytical Mechanics	New course proposed. Content attached
ME430	Theory of Fatigue Analysis	Change in Title from Advanced Machine Design to Theory of Fatigue Analysis
ME431	Contemporary Product Design	New course proposed. Content attached
ME432	Design of Solar Energy Systems	Same as in 2015 UG curriculum
ME433	Energy Audit and Management	Same as in 2015 UG curriculum
ME434	Experimental Stress Analysis	Same as in 2015 UG curriculum
ME435	Modeling & simulation of Engineering Systems	Same as in 2015 UG curriculum
ME436	Data Base Management Systems	Same as in 2015 UG curriculum
ME437	Non Linear and Random Vibrations	New course proposed. Content attached

| ME438 | Polymer Nano Composites | Same as in 2015 UG curriculum |
| ME439 | Introduction to Laser Processing of Materials | New course proposed. Content attached |

Name	Signature	Name	Signature
PRASAD KRISHNA		HEMANTHA KUMAR	
VIJAY DESAI		S.M. Munjunelsan	
Veershetty G		Ranjith M	
Samalekhaahaa		P. Mohanan	
P. Jeyaraj		Anish. S	
Ramesh M.R.		Kumar G. N.	
Sathyabhama		Subhaschundra Kattimani	
K.R. Gnanaprasad		D. Arumuga Perumal	
Vasudeva M		K.V. hanjadha	
D. Chakradhar		S.M. Kulkarni	
Srikanth Bontha		RAVIKIRAN KADOLI	
Suresh Kumar R		SHRIKANTHA S Rao	
H. Shivananda Nayaka			
AK Yadav			
SHARNAPPA JULADADASAD			

(VIJAY DESAI)
Chairman DUGC
8/4/16

HOD, Mech Engg

Dr. K.V. GANGADHARAN
Professor & Head
Dept. of Mechanical Engineering
National Institute of Technology Karnataka, Surathkal
Srinivasnagar 575025, Mangalore (INDIA)

ME210 MECHANICAL BEHAVIOR OF ENGINEERING MATERIALS (3-0-0) 3 (Existing)

Simple flexure theory, Bending stress and shearing stress distribution across sections, Macaulay's method for deflection of statically determinate beams. Compound stresses - Analytical Method, Graphical Method – Mohr's Circle. Torsion, Transmission of Power through hollow and solid shafts. Beams of Uniform strength, Springs, combined bending & Torsion, Strain energy. Thick and Thin pressure vessels

Singer, F.L. Strength of Materials, 3rd Edition, Harper and Row Publishers, New York, 1980.

Hearn, E.J., Mechanics of Materials, Pergaman Press, England, 1972.

Beer and Johnston E. R. Mechanics of Materials, 3rd Edition, Tata McGraw Hill, New-Delhi, 2007.

ME 210 MECHANICAL BEHAVIOR OF ENGINEERING MATERIALS (3-0-0)3

Elasticity Theory, Plasticity, Microstructure Aspects of plastic deformation, Strengthening Mechanisms, Fracture, Fatigue, High-temperature deformation

References

1. Thomas H.Courtney, " Mechanical Behaviour of Materials ", (2nd Edition), McGraw-Hill, 2000.
2. Mathew Philip, Bill Bolton, " Engineering Materials, Butterworth-Heiremann, 2001.
3. George E.Dieter, " Mechanical Metallurgy ", McGraw Hill, 1988.
4. R.W. Hertzberg, "Deformation and Fracture Mechanics of Engineering Materials", John Wiley and Sons, 1976.
5. MA Meyers and K Chawla, "Mechanical Behavior of Materials", Prentice Hall, 2005.

Detailed Syllabus

Elasticity Theory:
Stress at a point, State of stress in two dimensions and in three dimensions, stress tensor, principal stress and strain, elastic behaviour of metals, ceramics and polymers. Pseudoelasticity, Viscoelasticity

Plasticity:
True stress and true strain, yielding criteria for ductile metals, octahedral shear stress and shear strain, flow rules, plastic stress-strain relations

Microstructure Aspects of plastic deformation:
classification of defects, thermodynamics of defects, geometry of dislocations, dislocation generation, Forces between dislocations, Partial dislocation and stacking faults, dislocation interactions, dislocation movement and strain rate, Crystallography of Slip and Independent Slip systems

Strengthening Mechanisms:
Strengthening from grain boundaries, solid-solution strengthening, precipitation hardening, Fibre strengthening, strengthening due to point defects, martensitic strengthening, strain hardening

Fracture:
Griffith Fracture Theory, Evolution of fracture models, Stress intensity factors, Fracture Toughness-Microstructural Issues.

Fatigue:
S-N curves, Low and high cycle fatigue, Fatigue crack propagation, Effect of stress concentration, fatigue under combined stresses, Design for fatigue.

High-temperature deformation:
Creep curve, mechanism of creep deformation, deformation mechanism maps, Super plasticity, creep under multi-axial loading, High temperature alloys.

National Institute of Technology Karnataka, Surathkal
Department of Mechanical Engineering

Proposal for new course mini project

1. ME215 Mini project I (0-0-3) 2 - to be offered for 3rd or 4th semester students
2. ME331 Mini project II (0-0-3) 2 – to be offered for 5th or 6th semester

Mini project will involve experimental work either in the laboratory or in the field / design tasks / prototyping / working model development / mathematical modelling/creation of experimental facility etc. Mini project will be in line with the guide line formulated by DUGC (ME)

National Institute of Technology Karnataka, Surathkal
Department of Mechanical Engineering

Proposal for new course for Undergraduate Level

- ME312 -

Introduction to Aircraft Structures   3-0-0

Brief History-Components of an airplane and their functions. Different types of flight vehicles, classifications. Basic instruments for flying, Physical properties and structure of the atmosphere, Temperature, pressure and altitude relationships, Evolution of lift, drag and moment. Different types of drag. Aerodynanic forces on aircraft – classification of NACA aerofoils, aspect ratio, wing loading, Mach number, centre of pressure and aerodynamic centre-aerofoil characteristics lift, drag curves. General types of construction, Monocoque, semi-monocoque. Typical wing and fuselage structure. Metallic and non-metallic materials, Use of aluminium alloy, titanium, stainless steel and composite materials.

References :
1. Anderson, J.D., "Introduction to Flight", McGraw-Hill, 1995.
2. Kermode, A.C., "Flight without Formulae", McGraw-Hill, 1997.
3. Bruhn.E.F."Analysis and design of flight vehicle structures" Tri set of offset company, USA,1973.

4. Michael Chun Yung Niu."Airframe structural Design" Technical book company, Los Angeles, USA, 1989.

ME___ ROTORDYNAMICS

Introduction to dynamics of rotating machinery. Critical speeds of rotors and factors affecting them such as gyroscopic effects, internal damping, unequal moments of inertia, fluid film effects of bearings and seals. Unbalance response and Stability of rotors under various influences, including turbo machinery effects. Balancing of Rotors. Modelling and Calculation methods in rotor dynamics for advanced applications. Malfunction analysis ,diagnostics and condition monitoring of rotors. Applications and Case studies.

B.S.Prabhu and A.S.Sekhar, "Dynamic Analysis of Rotating Systems and Applications", Multi Science Publishing Co. Ltd, Essex, England, UK, 2008.

M.L Adams "Rotating Machinery Vibration, From Analysis to Troubleshooting", Marcel Dekker Inc. New York, 2001

E. Kramer, "Dynamics of Rotors and Foundations", Springer Verlag, Berlin, 1993

J.S.Rao, "Rotordynamics", New Age International Pvt. Ltd., New Delhi, 1996

J. M. Vance, "Rotordynamics of Turbomachinery", John Wiley and Sons, New York, 1998.

ME324 PRODUCT DEVELOPMENT AND PROTOTYPING (3-0-0) 3

Generic process of Product Development, Concept generation, selection and Testing, CAD applications in Testing, Virtual Prototyping, Product Architecture,Industrial Design and Design for manufacturing, Design considerations, Design for production, Metal and Plastic components, Optimum Design, Rapid Prototyping Technologies.

Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, Mc Graw Hill, 2000.
A. K. Chitale and R. C. Gupta, Product Design and Manufacturing, PHI Pvt. Ltd, 2002.

Modifications suggested for existing subject

ME324 PRODUCT DEVELOPMENT AND PROTOTYPING (3-0-0) 3

Generic process of Product development, Concept Generation, TRIZ, Concept Selection and Testing, Computer applications in Product Development. Product Architecture, Design for Manufacture and Assembly. Prototyping,Virtual and Physical. Rapid Prototyping Technologies, Reverse Engineering.

K T Ulrich and S D Eppinger, Product Design and Development, Mc Graw Hill, 2000.
K Otto and K Wood, Product Design, Pearson Education, Inc. 2001
K G Cooper, Rapid Prototyping Technology, Marcel Dekker, Inc. 2001
D T Pham and S S Dimov, Rapid Manufacturing, Springer-Verlag, 2001
Material from web

METAL FORMING (3 – 0 – 0)

Introduction and classification, primary and secondary forming processes, Hot and Cold working; Process, procedure, types, equipment, application of various forming processes like forging, rolling, extrusion, drawing etc. Metal flow, effect of friction; Design of dies for forging, extrusion, drawing; Metallurgical aspects.

References:

Metal forming Handbook – Springer

Metal Forming – Mechanics and Metallurgy, by William F Hosford and Robert M Cadell

Theory and Application to Metal Forming Process -R.A.C..Slater, McMillan Press, 1977

Metal Forming - Fundamentals and Applications, T. Altan, S. Oh. H. Gegel, ASM, Ohio, 1983.

ME329 BASICS OF COMPUTATIONAL FLUID DYNAMICS (3-0-0)3

Introduction to Computational Fluid Dynamics: historical review , applications. Derivation of the fluid flow and heat transfer governing equations based on various fluid flow models. Mathematical aspects of the fluid dynamic equations, classification methods. Implementation of the finite difference method for fundamental advection diffusion, advection- detiffusion partial differential equations. Stability, consistency and convergence issues. Numerical schemes for two dimensional Navier – Stokes equations like LaxWendroff method, MacCormacks method, SIMPLE. Jiyuan Tu, Guan Heng Yeoh and Chaoqn Liu.Computational fluid dynamics A Practical approach.

Butterworth Heinemann An Imprint of Elsevier, 2008.

John D. Anderson Jr . Computational Fluid Dynamics The Basics with Applications. McGraw –Hill International Eddtion, 1995. Chung Patankar S V . Numerical Heat Transfer and Fluid Flow.Hemisphere Publishing corporation, Taylor and Francis Group New York, 1980.

ME329 BASICS OF COMPUTATIONAL FLUID DYNAMICS (3-0-0)3

Introduction to Computational Fluid Dynamics: historical review, applications. Derivation of the fluid flow and heat transfer governing equations based on various fluid flow models. Mathematical aspects of the fluid dynamic equations, classification methods. Implementation of the finite difference and finite volume methods for fundamental advection diffusion, advection-diffusion partial differential equations. Stability, consistency and convergence issues. Numerical schemes for two dimensional Navier – Stokes equations like Lax-Wendroff method, MacCormacks method, SIMPLE. Implementation of boundary conditions. Various meshing methods. Errors and Uncertainty in CFD.

Versteeg, Henk Kaarle, and Weeratunge Malalasekera. An introduction to computational fluid dynamics: the finite volume method. Pearson Education, 2007.

Jiyuan Tu, Guan Heng Yeoh and Chaoqn Liu. Computational fluid dynamics A Practical approach. Butterworth Heinemann An Imprint of Elsevier, 2008.

