POST GRADUATE PROGRAMS
CURRICULA AND SYLLABI

(Including Policies and Procedures)

M TECH AND M C A

AMRITA VISHWA Vidyapeetham
UNIVERSITY

Established under Section 3 of the UGC Act 1956
Amritanagar, Coimbatore - 641 112.

AMRITAPURI, BANGALORE, COIMBATORE,
Kochi, Mysore

2012 and 2013 Admissions
I. POLICIES AND PROCEDURES

With the aim of developing a strong postgraduate and research culture, Amrita Vishwa Vidyapeetham offers postgraduate programs in Engineering, Medicine, Sciences, Business Management etc. This booklet contains the curricula and syllabi for all the Post Graduate Programs in Engineering together with the relevant Policies and Procedures

1. Policies

M. Tech
1. The duration of the M.Tech. Program shall normally be four semesters (2 years).
2. The M.Tech. Program will be known as: M.Tech. in <Name of specialization>. For example, if the M.Tech is offered with specialization in Embedded Systems, it will be called M.Tech in Embedded Systems. There will be no mention of the name of the Department(s) offering the programme. The University encourages inter-departmental PG Programmes.
3. The requirement shall be 50 to 52 credits of prescribed course work and 14 credits of project work totaling 64 to 66 credits for the award of the M.Tech. Degree of the University.
4. The medium of instruction shall be English.

M.C.A
1. The duration of the MCA program shall normally be six semesters (3 years).
2. The requirement shall be 116 credits of prescribed course work including 17 credits of project work.
3. The medium of instruction shall be English.

2. Structure of M.Tech/ MCA Programs

2.1 General Structure
M.Tech./ MCA programs are structured under credit based continuous assessment following semester pattern. Each program will have curricula and syllabi which will be updated necessarily once in two years based on the recommendations of the Board of Studies for the programs concerned. The Board of Studies will consist of experts from other leading academic institutions and R & D establishments in addition to the senior faculty from the University.

However the faculty can offer electives of current interest, in between also, with the approval of CPGP.

2.2 Credit Requirements
The credits are generally assigned to the courses based on the pattern given under:
- One credit for each lecture period per week
- One credit for each tutorial period per week
- One credit for each laboratory/practical course of three periods per week.

M.Tech:
This is generally a course work intensive program comprising of three semesters of course work ending with a dissertation in the fourth semester. The requirement shall be 50 to 52 credits of course work, and 14 credits of project / dissertation work totaling to 64 to 66 credits for the award of the M.Tech. Degree of the University. All the courses shall be University approved post-graduate courses, and the credits shall be earned as per the following category guidelines (specialization-wise details are given in the PG Programs - Curricula and Syllabi book)
- Core Courses: 35 to 40 credits
- Project / Dissertation Work: 14 credits (Minor Project – 4 credits + Dissertation – 10 credits)
- Remaining credits from Electives

MCA:
For MCA, the requirement is 116 credits including two credits of Minor Project and fifteen credits of Major Project Work.

2.3 Faculty Advisor
Upon admission, every M.Tech./ MCA student will be assigned a faculty advisor by the Chairman of the Department concerned. The faculty advisors will advise the students in all academic activities including registration, selection of electives, choosing projects etc. They will also counsel them wherever/ whenever required and advise them in non-academic matters also when needed.

2.4 Course Committee
For a given course, all the campuses will be governed by the same curricula and syllabi. When the same courses are offered in more than one campus, there will be a course committee for each
course offered. The committee will consist of mentors, one from each campus nominated by the Chairman of the Department in that Campus and a convener will be chosen from among them. In addition, there will be two student representatives in this Committee, who will be invited for all meetings except those dealing with question papers and other confidential matters. The course committee shall meet in the beginning of the semester to finalise the teaching program as well as evaluation pattern and, at the mid of the semester to finalise the question papers and the keys for the end semester examination of the particular course. The question for the end semester examination will be common for all the campuses. The mentor in each campus will coordinate all the aspects pertaining to the course in that campus.

2.5 Registration
It is necessary that every student registers for each and every course (including project / dissertation work) within the stipulated time by filling up the required form and getting it approved by the faculty concerned. Any violation may lead to non-acceptance of the course registration.

A student is permitted to register/ enroll for courses if and only if he/she has:
- Paid all fees and has no dues to the University
- Has maintained the progress as required by the University
- Has completed pre-requisite courses, if prescribed
- Has no disciplinary action pending against him/her

Every student will be given a copy of the booklet listing all the M.Tech and MCA courses (containing the relevant Policies, Procedures, syllabus, credits etc) offered. The students doing their Master's programme in one specialization can take courses offered in another specialization / Department, with prior approval of the mentor and Chairman concerned.

Except for the first semester, registration for a given semester shall be done during a week specified before the end semester examination of the previous semester. The consent of the faculty advisor and the course instructor are necessary for registration.

2.6 Evaluation
In theory courses (taught primarily in the lecture mode), the continuous assessment (sessionals) will be for 50% and end semester (final) examination for 50%, making it to 100%. For the continuous assessment, there will be two tests (dates will be given by the Controller of Examination) and a minimum of two assignments. The faculty can give more assignments, seminars, tutorials etc. In the case of laboratory courses and practicals, the weights for continuous assessment and end semester examination shall be 70:30. The weights for the components of continuous assessment will be decided by the course committee in the beginning of the course itself. It is mandatory that the students appear for the end semester examination for the completion of the course. The pass minimum shall be 40% marks in all the subjects. In addition, the students should get a separate minimum of 30% marks each in the end semester examination as well as from the sessionals. It is necessary the students are informed of these in the beginning itself.

2.7 Failures
The failed students can appear for the supplementary examination(s). In addition, those students who could not appear for the end semester examination due to illness, or reasons beyond their control will be also permitted to appear for the supplementary examination(s). The students who have passed the examination are not permitted to appear for the supplementary examination for improving their grades. The grade FA once awarded stays in record and it is not deleted even after he/she completes the course successfully later. If the student fails in the supplementary examination also, he/she has to re-register for the course and satisfy all the requirements expected of fresh registrants. Such of those who fail due to lack of attendance (FA grade) will not be allowed to appear for the supplementary examination and they have to re-register for the course. In the case of core courses, it is mandatory to successfully complete the same core course. However, in the case of electives, if the student fails in the supplementary examination and the