John D. Anderson Jr . Computational Fluid Dynamics The Basics with Applications. McGraw –Hill International Eddtion, 1995. Chung Patankar S V .

Numerical Heat Transfer and Fluid Flow. Hemisphere Publishing corporation, Taylor and Francis Group New York, 1980.

ME87xx: MODERN CONTROL ENGINEERING (3-0-0) 3

Dynamic systems and their classification; Dynamic models of lumped parameter systems; The state variable description of the dynamic models. Linearization and linear time invariant systems - relationship between state space and transfer function, system response, frequency response, stability; Feedback control of linear systems: Stability, controllability, observability, classical three term controller; Introduction to nonlinear systems and nonlinear control - stability, gain scheduling, feedback linearization, and other methods of nonlinear control.

Gene F. Franklin , J. Da Powell, Abbas Emami-Naeini, Feedback control of dynamic systems, 7th Edition, Pearson Prentice Hall, 2014

K. Ogata, Modern Control Engineering, Prentice Hall International, NJ.2004

H.J. Marquez, Nonlinear Control Systems - Analysis and Design, John Wiley & Sons, Inc., 2003.

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ME3xx Introduction to Robotics $ME 330$ $(3-0-0)3$

Introduction: understanding a robot, classification and applications; Manipulator - The industrial robotic arm; Kinematics of a serial-link robotic manipulator, dynamics and control of a serial-link manipulator; Sensors and actuators for robotics.

J.J. Craig, Introduction to Robotics: Mechanics and Control, 3rd Edition, Perason Ed, 2004,

Asitava Ghosal, RObotics: Fundamental concepts and analysis, Oxford University Press, 2013

ME 428 REFRIGERATION AND AIR CONDITIONING TECHNOLOGY (3-0-0) 3

Refrigerants, Refrigeration Cycles, Air cycle refrigeration, Vapour compression system, multi pressure system, Cascade refrigeration, Vapour absorption system, Dry ice manufacturing, Ejector refrigeration system, Decicant cooling system, Pollution by refrigerants. Use of solar energy, low grade energy to run the refrigeration system.

Psychrometry, Air-conditioning processes, use of Psychrometric chart, air conditioning processes, Cooling load calculations. types of air conditioning systems, winter and Summer air conditioning, Applications of air conditioning. (Use of Refrigeration data handbook permitted in examination).

Arora C. P, Refrigeration and Air Conditioning, Tata McGraw- Hill Company Limited, New Delhi, 1981.
Manohar Prasad, Refrigeration and Air conditioning, Wiley Eastern Limited, New Delhi, 1983.
Refrigeration/Thermodynamics/Heat transfer/Air conditioning data hand book.
Manohar Prasad, Refrigeration & Air conditioning Data Hand Book, Wiley Eastern Litd, New Delhi, 1989.

ME: Analytical Mechanics (3 0 0) 3

ME 429

Review of basic solid mechanics theory, Work, Energy and Variational Calculus, Energy principles in structural mechanics, Variational forms, Energy principles in mechanics, Principle of virtual work, Deformation of Bars and Beams, Plates, Problems in plane elasticity (Plane stress, plane strain, axisymmetric elasticity), Dynamical Systems, Hamilton's principle for particles, rigid bodies, continuum and constrained systems.

References:

- *Energy Principles and Variational Methods in Applied Mechanics* by J. N. Reddy (John Wiley, New York, 2002)
- *Mechanical Systems, Classical Models, Analytical Mechanics*, by P.P. Teodorescu, Springer, 2009
- *Analytical Dynamics, Theory and Applications*, by Mark D Ardema, Kluwer Academic/Plenum Publishers, 2005
- *Methods of Analytical Dynamics*, Leonardo Meirovitch, Dover Publications, 2010

ME : Nonlinear and Random Vibration (3 0 0) 3

ME 437

Nonlinear Vibration, Introduction, Examples of nonlinear vibration problems, exact methods, Approximate analytical methods, Sub harmonic and super harmonic oscillations, Graphical Methods, Stability of equilibrium states, Chaos.

Random Vibration, Introduction, Random variables and random processes, Probability Distribution, Mean Value and standard deviation, Probability distribution and Correlation functions, Stationary and Gaussian Random Process, Fourier Analysis, Power spectral density, Wide-band and Narrow Band process, Response of a single degree of freedom system. Response due to stationary random excitations,

References:

- *Mechanical Vibrations*, by Singiresu S Rao, Pearson Education, 2011.
- *Mechanical Vibrations Theory and Applications,* by S Graham Kelly, Cengage Learning, 2012.
- *Theory of Vibration with Applications*, by Willimam T Thomson, Marie Dillon Dahleh and Chandramouli Padmanabhan, Pearson Education, 2008.
- *Elements of Vibration Analysis* by Leonard Meirovitch McGraw Hill (India) Education, 2014

Co-ordinator:

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Scholar:http://scholar.google.co.in/citations?user=k2wxXJAAAAAJ&hl=en

10-Apr-16

ME 431

Newly Proposed Subject

MExxx   CONTEMPORARY   CONCEPTS IN PRODUCT DESIGN   (3-0-0) 3
Pre-requisite : ME 324   (TO BE PROPOSED IN THE FORTHCOMING BOS)

Human-Product Interactions – Design for Aesthetics, Input-Output Human interface devices, Design thinking. Design for ease of use. Ergonomics and Human modeling-Definition and aspects in Product Design, Digital Human Modeling and Virtual Humans. Bio-inspired product design and biomechanics-Designs inspired by flora and fauna, fundamentals of biomechanics. Creative Design and Design research methodology- Definition of Novelty and creativity. Abstractize and Synthesize for creative design. Design for sustainability, twelve principles of green engineering.

M S Sanders and E J McCormick, Human Factors in Engineering and Design, McGraw-Hill Education (India)Pvt. Ltd., 7ed, 2013
Don Norman, The Design of Everyday things, Basic Books, 2013
W Lidwell, K Holden and J Butler, Universal Principles of Design, Rockport Publishers
Duane Knudson Fundamentals of Biomechanics, Springer, 2007 (Second Edition)
Lucienne T.M. Blessing, Amaresh Chakrabarti, DRM, a Design Research Methodology, Springer, 2009
Our common future – Brundtland Report

National Institute of Technology Karnataka
Department of Mechanical Engineering

MF4XX   **Introduction to Laser Processing of Materials**   **(3-0-0) 3**

Basics of Lasers – Laser Operation Mechanism, Properties of Laser Radiation, Types of Industrial Lasers, Fundamentals of Laser Material Interactions: Absorption of Laser Radiation, Thermal Effects, Materials science for laser processing, Transport phenomena for laser materials processing, Lasers in Manufacturing (Laser Cutting, Laser Drilling, Laser Machining, Laser Forming, Laser Welding, Laser Surface Alloying, Laser Cladding) Laser Additive Manufacturing – Classification, Processing Philosophy and Metallurgical Mechanisms, Modeling of Laser Material Processing.

Text/Reference Books
1. Laser Material Processing, 4th Edition, W M Steen and J Mazumder, Springer, 2010.
2. "Laser Processing of Materials - Fundamentals, Applications and Developments", Schaaf, Peter , Springer, 2010.
3. "Physics of Laser Materials Processing: Theory and Experiment", Gennady G. Gladush and Igor Smurov, Springer, 2011.
4. "The Mathematics of Thermal Modeling: An Introduction to the Theory of Laser Material Processing" John Michael Dowden, Chapman and Hall/CRC, 2001.
5. Principles of Laser Materials Processing, E Kannatey-Asibu, Wiley, 2009.
6. Laser Fabrication and Machining of Materials, N B Dahotre and S P Harimkar, Springer, 2008.
7. Laser Processing of Engineering Materials: Principles, Procedure and Industrial Applications, John C Ion, Elsevier, 2005.

Department of Mechanical Engineering
Bachelor of Technology in Mechanical Engineering

Basic Science Core (BSC)

MA110	Engineering Mathematics-I	(3-0-0)3
PH110	Physics	(3-1-0)4
PH111	Physics Lab	(0-0-2)1
MA111	Engineering Mathematics-II	(3-0-0)3
CY110	Chemistry	(3-0-0)3
CY111	Chemistry Lab	(0-0-3)2

Engineering Science Core (ESC)

EE110	Elements of Electrical Engineering	(3-0-0)3
ME110	Elements of Mechanical Engineering	(3-0-0)3
CO110	Computer Programming	(3-1-0)4
CO111	Computer Programming Lab	(0-0-2)1
EC110	Elements of Electronics and communication Engineering	(3-0-0)3
AM110	Engineering Mechanics	(3-0-0)3
ME111	Engineering Graphics	(1-0-3)3
AM201	Mechanics of Solids	(3-0-0)3
AM217	Mechanics of Solids Lab	(0-0-2)1
AM317	Fluid Mechanics & Machinery Lab	(0-0-2)1

Humanities and Social Science Core (HSC)

HU110	Professional Communication	(3-0-0)3
HU300	Engineering Economics	(3-0-0)3
HU302	Principles of Management	(3-0-0)3

Programme Core (PC)

ME201	Basic Engineering Thermodynamics	(3-1-0)4
ME202	Fluid Mechanics and Machinery	(3-1-0)4
ME203	Mechanics of Machines	(3-1-0)4
ME204	Basic Manufacturing Process	(3-1-0)4
ME205	Materials Science and Metallurgy	(3-0-0)3
ME206	Engineering Drawing	(1-0-3)3
ME207	Workshop Practice	(0-0-3)2
ME250	Applied Thermodynamics	(3-1-0)4
ME251	Analysis & Design of Machine Components	(3-1-0)4
ME252	Computer Aided Engineering	(3-0-0)3
ME253	Manufacturing Technology	(3-0-0)3
ME254	Metrology	(3-0-0)3
ME255	Machine Drawing	(1-0-3)3
ME300	Energy Engineering	(3-0-0)3
ME301	Design of Mechanical Drives	(3-1-0)4
ME302	Mechanical Measurements & Instrumentation	(3-0-0)3
ME303	Metrology & CAD Lab	(0-0-2)1
ME304	Mechanical Lab-I	(0-0-2)1
ME350	Heat Transfer	(3-1-0)4
ME351	Machine Dynamics and Vibrations	(3-1-0)4
ME352	Machine Shop-I	(0-0-3)2
ME401	Mechanical Lab-II	(0-0-2)1
ME402	Machine Shop-II	(0-0-3)2

Programme Specific Electives (PSE)

ME210	Mechanical Behavior of Engg. Materials	(3-0-0)3
ME211	Fuels And Combustion	(3-0-0)3
ME212	Metal Cutting and Press Working	(3-0-0)3
ME310	Measurements In Thermal Systems	(3-0-0)3
ME311	Hydraulic and Pneumatic Control	(3-0-0)3
ME312	Synthesis of Mechanisms	(3-0-0)3
ME313	Internal Combustion Engines	(3-0-0)3
ME314	Mechatronics System Design	(3-0-0)3
ME315	Turbo-machines	(3-0-0)3
ME316	Theory of Elasticity	(3-0-0)3
ME317	Refrigeration Technology	(3-0-0)3
ME318	Manufacturing Technology of Plastics	(3-0-0)3
ME319	Mechanics of Compressible Fluids	(3-0-0)3
ME320	Automobile Engineering	(3-0-0)3
ME321	Quality Control	(3-0-0)3
ME322	Automatic Control Engineering	(3-0-0)3
ME323	Human factors in Engineering Design	(3-0-0)3
ME324	Product Development & Prototyping	(3-0-0)3
ME325	Manufacturing and Design of MEMS	(3-0-0)3
ME329	Basics of Computational Fluid Dynamics	(3-0-0)3
ME410	Non Conventional Energy sources	(3-0-0)3
ME411	Pollution Control & Environmental Management	(3-0-0)3
ME412	Operations Research	(3-0-0)3
ME413	Microprocessors and PLC	(3-0-0)3
ME414	Advanced I.C. Engines	(3-0-0)3
ME415	Fracture Mechanics	(3-0-0)3
ME416	Cryogenics	(3-0-0)3
ME417	Applied Finite Element Method	(3-0-0)3
ME418	Composite Materials	(3-0-0)3
ME419	Propulsion	(3-0-0)3
ME420	Mechanical Vibration & Acoustics	(3-0-0)3
ME421	Theory of Plasticity	(3-0-0)3
ME422	Automation systems	(3-0-0)3
ME423	Nuclear Energy	(3-0-0)3
ME424	Industrial Tribology	(3-0-0)3
ME425	Engineering Acoustics	(3-0-0)3
ME426	Applied Computational Methods in Mechanical Sciences	(3-0-0)3
ME427	Collaborative Manufacturing	(3-0-0)3
ME428	Air-conditioning Technology	(3-0-0)3
ME429	Welding Technology	(3-0-0)3
ME430	Advanced Machine Design	(3-0-0)3
ME431	Flexible Manufacturing Systems	(3-0-0)3
ME432	Design of Solar Energy Systems	(3-0-0)3
ME433	Energy Audit and Management	(3-0-0)3
ME434	Experimental Stress Analysis	(3-0-0)3
ME435	Modeling & Simulation of Engineering Systems	(3-0-0)3
ME436	Data Base Management Systems	(3-0-0)3
ME437	Production and Operations Management	(3-0-0)3
ME438	Polymer Nano Composites	(3-0-0)3

Open Electives (OE)

ME341	Mechatronics	(3-0-0)3
ME342	Environmental Pollution Control	(3-0-0)3
ME343	Fluid Power Control	(3-0-0)3
ME344	Condition Monitoring and Predictive Maintenance	(3-0-0)3
ME441	Nuclear Science & Engineering	(3-0-0)3
ME442	Micro System Technology	(3-0-0)3
ME443	Product Design and Manufacturing	(3-0-0)3
ME444	Solar Energy	(3-0-0)3
ME445	Energy Management	(3-0-0)3
ME446	Theory of Gas Turbine and Jet Propulsion	(2-1-0)3
ME447	Multi Body dynamics and applications	(2-1-0)3

Project (MP)

ME449	Major Project –I	(0-1-3)2
ME499	Major Project –II	(0-1-9)6

Mandatory Learning Courses (MLC)

CV110	Environmental studies	(1-0-0) 1
HU111	Professional Ethics and Human values	(1-0-0) 1
ME440	Practical Training	(0-0-3) 2
ME490	Seminar	(0-0-2) 1

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Proceedings of the combined DFC meeting held on 12th April 2016 at 03:00PM in the department Meeting room

The following agenda items were proposed in the meeting:

1. There will be three different pools of electives to be taken by second, third, fourth year UG students. They can take any subjects from these pool during respective years.

2. √ There will be one pool of electives for PG courses which are to be taken in respective years which are to be taken in respective years by PG students independent for different PG programs. Apart from these there will be one open elective group.

3. A faculty must be free to offer any elective of his choice even though the subject is offered by other departments.

4. Permission should be given to B.Tech. final year students to take M.Tech. level electives.

5. DFC recommends/proposes to change the B.Tech. degree name from Computer Engineering to Computer Science and Engineering.

6. It was proposed to include two new UG program specific elective course approved by DUGC, for inclusion in the Curriculum:

   a. Algorithmic Graph Theory
   b. Introduction to Graph Theory

CO473   Algorithmic Graph Theory   (3-0-0) 3

Basic definitions and terminology of graphs and digraphs, and introduction to simple complexity theory, How choice of graph traversals (e.g., depth-first and breadth-first searches) affect algorithmic efficiency, Spanning Trees, connectivity. Circuit space, Planarity testing, genus of a graph, Networks and flows: max-flow/min-cut theorem and max-flow algorithms, Matchings in weighted and un-weighted graphs, Eulerian and Hamiltonian tours, Chinese postman and travelling salesman problems, Dominating sets, independence and cliques, Colouring graphs (including the famous 4-colour problem of planar graphs) NP-completeness and its importance in graph algorithms.

References

Alan Gibbons, Algorithmic Graph Theory, Cambridge University Press, 1985.
Cormen, Leiserson and Rivest, Introduction to Algorithms, McGraw-Hill, 1986.
James McHugh, Algorithmic Graph Theory, Prentice-Hall, 1989.

CO317   Introduction to Graph Theory   (3-0-0) 3

Basic concepts on Graphs- degree, paths, cycles, connectivity, trees and other graph parameters, Matchings – Matchings in bipartite graphs : Konig's theorem, Halls' Theorem, Matchings in general graphs, Vertex Cover, Vertex Coloring- upper bound and lower bounds, degeneracy, Edge Coloring-bipartite graphs, upper bound: Vizing's theorem, Connectivity-2-connectivity and ear decomposition, Menger's minmax theorem relating connectivity and vertex disjoint paths, Planarity- Eulers formula, 5-coloring, Hamiltonian Graphs.

References

Reinhard Diestel: Graph Theory, Springer, 2010.
Douglas B. West: Introduction to Graph Theory, Prentice Hall, 2001.
A. Bondy and U. S. R. Murty: Graph Theory with Applications, Elsevier, 1976.
B. Bollabas: Modern Graph Theory, Springer, 1998.

Appendix-I

Detailed syllabus of the Elective Courses proposed for the B.Tech. Program in E&C Engineering.

EC451 DETECTION AND ESTIMATION THEORY (3-0-0) 3

Preliminaries on probability and random processes. Hypothesis testing: Neyman-Pearson theorem, likelihood ratio test and generalized likelihood ratio test, uniformly most powerful test, multiple-decision problem, detection of deterministic and random signals in Gaussian noise, detection in nonGaussian noise, sequential detection. Parameter estimation: unbiasedness, consistency, Cramer-Rao bound, sufficient statistics, Rao-Blackwell theorem, best linear unbiased estimation, maximum likelihood estimation, method of moments. Bayesian estimation: MMSE and MAP estimators, Levinson-Durbin and innovation algorithms, Wiener filter, Kalman filter. Applications in Wireless Communication, Radar Systems, Speech, Image and Video processing and any other applicantion relevant to Engineering with emphasis on E&C.

H. V. Poor, An Introduction to Signal Detection and Estimation, Springer-Verlag, 2nd edition, 1994.

H. L. Van Trees, Detection, Estimation and Modulation Theory, Parts 1 and 2, John Wiley Inter-Science, 2002.

Steven Kay, Fundamentals of Statistical Signal Processing - Estimation Theory (Vol. 1), Prentice Hall, 1993.

Steven Kay, Fundamentals of Statistical Signal Processing - Detection Theory (Vol. 2), Prentice Hall, 1998.

M. D. Srinath, P. K. Rajasekaran and R. Vishwanathan, An Introduction to Statistical Signal Processing with Applications, Prentice-Hall, 1996.

Kailath,Sayed and Hassibi, Linear Estimation, Pearson, 2000.

EC452 DYNAMICAL SYSTEMS, CHAOS AND FRACTALS (3-0-0) 3

Preliminaries on linear equations, eigen values and eigen vectors, solutions of linear ODEs. dynamics of linear and nonlinear systems, solutions, attractors, equilibrium point, limit cycles, stability. Linear systems: solutions, stability of autonomous systems, BIBO stability, relation to frequency domain analysis. Nonlinear systems: large-scale notions of stability (Lyapunov functions), linearization.

Vector fields of nonlinear systems, limit cycles, Lorenz and Rossler equation, Chua's circuit, discrete dynamical systems, logistic maps, two dimensional maps, bifurcations, flows, phase plane analysis.

Introduction to fractals, Mandlebrot and Julia sets, iterated function systems, strange attractors, fractal dimension, stable and unstable manifolds, analysis of chaotic time series, multifractals

Applications in various fields that include, Control theory, Signal processing, Digital image modeling, synthesis and compression, Chaos communication and Cryptography. Other applications in engineering, natural and social sciences, medicine, economics, ecology, bio and life sciences, and environmental sciences.

S. Stenberg, Dynamical systems, Dover 2010.

MW Hirsch, S. Smale, RL Devaney, Differential equations, dynamical systems, and an introduction to chaos, Academic Press, 2012.

Steven H. Strogatz, Nonlinear dynamics and chaos: with applications to physics, biology, chemistry, and engineering, West-view Press, 2015.

E. Ott, Chaos in dynamical systems, 2nd ed Cambridge University Press, 2002

S. Wiggins, Introduction to applied nonlinear dynamical systems and chaos, Springer-Verlag, 1990.

Denny Gulick, Encounters with chaos and fractals, 2nd ed CRC Press, 2012

J.M. Bahi, C. Guyeux, Discrete dynamical systems and chaotic machines: theory and applications, CRC Press, 2013.

M. Barnsley, Fractals everywhere, Academic Press, 1993.

EC453 STATISTICAL ANALYSIS AND APPLICATIONS (3-0-0)3

Preliminaries on matrix theory and probability distributions. Sampling theory: random samples, sampling distribution, statistical inference, estimation of mean and variances, hypothesis testing, statistical tests, goodness of fit. Data analysis: correlation and regression, simple linear regression, multiple linear regressions, logistic regression, nonlinear regression. The Multivariate Normal Distribution, Estimation of the Mean Vector and the Covariance Matrix, The Distributions and Uses of Sample Correlation Coefficients, The Generalized T2-Statistic, Classification of Observations, The Distribution of the Sample Covariance Matrix and the Sample Generalized Variance, Testing the General Linear Hypothesis: Multivariate Analysis of Variance, Testing Independence of Sets of Variates, Testing Hypotheses of Equality of Covariance Matrices and Equality of Mean Vectors and Covariance Matrices, Principal Components, Canonical Correlations and Canonical Variables, The Distributions of Characteristic Roots and Vectors, Factor Analysis, Pattern of Dependence, Graphical Models. Applications in various fields that include Signal and Image modeling and analysis, Communication systems analysis, Pattern recognition and machine learning. Other applications in engineering, natural and social sciences, medicine, bio and life sciences, economics and finance, any other areas.

Sam Kash Kachigan, Statistical Analysis: An Interdisciplinary Introduction to Univariate and Multivariate Methods, Radius Press, 1986.

RA Johnson, DW Wichern, Applied multivariate statistical analysis, 6th ed, PHI, 2012

T. W. Anderson, An Introduction To Multivariate Statistical Analysis, 3rd Edition, Wiley, 2003.

Sam Kash Kachigan, Multivariate Statistical Analysis: A Conceptual Introduction, Radius Press, 1991

Robert Nisbet, John Elder and Gary Miner, Handbook of Statistical Analysis and Data Mining Applications, Elsevier Inc 2009.

EC454 NUMERICAL ANALYSIS AND APPLICATIONS (3-0-0)3

Preliminaries on numerical analysis, solutions of equations, errors and measuring efficiency in numerical analysis, matrix analysis, linear systems of equations.

Solution of equations in one and multiple variables, direct method, iterative techniques in matrix algebra, elimination method, inverse of a matrix, ill conditioned systems, eigen values, eigen vectors, LU and QR factorization.

Solving nonlinear equations, bisection, Newton's method, Mullers method, fixed point interpolation, steepest descent.

Interpolation and curve fitting: interpolating polynomials, spline curves, interpolation on a surface, least square approximations.

Approximation of functions: Chebyshev polynomials, rational function approximation.

S Ponnusamy, H Silverman, Complex variables with applications, Birkhauser, 2006.
JH Mathews, RW Howell, Complex analysis for mathematics and engineering, Jones and Bartlett, 2001.
Edward B. Saff, Arthur David Snider, Fundamentals of Complex Analysis with Applications to Engineering, Science, and Mathematics, Pearson Education 2003
Kozo Sato, Complex Analysis for Practical Engineering, Springer, 2015.
Cohen, Harold, Complex Analysis with Applications in Science and Engineering, Springer, 2007.
JW Brown, RV Churchill, Complex variables with applications, 8th ed, McGraw Hill 2009.

EC457 FOURIER AND WAVELET SIGNAL PROCESSING (3-1-0) 4

Hilbert Spaces, Review of sequences and discrete time systems, functions, DTFT, convergence, multi rate systems, polyphase representation, stochastic processes and systems. Continuous time systems, Fourier transform, definition, existence, spectral decay, Fourier series. Sampling and Interpolation – finite dimensional vectors, sequences, functions, periodic functions, approximation and compression – polynomial and spline approximation. Localization and uncertainity.

Filter banks – Localization, two channel orthogonal filter banks, design, biorthogonal filter banks, design. Local fourier bases – N channel filter banks, exponentially modulation filter banks, cosine modulated filter banks. Wavelet bases on sequences, Tree structured filter banks, orthogonal, bi-orthogonal bases, wavelet packets, frames. Wavelet bases on functions – local fourier transforms,

Martin Vetterli Jelena Kovacevic & Vivek K. Goyal, Foundations of Signal Processing, Cambridge University Press 2015
J. Kovacevic, V. K. Goyal and Martin Vetterli, Fourier and Wavelet Signal Processing, Cambridge University Press 2013

EC458 MATHEMATICAL ALGORITHMS FOR SIGNAL PROCESSING (3-1-0) 4

Mathematical Foundations – mathematical models, random variables and random processes, markov and hidden markov models. Represensations and approximations - orthogonality, least squares, MMSE filtering, frequency domain optimal filtering, minimum norm solutions, Iterated reweighted least squares. Linear Operators – Operator norms, adjoint and transposes, geometry of linear equations, least squares and pseudo inverses, applications to linear models. Subspace methods – Eigen decomposition, KL transform and low rank approximation, Eigen filters, signal subspace techniques – MUSIC, ESPRIT. SVD – matrix structure, pseudo inverse and SVD, system identification using SVD, Total least squares, partial total least squares. Special matrices – Toeplitz matrices, optimal predictors and lattice filters, circulant matrices, properties.

Todd Moon and WC Stirling, Mathematical Methods and Algorithms for Signal Processing, Pearson Education, 2000
Steven, M. Kay, Modern spectral estimation: theory and application, Prentice Hall, 1988.

Numerical differentiation and integration, solution of ordinary differential equations: Taylor series method, Euler method, Runge-Kutta method.
Solution of partial differential equations, finite element methods, optimization.
Applications in Circuit simulators for design and analysis of circuits (including VLSI circuit simulators), Microwave techniques and antennas, Numerical Software packages,

CF Gerald, Applied numerical analysis, 7th ed Pearson 2004
RL Burden, JD Faires, Numerical analysis, 9th ed Cengage Learning 2011
LV Fausett, Applied numerical analysis using MATLAB, 2nd ed Pearson 2009
Philippe G. Ciarlet , Introduction to Numerical Linear Algebra and Optimisation, Cambridge Texts in Applied Mathematics, 1989
Gene H. Golub, Matrix computations, 3rd ed, Johns Hopkins Studies in the Mathematical Sciences, 1996.
James Demmel, Applied Numerical Linear Algebra, SIAM 1997
Biswa Nath Datta, Numerical methods for linear control systems, Design and Analysis, Elsevier 2003.

EC455 STOCHASTIC PROCESSES AND APPLICATIONS (3-0-0)3

Review of Probability theory and stochastic processes, stochastic processes and linear systems, Gaussian random process, spectral analysis of stationary processes, Power Spectral Densities, Stationarity and Ergodicity, Optimal Linear Systems, Wiener Filters, discrete and continuous time Markov chains, discrete time branching processes, birth and death processes, random walks, large deviations and Martingales, Poisson processes, renewal processes, Brownian motion, Queueing theory Diffusion processes and stochastic differential equations, the Fokker-Planck and Langevin Equations. Applications in Communication engineering and Signal processing, Wireless systems, Detection, estimation and control, Computer networks, Optical communication, Speech modeling and recognition, Modeling of neural processes, Radar and automatic control. Other applications in epidemic, competition, predation and population genetics, mathematical finance, and processes in natural and social sciences.

Richard Durrett, Essentials of Stochastic Processes (Springer Texts in Statistics) May 2001.
R G Gallager, Stochastic processes: theory for applications, 2013.
W. Paul and J. Baschnagel: Stochastic Processes – From Physics to Finance, Springer, 1999.
Frank Beichelt, L. Paul Fatti, Stochastic Processes and Their Applications, CRC Press, 2001.
Petar Todorovic, An Introduction to Stochastic Processes and Their Applications, Springer, 1992.

EC456 COMPLEX ANALYSIS WITH APPLICATIONS (3-0-0)3

Complex numbers: algebra, representation, polar forms, complex exponential, powers and roots, topological representation, Riemann sphere and stereographic representation.
Analytic functions: limits and continuity, analyticity, CR equations, harmonic functions, elementary functions: polynomials, rational functions, exponential, hyperbolic functions, complex integration: contour integrals, Cauchy's integral theorem, bounds for analytic functions, Series representation for analytic functions: Taylor series, power series, Laurent series, singularities, Residue theory: improper integrals, Conformal mapping, Entire and meromorphic functions, applications of harmonic functions, Fourier series and Laplace transform.
Applications in Circuit Simulators, Electromagnetism (time-harmonic fields), Electrostatics (solutions to Laplace's equation), and in various other fields of engineering and, natural and applied sciences.

enda item-EED-DUGC -3:

pdation of 1 course EE404 in the curriculum under Programme Specific Electives:

E404   SOFT COMPUTING AND APPLICATIONS: (3-1-0) 4

Introduction to intelligent systems and soft computing, Intelligent systems, Knowledge-based systems, Knowledge representation and processing. Soft computing, Fundamentals of fuzzy logic systems, Fuzzy Sets, operations, relations, fuzzy logic, fuzzy control, Composition and inference, Considerations of fuzzy decision-making, neural networks – Single layer, multilayer networks, Features of artificial neural networks, learning, Fundamentals of connectionist modelling, BP algorithm, Major classes of neural networks, The multilayer perceptron, Radial basis function networks, Kohonen's self-organizing network, Industrial and commercial applications of ANN such as optimal control, manufacturing, power systems, robotics, etc., neuro-fuzzy systems, Architectures of neuro-fuzzy systems, Neural network-driven fuzzy reasoning, Hybrid neuro-fuzzy systems, Construction of neuro-fuzzy systems, Evolutionary computing, Integration of genetic algorithms with neural networks, Integration of genetic algorithms with fuzzy logic, Known issues in GA and applications.

References:

1. Karray, Fakhreddine O., and Clarence W. De Silva. *Soft computing and intelligent systems design: theory, tools, and applications.* Pearson Education, 2004.
2. *J. S. R. Jang, C. T. Sun , E. Mizutani, Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, PHI, 2002.*
3. M. Negnevitsky, Artificial Intelligence, A Guide to Intelligent Systems, Pearson Publishing, 2006
4. C. T. Lin and C.S. Lee, Neural Fuzzy Systems, Prentice Hall Publishing, 1995
5. *Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 1997.*
6. *Simon Haykin, Neural Networks – A Comprehensive Foundation, Prentice Hall, 1999.*
7. *David E. Goldberg , Genetic Algorithms in Search, Optimization and Machine Learning. Pearson Education, 2003.*

If there is any comments, Please indicate it at back side of the paper

FC Members

Dr. U Vinatha		Prof. Udaykumar R.Y.	
Prof. K P Vittal		Mr. Jora M Gonda	
Mr. K Rajagopala		Dr. K.N Shubhanga	
Dr. G.S. Punekar		Please See my Comment Dr. Manjunatha Sharma	
Mr. I. R. Rao		Mr. H Girisha Navada	
Dr. D.N. Gaonkar		Dr. P Parthiban	
Dr. D Jena		Dr. A Karthikeyan	
Dr. R Kalpana		Dr. Sheron Figarado	
Dr. Krishnan CMC		Dr. Yellasiri Suresh	
Dr. H Nagendrappa		Mr. Tukaram Moger	

Dr. Vekatesa Peramal

K. Manjunatha Sharma

3 -3

3/4

The Name signature of the faculty proposing the modifications, additions be taken against the Proposal of course so that the

P-T-O

Originator can be contacted for any further changes in due course

7. Dr. Basavaraj Talawar proposed for revision of syllabus for the electives of UG courses to be approved by DUGC

    a. CO460 – High Performance Computing
    b. CO471 – Parallel Programming

CO460	High Performance Computing	(3-0-0) 3

High performance computing architectures, cluster components, monitoring tools. Fundamentals of Superscalar processors, Vector processors and General Purpose Graphical Processing Unit (GPGPU) architectures. Virtualization and architecture of virtual machines. Instruction Level Parallelism: Pipelining, Hazards, Branch prediction, Static and Dynamic Scheduling, Speculation. Multicore Memory Hierarchy: Caches, Virtual Memory, DRAM, Cache aware programming. Multiprocessors: Symmetric and Distributed architectures, Cache coherence protocols, Memory Consistency Models. Interconnection network design – Topologies, Performance, Routing, Flow control, Switch design. Benchmark suites. Recent, relevant high performance computing advances from literature.

References

Dennis Abts, John Kim, High Performance Datacenter Networks - Architectures, Algorithms, and Opportunities. Mark Hill/Margaret Martonosi (eds.). Synthesis Lectures on Computer Architecture, Morgan and Claypool, 2011. David B. Kirk, Wen-mei W. Hwu, Programming Massively Parallel Processors: A Hands-on Approach (Applications of GPU Computing Series) Elsevier-2014 David j. Kuck, "High Performance Computing", Oxford Univ Pr, 1996 Gary W. Sabot, "High Performance Computing", Addison-Wesley, 1995 John L Hennessy, David A Patterson, Computer Architecture - A quantitative approach, 5 th edition, Morgan Kaufmann.

CO471	Parallel Programming	(1-0-3) 3

Introduction to Parallel Computers, Message-Passing Computing and Programming, Shared Memory Computing and Programming.
Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Process-Processor Mapping and Mapping Techniques, Parallel Algorithm Design - Decomposition Techniques, Tasks and Interactions, Mapping Techniques for Load Balancing.
Communication Operations in Parallel Computers. Analytical Modeling of Parallel Programs - Overheads, Performance Metrics, Scalability, Asymptotic Analysis.
Dense Matrix Algorithms, Graph Algorithms, Search algorithms for discrete optimization problems, Sorting Algorithms, FFT, Image Processing algorithms. Programming Paradigms: Shared Address Space (OpenMP), Message Passing (MPI), GPGPU (CUDA), Heterogenous Parallel Computing (OpenCL and Intel MIC programming).
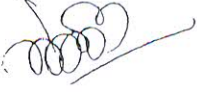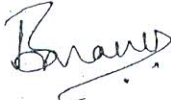
References

Maurice Herlihy, Nir Shavit, The Art of Multiprocessor Programming, MK, 2008. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Introduction to Parallel Computing, Second Edition, Addison Wesley, 2003. Barbara Chapman, Gabriele Jost, Ruud van der Pas, Using OpenMP - Portable Shared Memory Parallel Programming, The MIT Press, 2008. David B. Kirk and Wen-mei W. Hwu, Programming Massively Parallel Processors - A Hands-on Approach, MK. 2nd edition, 2014. Wen-mei W. Hwu, GPU Computing Gems - Jade and Emerald Editions, MK, 2011. Benedict R. Gaster, Lee Howes, David R. Kaeli, Perhaad Mistry, Dana Schaa, Heterogeneous Computing with OpenCL, MK. 2013. Rezaur Rahman, Intel Xeon Phi Coprocessor Architecture and Tools - The Guide for Application Developers, Apress, 2013.

9. Proposal given by Mr. K. Vinay Kumar to change the course code of elective CO423 - Machine Intelligence to CO472.

The proposal for change of course code was discussed in the meeting. It was decided to approve the same and send it to BOS for further approval.

Members Present:

1. K. Chandrasekaran

2. K. Vinay Kumar

3. Annappa

4. Alwyn R. Pais

5. B.R. Chandavarakar

6. Shashidhar G. Koolagudi

7. Jeny Rajan

8. Mohit P. Tahiliani

9. Manu Basavaraju

10. Vani M. (HOD)

Chairman
DUGC/DPGC/DAPC
Dept. of Computer Engg.
NITK - Surathkal
Srinivasnagar - 575025

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, NITK, SURATHKAL
Recommendation for the BOS meeting (19-04-16) agenda (Post Graduate Courses)
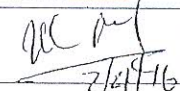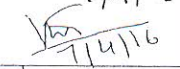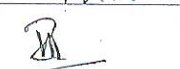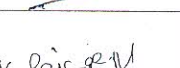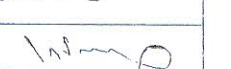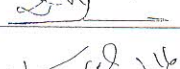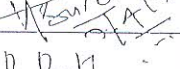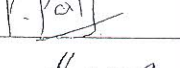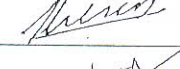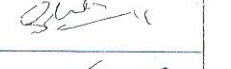
Item No. BOS30-EED-DPGC-01: Introduction of PG level elective courses into the curriculum, the details of which are given in the attachment along with the agenda

Sl. No	Tentative Course no	Proposed Title	Credits
1	PS867	Power System Simulation Laboratory	(0-0-3) 2
2	PS818	Advanced Semiconductor Devices	(3-0-0) 3
3	PS820	Analysis of Faulted Power Systems	(4-0-0)4
4	PS868	Switched Electric Network - Power Electronics Perspective	(4-0-0)4
5	PS869	Tensors	(4-0-0)4
6	PS870	Tensor Analysis of Networks	(4-0-0)4
7	PS809	DC - A.C. SYSTEM INTERACTION [CONTENT MODIFICATION]	(3-1-0) 4

Item No. BOS30-EED-DPGC-02: Correction of the typographical error for the course for which the word "System" is missing. PS859: Computational Methods for Large Power **System**

Signature of the Faculty Council, E &E

Sl. No.	Name	Signature with date	Sl. No.	Name	Signature with date
1	Uday kumar. R Y	7/4/16	12	R. Kalpana	7-[4][16
2	Vinatha. U	7/4/16	13	H - GIRLSHANAVADA	
3	KRBHNAN CMC	7/4/16	14	D. N. Gaonlco	
4	Tukaram. M.		15	Jora M. Gonla	
5	K. Rajagopala	K. Rajagopala	16	K. Manjunatha Shenoi See my Comments.	K Mashenan
6	V. Tena		17	K. N. Nikhil	
7	Y. Suresh	7/4/16	18	NAGENDRAPPA H.	
8	P. Parthiban	P. Parti	19	Shubhanga. K.N.	
9	Sheron. Figarado		20	G S Punekar	
10	B. VENKATESPRM		21	I R Rao	
11	A. KARTHIKEYAN				

Secretary DPGC

Chairman DPGC

PS867   POWER SYSTEM SIMULATION LABORATORY   (0-0-3) 2

Laboratory exercises and assignments to provide additional support to PS 859.

PROPOSED BY: Dr. TUKARAM. M.

PS818   ADVANCED SEMICONDUCTOR DEVICES   (3-0-0) 3

Power switching devices overview – Attributes of an ideal switch, application requirements, circuit symbols; Power handling capability – (SOA); Device selection strategy – On-state and switching losses – EMI due to switching - Power diodes - Types, forward and reverse characteristics, switching characteristics – rating. BJT's – Construction, static characteristics, switching characteristics; Negative temperature co-efficient and secondary breakdown; Power darlington - Thyristors – Physical and electrical principle underlying operating mode, Two transistor analogy – concept of latching; Gate and switching characteristics; converter grade and inverter grade and other types; series and parallel operation; comparison of BJT and Thyristor – steady state and dynamic models of BJT & Thyristor. Power MOSFETs and IGBTs – Principle of voltage controlled devices, construction, types, static and switching characteristics, steady state and dynamic models of MOSFET and IGBTs - Basics of GTO, MCT, FCT, RCT and IGCT. Necessity of isolation, pulse transformer, optocoupler – Gate drives circuit: SCR, MOSFET, IGBTs and base driving for power BJT. - Over voltage, over current and gate protections; Design of snubbers. Heat transfer – conduction, convection and radiation; Cooling – liquid cooling, vapour – phase cooling; Guidance for hear sink selection – Thermal resistance and impedance -Electrical analogy of thermal components, heat sink types and design – Mounting types.

References:

1. B.W Williams 'Power Electronics Circuit Devices and Applications'.
2. Rashid M.H., "Power Electronics Circuits, Devices and Applications ", Prentice Hall India, Third Edition, New Delhi, 2004.
3. MD Singh and K.B Khanchandani, "Power Electronics", Tata McGraw Hill, 2001.
4. Mohan, Undcland and Robins, "Power Electronics – Concepts, applications and Design, John Wiley and Sons, Singapore, 2000.

PROPOSED BY: Dr. Y. SURESH

PS820   ANALYSIS OF FAULTED POWER SYSTEMS   (4-0-0)4

Unsymmetrical faults on normally balanced 3-phase systems, simultaneous faults on symmetrical 3-phase systems. Ground faults and open conductors. Unsymmetrical 3-phase circuits.

References:

1. Clarke E., "Circuit Analysis of AC Power Systems", Volumes I & II, John Wiley and Sons, 1943 & 1950.
2. Anderson P.M., " Analysis of Faulted Power Systems", Wiley/IEEE Press, 1995.

PROPOSED BY: Mr. I.R. RAO.

PS868   SWITCHED ELECTRIC NETWORK - POWER ELECTRONICS PERSPECTIVE
                    (4-0-0) 4

Electric network topology, modeling, and time domain analysis of switched electric-circuits. Natural frequency and choice of state-variables. Periodically switched networks with multi-part excitations.

References:

1. *Norman Balabanian and Theodore A. Bickart – Electrical Network Theory, John Wiley and Sons, Inc. 1969*
2. *Louis Weinberg – Network Analysis and Synthesis, McGraw-Hill Book Company, Inc. 1962*
3. *Ernst A. Guillemin – Introductory Circuit Theory, John Wiley and Sons, Inc. 1953*
4. *Robert W. Erickson – Fundamentals of Power Electronics, Chapman and Hall, 1997*

PROPOSED BY. Mr. JORA M. GONDA

PS869   TENSORS: (4-0-0) 4

n-Way matrices, Generalisation postulates, Transformation Tensor, Singularity transformations, Examples of invariant transformations, Covariant and contravariant indices, geometrical interpretations, Compound tensors, Reduction formulae.

Reference:

Gabriel Kron – Tensor Analysis of Networks, John Wiley and Sons, Inc. 1939

PS870   TENSOR ANALYSIS OF NETWORKS   (4-0-0) 4

Review of Tensor Basics, Theory of groups, Reactance calculation of windings, Spinor transformations, Junction networks, Orthogonal networks, Interlinked electric and magnetic networks, the metric tensor, Compound networks, Symmetrical components, Multiple tensors, Analysis of networks.

References:

Gabriel Kron – Tensor Analysis of Networks, John Wiley and Sons, Inc. 1939

CONTENT MODIFICATION

PS809 DC-AC SYSTEM INTERACTION   (3-1-0) 4

Introduction to HVDC transmission systems, General aspects and comparison with AC transmission systems, HVDC configurations, components of HVDC transmission system, Converter and inverter circuit operation for HVDC system, Line Commutated and Capacitor commutated converters, HVDC control, Harmonic generation and their elimination, Converter faults and protections of HVDC systems, filter design, AC/DC load flow and stability analysis, Interaction between AC-DC systems, HVDC light system, Multi-terminal HVDC, Multipulse VSC/CSC based HVDC systems, New developments and recent trends in HVDC systems.

References:

1. J Arrillaga, "High Voltage Direct current Transmission", Peter Peregrinus Ltd, UK.
2. E W Kimbark, "Direct Current Transmission", Wiley-Interscience, New York.
3. K R Padiyar, "HVDC Power Transmission Systems", Willey Eastern Limited, Second edition.
4. N Singh, "Electric Power Generation, Transmission and Distribution", PHI, New Delhi 2nd edition, 2008.

National Institute of Technology Karnataka
Department of Mechanical Engineering

Proceedings of DPGC/DFC meeting held on 8/4/2016 at 4 pm in the Department of Mechanical Engineering

The meeting was conducted to discuss about the inclusion/modification of the following subjects at PG level:

No	Course code	Course Title / Agenda	Remarks
1	MF704	Manufacturing Systems Lab I	Item 1- Revised
2	MF707	Manufacturing Systems Lab II	Item 2- Revised
3	MF705	Metrology and Instrumentation	Item 3- Revised
4	DP 850	Design of Aircraft Structures	Item 4- New course
5	ME 850	MODERN CONTROL ENGINEERING	Item 5- New course
6		PG Major Project	Item 6- Request for Revision
7		Request for increase in PG students intake to 30 in all the department PG programs	
8		Uniform course code for all courses offered by different departments at PG level	Item 7- Revision

Names and Signatures of Member present:

1. Arun M
2. Ranjith M
3. S M Murigendrappa
4. Hemanthe Kumar
5. Ajay Kumar Pandey
6. Satyashama t
7. N. Gnanasekaran
8. Srikanth Bontha
9. Ramesh M.R.
10. Prasad Krishna
11. Anish-S
12. Suresh Kumar Y

13. Vijay Desai
14. Ravikiran Kadoli
15. B. M. Kulkarni

HOD

Item #1 : Proposed by Dr. Srikanth Bontha and Dr. M.R. Doddamani

MF704   Manufacturing Systems Lab I   (0-0-2) 1

CAD Modeling, Assembly, Drafting of Production Drawing, Tolerance Analysis of Machine components like screw jack, Drill Jig etc. Structural, thermal, modal, harmonic analysis using FEA.

Item #2 : Proposed by Dr. Srikanth Bontha and Dr. M.R. Doddamani

MF707   Manufacturing Systems Lab II   (0-0-3) 2

CNC programming Manual and Automated, Tool path generation and verification using CAM software. Measurement of cutting forces using Dynamometer. Additive Manufacturing – STL file generation, tool path planning, deposition of samples and testing samples for their mechanical properties. Simulation of manufacturing processes.

Item #3 : Proposed by Prof. Shrikantha S Rao

MF705 Metrology & Instrumentation   (3-0-0) 3

General Measuring System, Errors in Measurement, Calibration, Analog Measurand (Time Dependent), Circular & Cyclic Frequency, Frequency Spectrum – Complex Relations, Fourier series, Practical Harmonic Analysis and Discrete Sampled signals, Response of Measuring systems , Characteristics of 1st Order, 2nd Order Damped & Undamped systems for Mechanical and Electrical Measurement instruments, case studies on these systems, Principle of Interferometry, Working & Applications of Optical Microscope, Scanning Electron microscope, Transmission Electron microscope, Image Analysis & Interpretation.

ASTME Hand Book of Industrial Metrology, Prentice Hall, India.
Thomas G. Beckwith,Roy D Marangoni,John H Lienhard, Mechanical Measurements, Pearson Publications, 2012.
A.K.Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co.

Item #4 : Proposed by Dr. Sharanappa J

DP 850 Design of Aircraft Structures   (3-0-0) 3

Aircraft Loads, Materials used for Aircraft, Buckling and Stability of thin walled structures. Analysis of plane Truss-Method of joints-3 D Truss-Plane frames-Composite beam. Strain Energy due to axial, bending and Torsional loads – Castigliano's theorems Maxwell's Reciprocal theorem, Unit load method - application to beams, trusses, frames, rings. Columns with various end conditions, Beam column. Lug analysis, Cutout analysis. Shear and bending moment distribution for cantilever and semi-cantilever types of beams-loads on aircraft –lift distribution-V-n diagram-Gust loads. Theories of failure and Application to aircraft Structural problems.

Donaldson, B.K., "Analysis of Aircraft Structures – An Introduction", McGraw-Hill, 1993.
Bruhn.E.F."Analysis and design of flight vehicle structures" Tri set of offset company, USA,1973.
Michael Chun Yung Niu."Airframe structural Design" Technical book company, Los Angeles, USA, 1989.
Timoshenko, S., "Strength of Materials", Vol. I and II, Princeton D. Von Nostrand Co,1990.

Item #5 : Proposed by Dr. K R Guruprasad

ME850 MODERN CONTROL ENGINEERING   (3-0-0) 3

Dynamic systems and their classification; Dynamic models of lumped parameter systems; The state variable description of the dynamic models. Linearization and linear time invariant systems - relationship between state space and transfer function, system response, frequency response, stability; Feedback control of linear systems: Stability, controllability, observability, classical three term controller; Introduction to nonlinear systems and nonlinear control - stability, gain scheduling, feedback linearization, and other methods of nonlinear control.

Gene F. Franklin , J. Da Powell, Abbas Emami-Naeini, Feedback control of dynamic systems, 7th Edition, Pearson Prentice Hall, 2014.
K. Ogata, Modern Control Engineering, Prentice Hall International, NJ., 2004.
H.J. Marquez, Nonlinear Control Systems - Analysis and Design, John Wiley & Sons, Inc., 2003.

Item #6 : Proposed by Prof. P. Mohanan

Kindly include the Grade of the PG project work in calculating CGPA with reduced no. of credits to 6 as a possibility. This will enhance the quality of the project work. Also the average CGPA for the Pg course is 7.68.This CGPA also will be improved if the students are getting the fair grades.

Item #7 : Request of uniform course codes for all courses offered by different departments at PG level.

Institute proposes to have uniform course code for all subjects offered at PG level.

All PG level courses will have 6xx, 7xx, and 8xx course number with offering department code.

All PG electives will be in a single pool.

It is suggested to have number for course in such a way there is common coding system.

IF department would like to have distinct number to recognize core course for each stream like e.g., TH, MF and MC etc.

ME700 upward for Thermal engineering first year courses.

ME720 downward for Manufacturing engineering first year core courses. This scheme allows a common buffer for both TH and MF.

ME800 upward for Thermal Engineering first year core course.

ME820 downward for manufacturing engineering first year core courses.

All the electives listed together in a common pool and DPGC decided which are to be offered to each stream.

MLC/Project/seminar etc. will have the same number for all the streams.

Preamble: In the last few years, a number of new faculty members with diverse specializations have joined the E&C department. This has resulted in an increase in the number of Research students (both M.Tech (Research) and Ph.D. joining the department. The discipline of E&C Engineering has also evolved with many new developments in the state of art that also have made the transition from laboratory to practice. All of this has resulted in the need to add new courses to the Elective list. Faculty members from the E&C department have proposed the inclusion of the following courses to the Elective list of the B.Tech. in E&C Engineering and M.Tech program in Communication Engineering.

Appendix-II

Detailed syllabus of the Elective Courses proposed for the M.Tech. Program in Communication Engineering.

CE839 ADVANCED OPTICAL COMMUNICATION SYSTEMS (3-0-0) 3

Correlation properties and power density spectrum of shot noise process; Laser phase noise modeling and Lorentzian power spectrum of lasers; Coherent optical communication systems: Homodyne and heterodyne detection schemes, BER analyses - super-quantum and shot noise limits for homodyne PSK, Synchronous and asynchronous FSK, Impact of finite laser linewidth on BER, Polarization control and diversity schemes, Frequency alignment schemes; Review of optical amplifiers - Semiconductor amplifiers, Erbium-doped fibre amplifiers (EDFAs) and Raman amplifiers, Analytical modelling of gain saturation in EDFAs, Gain equalization in EDFAs, ASE noise in EDFAs, Amplifier cascades, Amplifier spacing penalty; BER analysis of lightpaths in WDM backbones in presence of ASE noise and switch crosstalks; Optical duobinary modulation: Spectral efficiency, Basic scheme, BER analysis, Impact of fibre nonlinearities; Advanced modulation schemes, Advanced detection schemes, Advanced Coding Schemes, Advanced optical networking, Optical Channel capacity and energy efficiency.

Milorad Cvijetic, Ivan Djordjevic, Advanced Optical Communication Systems and Networks, Artech House, 2013

J.E. Midwinter, Optical fibers for transmission, John Wiley, 1979.

S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.

G.P Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.

G P. Agrawal, Fiber optic Communication Systems, John Wiley and sons, 1992.

Research Papers.

CE840 ADVANCED COMMUNICATION NETWORKS (3-0-0) 3

Overview of Internet-Concepts, challenges and history. Overview of high speed networks-ATM. TCP/IP Congestion and Flow Control in Internet-Throughput analysis of TCP congestion control. TCP for high bandwidth delay networks. Fairness issues in TCP.;Real Time Communications over Internet. Adaptive applications. Latency and throughput issues. Integrated Services Model (intServ). Resource reservation in Internet. RSVP.;Characterization of Traffic by Linearly Bounded arrival Processes (LBAP). Concept of (o,, p) regulator. Leaky bucket algorithm and its properties.;Packet Scheduling Algorithms-requirements and choices. Scheduling guaranteed service connections. GPS, WFQ and Rate proportional algorithms. High speed scheduler design. Theory of Latency Rate servers and delay bounds in packet switched networks for LBAP traffic.;Active Queue Management - RED, WRED and Virtual clock. Control theoretic analysis of active queue management.;IP address lookup-challenges. Packet classification algorithms and Flow Identification- Grid of Tries, Cross producting and controlled prefix expansion algorithms.;Admission control in Internet. Concept of Effective bandwidth. Measurement based admission control. Differentiated Services in Internet (DiffServ). DiffServ architecture and framework.;IP switching and MPLS-Overview of IP over ATM and its evolution to IP switching. MPLS architecture and framework. MPLS Protocols. Traffic engineering issues in MPLS. [P control of Optical Routers. Lamda Switching, DWDM Networks.

Jean Wairand and Pravin Varaiya, High Perforamnce Communications Networks, Second Edition, 2000.

Jean Le Boudec and Patrick Thiran, Network Calculus A Theory of Deterministic Queueing Systems for the Internet, Springer Veriag. 2001.

_48 B_

Zhang Wang, Internet Qo,5, Morgan Kaufman 2001.
George Kesidis, ATM Network Performance, Kluwer Academic, 2000.
Research Papers.

CE841 INTERNET OF THINGS (3-0-0) 3

The IoT Networking Core , Technologies involved in IoT Development, Internet/Web and Networking Basics, OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Subnetting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing.

IoT Platform overview: Overview of IoT supported Hardware platforms such as : Raspberry pi, ARM

Cortex Processors, Arduino and Intel Galileo boards.

Network Fundamentals: Overview and working principle of Wired Networking equipment's, Router, Switches, Overview and working principle of Wireless Networking equipment's,Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions.

IoT Architecture:History of IoT, M2M, Machine to Machine, Web of Things, IoT protocols, Applications:Remote Monitoring & Sensing, Remote Controlling, Performance Analysis The Architecture, The Layering concepts , IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN, Security aspIoT Application Development: Application Protocols,MQTT, REST/HTTP, CoAP, MySQLects in IoT.

Back end Application Designing: Apache for handling HTTP Requests, PHP & MySQL for data processing, MongoDB Object type Database, HTML, CSS & jQuery for UI Designing , JSON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android / IOS App Development tools.

Case Study & advanced IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/Arduino).

Zach Shelby, Carsten Bormann, 6LoWPAN: The Wireless Embedded Internet, Wiley, 2009
Ovidiu Vermesan, Peter Friess, Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, River Publishers, 2013.
Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Morgan Kuffmann, 2010.
Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next Generation Pervasive Networked, Auerbach Publications, 2008.
Arshdeep Bahga, Vijay Madisetti, Internet of Things (A Hands on Approach), VPT, 2014 .
Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2013.
Asoke K Talukder and Roopa R Yavagal, "Mobile Computing," Tata McGraw Hill, 2010.
William Stallings; Data and Computer Communications, Pearson Education Pte. 6th Edition, 2014.

CE842 ALGORITHMS FOR PARAMETER AND STATE ESTIMATION   (3-0-0) 3

Maximum likelihood (ML) estimation, Maximum a posteriori (MAP) estimation, Least squares (LS) estimation, Minimum mean square error (MMSE) estimation, Linear MMSE (LMMSE) estimation. LS estimation for linear and nonlinear systems, modeling stochastic dynamic systems, the Kalman filter for discrete time linear dynamic systems with Gaussian noise. Steady state filters for noisy dynamic systems, adaptive multiple model estimation techniques. Nonlinear estimation techniques, computational aspects of discrete time estimation.

Y. Bar-Shalom, X. Rong Li and T. Kirubarajan, Estimation with Applications to Tracking and Navigation, John Wiley & Sons, 2001.

F. L. Lewis, Optimal Estimation, John Wiley & Sons, 1986.

R. G. Brown and P. Y. C. Hwang, Introduction to Random Signals and Applied Kalman Filtering, John Wiley & Sons, 1992.

http://www.ece.mcmaster.ca/~kiruba/ece771/ece771.html

CE843 MULTI TARGET TRACKING AND MULTISENSOR INFORMATION FUSION   (3-0-0) 3

Target tracking, performance evaluation techniques, data association. Tracking with multiple sensors, out-of-sequence measurement, track initialization, track management. Probabilistic Data Association Filter (PDAF), adaptive gating for PDAF. Maximum Likelihood-PDA (ML-PDA). Joint Probabilistic Data Association Filter (JPDA). Multiple Hypothesis Tracking (MHT). Performance prediction, sensor management, track-to-track fusion. Nonlinear filters.

Y. Bar-Shalom, X. Rong Li, Multi Target Multi Sensor Tracking-Principles and Techniques, YBS Publishers, 1995.

Y.Barshalom, P K Willet and X Tin, Tracking and Data Fusion: A Hand book of algorithms , Yaakov Bar-Shalom, 2011.

Y.Barshalom, Multitarget-Multisensor Tracking: Applications and Advances v.2, Yaakov Bar-Shalom, 2000.

Y.Barshalom, Multitarget-Multisensor Tracking: Applications and Advances v.3, Artech House, 2000.

S.Blackman and R.Popoli, Design and Analysis of Modern Tracking systems published by Artech house.1999

Lecture Notes, Dr. R. Tharmarasa, McMaster University, Canada.

CE844 NETWORK FLOW AND ITS OPTIMIZATION   (3-0-0) 3

Concepts and applications of Search methods, Convex sets, Linear, duality principles and Integer Programming. Static Maximum Flow, and Graph modeling of Networks. Multiple sources and sinks . The labeling method for solving maximal flow problems Lower bounds on arc flows. Flows in undirected and mixed networks. Node capacities and other extensions. Flow value function of capacities. Case studies for optical networks and wireless sensor networks.

Ford and Fulkerson, Flow in Networks, Princeton University Press, 1962.

Dantzig G. B., Linear Programming and Extensions, Princeton University Press, 1963.

N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI, 1974.

R. Diestel, Graph Theory, Springer-Verlag, 2000.

M. Pior and, D.Medhi, Routing Flow and Capacity design in Communication and Computer Networks, Morgan Kaufmann Publisher, 2004

CE845 SIGNAL PROCESSING TECHNIQUES FOR SOFTWARE RADIOS (3-0-0) 3

Sampling and Discrete Time Systems: Sampling, Aliasing, Antialiasing filter, Nyquist criteria for ISI free communication, Sampling in frequency domain.

Numerical Computation of the Fourier Transform: Derivation of DFT and properties, FFT, Improving the resolution of the spectrum via zero padding, Spectral densities, z-transforms.

Digital Filters: Filter specifications, Filter design using windowing method, Equiripple filters, Nyquist and square root Nyquist filters.

Multirate Signal Processing: M-fold decimator and L-fold expander, sample rate conversion, noble identities, polyphase representations, interpolated FIR technique, CIC filters.

An Overview of Transceiver Systems: Baseband PAM transceiver, Eye patterns in PAM systems, QAM transceiver, Eye patterns in QAM systems, the impact of frequency offset and phase offset on the baseband equivalent of passband channels.

Adaptive Systems: Wiener filter, The LMS algorithm, The standard RLS algorithm, Sampling with AGC.

Phase Locked Loop: Continuous time PLL, Discrete time PLL, Maximum likelihood phase estimation, PLL with extended lock range.

Carrier Acquisition and Tracking: Non data aided carrier recovery techniques, Coarse carrier acquisition, Fine Carrier acquisition and tracking, Costas loop, Pilot aided carrier acquisition method, Data aided carrier tracking method.

Timing Recovery: Non data aided timing recovery methods and algorithms, Data aided timing recovery techniques, Muller and Muller's method, Decision directed method.

Channel Equalization: Continuous time channel model, Discrete time channel model, Symbol spaced equalizer, Fractionally spaced equalizer, Performance study of equalizers (Wiener-Hopf Equations), Adaptation algorithms, Cyclic equalization.

Behrouz Farhag, "Signal Processing Techniques for Software Radios", Second Edition, Lulu Publications, 2010.

Michael Rice, "Digital Communications: A Discrete Time Approach", First Edition, Pearson Education, 2009.

Richard Johnson, William Sethares, and Andrew Klein, "Software Receiver Design", First Edition, Cambridge University Press, 2011.

CE847 RF TRANSCEIVER SYSTEM DESIGN FOR WIRELESS COMMUNICATION (3-0-0) 3

An overview of wireless systems: Mobile communication systems, WLANs, Bluetooth, GPS, OFDM, MIMO, and UWB. Converge of system design.

System design fundamentals: Linear systems and transformation, Non-linear system representation and analysis approaches, Noise and random processes: Noise Figure, Noise Temperature, Noise PSD, Narrowband noise representation.

Elements of Digital Baseband Systems: Sampling theorem and sampling process, Jitter effect, pulse shaping and ISI, BER, SNR, CNR, EVM, eye diagram, scatter plot.

Radio Architectures and Design Considerations: Super heterodyne architecture, Direct conversion (or Zero IF architecture), Low IF Architecture, Band-pass sampling radio architecture. Discuss merits and demerits.

Receiver system analysis and design: Sensitivity, selectivity and Noise figure of receiver, Intermodulation characteristics, Single tone desensitization, Adjacent/Alternate channel selectivity and blocking characteristics, Receiver dynamic range and AGC system, System design and performance evaluation, Examples

Transmitter system analysis and design: Transmission power and spectrum, Modulation accuracy, Adjacent and Alternate channel power, Noise emission calculation, Some important considerations in system design, Examples.

Qizheng Gu, "RF System Design of Transceivers for Wireless Communications", First Edition, Springer Publication, 2005.
Kevin McClaning, "Wireless Receiver Design for Digital Communications", Second Edition, SciTech Publications, 2012.
Cornell Drentea, "Modern Communications Receiver Design and Technology", First Edition, Artech House, 2010.
William F. Egan, "Practical RF System Design", First edition, Wiley IEEE Press, 2003.

CE847 PRINCIPLES OF COMMUNICATION SYSTEMS SIMULATION   (3-0-0) 3

The role of simulation and simulation methodology: examples of complexity, deterministic and stochastic simulation, software packages for simulation, performance estimation.

Sampling and Quantization: Reconstruction and interpolation, Sampling frequency, number of samples, Quadrature sampling, resolution.

Low pass Simulation models for Band pass Signals and systems: Complex envelope representation of band pass signals, multi carrier signals, nonlinear and time variant systems.

Filter Models and Simulation Techniques: FIR and IIR Filters, Synthesis techniques, representation, characteristics and analysis, raised cosine and square root raised cosine pulse example.

Phase Locked Loops and Differential Equation Methods: Basic PLL concepts, analog and digital models, solving differential equations using simulation, simulation of PLL characteristics (first and second order).

Generating and Processing random Signals: Stationary and ergodic processes, uniform random number generators, mapping uniform random variables to an arbitrary pdf, generating iid Guassian random numbers, generating correlated Gaussian numbers, establishing a pdf and psd, PN sequence generation and processing.

Monte Carlo Simulation of Communication Systems: Fundamental concepts, AWGN channel, Fading channel, examples, Semi analytic techniques.

Tranter, Sam Shanmugan, Rappaport and Kosbar, "Principles of Communication Systems Simulation with Wireless Applications", First edition, Prentice Hall, 2004.
Jeruchim, "Simulation of Communication Systems", Second Edition, Springer, 2011.
Won Y Yang, "MATLAB/Simulink for Digital Communication", Second Edition, YesDee Publishers, 2014.
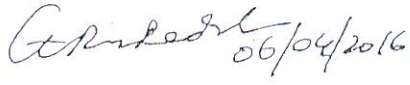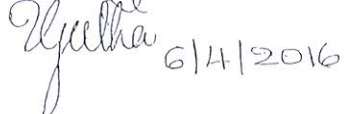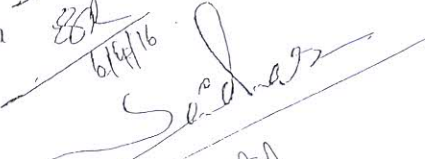
Proceedings of DPGC Meeting held on 06/04/2016 at 12.00 PM in HOD Chamber.

Members Present	Signature

1. Prof. G. Ram Mohana Reddy   *06/04/2016*

2. Prof. Ananthanarayana V. S   *6/4/16*

3. Dr. Geetha V   *Ujutha 6/4/2016*

4. Mr. Biju R Mohan

5. Mrs. Sowmya Kamath   *6/4/16*

6. Dr. Jaidhar C D

7. Dr. Nagamma Patil

Agenda Items: Inclusion of Major Project Grades for PG students for CGPA Calculation.

Business Transacted:

It is resolved to Include the Grades of Major Project (IT898: Major Project I - 6 Credits and IT899: Major Project II - 14 Credits) for CGPA Calculation of M.Tech(IT) students.

DEPARTMENT OF APPLIED MECHANICS AND HYDRAULICS
NITK - Surathkal

Ref No.: NITK / AMD / 4 3 1 201	Date: 04-04-2016

Date 6 4 201

Priority Level	Initiator's Expectations		
1. **URGENT**	1. Approval	2. Decision	**3. Action**
	4. Suggestions	5. Information	4. Information
2. NORMAL	Sought	Sought	Conveyed

From	To	Through	Copies to
Head of the Dept.	Dean (A) / Chairman, BoS		Secretary, BoS

Sub: Agenda Items for BoS-Re-orientation of courses for PG –M.Tech in Water Resources Engg., & Management from the academic year 2016-17-reg.

1. Re-orientation of postgraduate courses offered by the department of Applied Mechanics & Hydraulics from the academic year 2016-17-reg.

The re-orientation of courses between first and second semester is proposed for the following reasons:

1. At present, lab. course for MTech.(WREM) is in the first semester. However, during this semester, our labs are occupied by undergraduate lab. slots. Hence, it is proposed to shift this PG lab. to even semester.

2. The number of electives offered in the first and second semester are one and three respectively. Since, only one elective can be taken during the first semester, the students are deprived of opting for good electives being offered during this semester. During the even semester, since the number of required electives is three, students depend on outside the department electives. The present and proposed courses in each semester are presented for reference.

To resolve these issues, it is proposed to have two electives in each semester instead of one and three. This re-orientation of courses between first and second semesters of MTech(WREM) offered by the department of Applied Mechanics & Hydraulics (Annexure) is placed before the BoS for approval.

G. S. Dwarakish
Prof.G.S.Dwarakish 5 4 16
विभागाध्यक्ष/HOD
अनुप्रयुक्त यांत्रिकी विभाग/AMD
Head of the Department
राष्ट्रीय प्रौद्योगिकी संस्थान कर्नाटक, सुरत्थल
NITK, SURATHKAL
मंगलूर – ५७५ ०२५, भारत
Mangalore - 575 025, INDIA

Encl: Annexure – Present and proposed course structure; course details

Signatures of DPGC Members

K Varija

M.Tech. in Water Resources Engineering and Management (WR)

Present Plan of Study

Sl. No.	Semester			
	I	II	III	IV
1	WR701	WR706	WR891/ WR898	WR899
2	WR702	WR707	WR899	
3	WR703	WR708		
4	WR704	WR890		
5	WR705	Elective 2		
6	Elective 1	Elective 3		
7	-------	Elective 4		

Proposed Plan of Study

Sl. No.	Semester			
	I	II	III	IV
1	WR701	WR705	WR891/ WR898	WR899
2	WR702	WR706	WR899	
3	WR703	WR707		
4	WR704	WR708		
5	Elective 1	WR890		
6	Elective 2	Elective 3		
7	_____	Elective 4		

Programme Core (Pc)

WR701	Applied Hydromechanics	(3-0-0)	3
WR702	Surface Water Hydrology	(3-0-0)	3
WR703	Optimization Techniques in Water Resources Engineering	(3-1-0)	4
WR704	Ground Water Engineering	(3-0-0)	3
WR705	Hydrology & Hydraulics Lab	(0-0-3)	2
WR706	Design of Hydraulic Systems	(3-0-0)	3
WR707	Infrastructural Project Management	(3-0-0)	3
WR708	Water Resources Management	(3-0-0)	3

Elective (Ele) Courses

AM801	Finite Element Method	(3-0-0)	3
AM802	Engineering Optimisation	(3-0-0)	3
WR800	Irrigation Technology & Water Management	(3-0-0)	3
WR801	Finite Element Applications to Flow Problems	(3-0-0)	3
WR802	Computational Methods in Subsurface Flow	(3-0-0)	3
WR803	Integrated River Basin Development	(3-0-0)	3
WR804	Fluvial Hydraulics	(3-0-0)	3
WR805	Selected topics in Water Resources Engineering & Management	(3-0-0)	3
WR806	Remote Sensing & GIS Applications in Water Resources Engineering	(3-0-0)	3
WR807	Water Quality Modelling & Management	(3-0-0)	3
CV801	Environmental Impact Assessment	(3-0-0)	3
MA706	Probability & Statistical Applications	(3-0-0)	3

Mandatory Learning Courses (MLC)

WR890	Seminar	2
WR891/WR898	Practical Training/Minor Project	2

(to be completed during vacation between 2nd & 3rd sem.)

Major Project (MP)

WR899	Major Project *(3rd & 4th sem.)*	20

8. Dr. Basavaraj Talawar proposed for revision of syllabus for the electives of PG courses to be approved by DPGC

      a. CS866 – Interconnection Networks

      b. IS860 – High Performance Computing for Security

| 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. Deadlocks, livelocks, and starvation in Interconnection Networks. Deadlock and livelock detection strategies. The Turn Model for deadlock detection. Deadlock and livelock avoidance protocols. Deadlock free proofs of interconnection networks. Shared Memory networks in Chip Multiprocessors – Impact of Coherence Protocols, and Cache Hierarchy on Network Performance, Coherence Protocol Requirements for the On-Chip Network. Home Node and Memory Controller Design Issues. Miss and Transaction Status Holding Registers. Synthesized Network-on-Chips in Multiprocessor System-on-Chips. Network-on-Chips in 3D-Stacked ICs, Photonic Network-on-Chips, Wireless Network-on-Chips. Case Studies and Current NoC proposals in literature.

References

William Dally And Brian Towles, Principles And Practices Of Interconnection Networks. Morgan Kaufmann, 2004.

Jose Duato, Sudhakar Yalamanchili, Lionel Ni. Interconnection Networks - An Engineering Approach. MK, 2003.

John L. Hennessy And David A Patterson, Computer Architecture A Quantitative Approach. Appendix F. 5th Edition, Morgan Kaufmann, 2012.

Li-Shiuan Peh And Natalie Enright Erger. On Chip Networks. Synthesis Lectures On Computer Architecture. Morgan And Claypool Publishers, 2009.

Recent Publications From NoCS, ISCA, MICRO And Other Leading Conferences.

| IS860 | High Performance Computing for Security | (3-0-0)3 |

Instruction Level Parallelism: Pipelining, Hazards, Compiler techniques for ILP, Branch prediction, Static and Dynamic Scheduling, Speculation, Limits of ILP. Multicore Memory Hierarchy: Cache tradeoffs, Basic and Advanced optimizations, Virtual Memory, DRAM optimizations. Multiprocessors: Symmetric and Distributed architectures, Cache coherence protocols - Snoopy and Directory based, ISA support for Synchronization, Memory Consistency Models. Security Architecture Design Methodology, Security policy models - Multi-Level Security, Multi-Lateral Security Policies. Example Symmetric key cipher architecture – Secure Processors, Cryptographic hash functions – Hardware trust anchors for confidentiality and integrity. Public Key Cryptography Architecture – Bastion.

References

John Hennessy and David Patterson. Computer Architecture - A Quantitative Approach. 5ed Morgan Kaufmann.

Ruby B. Lee, Security Basics for Computer Architects. Mark Hill/Margaret Martonosi (eds.). Synthesis Lectures on Computer Architecture, Morgan and Claypool, 2013.

John P. Shen and Mikko H. Lipasti. Modern Processor Design - Fundamentals of Superscalar Processors. Tata McGraw Hill.

Important publications in secure processors, and high performance computing.

The proposed syllabus, reference books, etc. was discussed in the meeting. It was decided to approve the same and send it to BOS for further approval.

Department of Electronics and Communication Engineering
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

Date: 08-04-2016

A DFC meeting was held at 3.30PM on 8-04-2016 in E&C Meeting room with the aim of discussing and gathering inputs from faculty members of the department for next BoS meeting, to be held on 19-04-2016. It was jointly resolved that the following points will be forwarded to the BoS for discussion and approval.

Agenda Points:
1. Awarding credits for the short courses conducted jointly with MoU partners.
2. Comprehensive test for Research Scholars (Ph.D. students).
3. Increasing the course requirements for M.Tech(R) from existing 12 to 18.
4. Proposal for adding nine new electives to the curriculum of M.Tech in Communication Engineering.
5. Proposal to hold Curriculum conclave with the participation of NIT Tirucharapalli, NIT Warangal and NIT Calicut during June-July 2016.

1. Awarding credits to students for attending short courses conducted jointly by NITK with MoU partners:

Preamble: Short courses conducted by the Department of E&C Engg with the involvement of experts from external organisations such as industry and foreign universities have become a regular activity. One GIAN course has also been conducted in January 2016. Many of these courses have very rigorous academic content with 30+ hours of teaching and 10+ hours of Lab content. In some courses, at the end, tests will be conducted and evaluated. Many undergraduate, postgraduate and research students attend such courses.

Also, many of the students do certified on-line courses from NPTEL and verified certificate Massive Open On-line Courses (MOOC). These courses too have rigorous academic content.

The department resolved to place before the BoS to grant permission to award appropriate credits for courses conducted under the GIAN program, jointly with MoU partners and the on-line courses through NPTEL and MOOC. It is requested that DUGC/ DPGC/ DRPC may be empowered to decide on,

a. Courses to be considered for awarding the credits.
b. Number of credits for the course depending on the number of lecture hours, lab hours and evaluation.
c. The credits earned to be counted as elective courses.
d. Total cap on credits earned through such courses.

NITK regulations have provision to transfer upto 20 credits from MoU partner Institutions. The above scheme may be considered to be similar to the credits earned by attending courses in MoU partner institutions. In addition, NPTEL on-line courses and verified and certified courses from MOOC may also be considered for the credit transfer.

List of electives proposed for M.Tech in Communication Engineering:

1. CE839: Advanced Optical Communication Systems (3-0-0) 3
2. CE840: Advanced Communication Networks (3-0-0) 3
3. CE841: Internet of Things (3-0-0) 3
4. CE842: Algorithms for Parameter and State Estimation (3-0-0) 3
5. CE843: Multi Target Tracking and Multi Sensor Information Fusion (3-0-0) 3
6. CE844: Network Flow and its Optimization (3-0-0) (3 credits)
7. CE845: Signal Processing Techniques for Software Radios (3-0-0) 3
8. CE846: RF Transceiver Systems Design for Wireless Communication (3-0-0) 3
9. CE847: Principles of Communication Systems Simulation (3-0-0) 3

Detailed syllabi with details of text books and other reference material for electives proposed for B.Tech. in E&C Engineering is contained in Appendix I and syllabi the electives proposed for the M.Tech. program in Communication Engineering is contained in Appendix II.

5. **Proposal to hold Curriculum conclave (supported by TEQIP-II) with the participation of NIT Tiruchirapalli, NIT Warangal and NIT Calicut during June-July 2016.**

The last comprehensive syllabus review with participation of external academic and industry experts was held in May 2012. Since then, a number of new faculty members with new specializations have joined NITK. There has also been an increase in the number of research scholars across all departments. There is also a need to reorient our curriculum in line with the requirements of new accreditation policies. In order to develop a comprehensive and modern curriculum that will enable our students to find ready acceptance in the Indian and global job market as well as in leading Universities in the country and abroad, the department of E&C proposes to conduct a Curriculum Conclave during June-July 2016 with the participation of resource persons from NIT Tiruchirapalli, NIT Warangal, NIT Calicut and other leading academic and industry organizations with support from TEQIP-II.

The DFC resolved to request the BoS for permission to hold the Curriculum Review with support from TEQIP-II.

Signature of the members present:

3/3

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA
DEPARTMENT OF ELECTRICAL & ELECTRONICS, NITK.
Agenda items for the BoS meeting scheduled on 19-April-2016

Agenda item-EED-DRPC -1:

Introduction of a new 9 level course in the curriculum:

EE9xx   SELECTED TOPICS IN CONTROL SYSTEMS   4 Credits

Review of classical control theory, state-variable methods, optimal control, robust control, introduction to non-linear control.

References:

1. *K. Ogata, Modern Control Engineering, Prentice Hall International, NJ.2004*
2. Gopal, Madan. *Control systems: principles and design.* Tata McGraw-Hill Education, 2002.
3. Gopal, Madan. *Modern control system theory.* New Age International, 1993.
4. M. Athans and P. L. Falb, *Optimal Control: An Introduction to the Theory and Its Applications*, Dover Books on Engineering, 2006.
5. D. S. Naidu, *Optimal Control Systems*, CRC Press, 2002.
6. Gu, Da-Wei, Petko Petkov, and Mihail M. Konstantinov. *Robust control design with MATLAB.* Springer Science & Business Media, 2005.

Agenda item-EED-DRPC/DPGC -2:

Amendment in the admission policies are suggested for industry sponsored part time research Scholars both at PhD and M.Tech (Research):
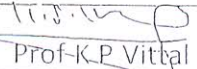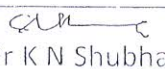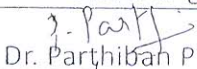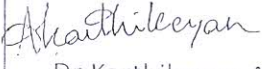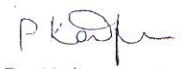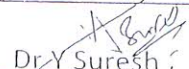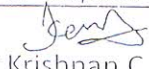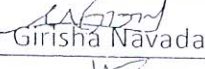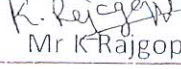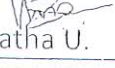
1. Residential requirements of six months is waived off for part time industry / central government research organization sponsored candidates. They will fulfil the course work requirements of 12 credits through self-study courses with no residential requirements. The self-study courses can be from 7 or 8 or 9 level courses for these candidates.
2. Applicants working in industry with minimum of 5 years working experience shall be exempted from course work, and they register as part time research scholars.
3. Applicant can have solely one guide at the institute, and it is not mandatory to have qualified guide at industry.

Note: The process of selection of candidates under this category will remain same as that of regular Phd/M.Tech(Research) applicant and they should meet the minimum requirements in the written test/interview during the process of selection.

Secretary DRPC: Chairperson DRPC/HoD-EED
Dr G S Punekar   Dr Vinatha U

FC Members:

Prof Udaykumar R Y	Prof K P Vittal	Dr K N Shubhanga	Dr K M Sharma
Dr Nagendrappa H	Dr. D N Goankar	Dr. Parthiban P	Dr. Jena D
Dr Karthikeyan A	Dr Kalpana R	Dr Venkatesh Perumal	Dr Sheron Fegirado
Dr Y Suresh	Dr Krishnan C M C	Mr I R Rao	Mr Jora M Gonda
Mr Girisha Navada	Mr. Tukaram M	Mr K Rajgopala	Dr G S Punekar
Dr Vinatha U.			

Note: Please write your comments, if any, at the back of this sheet.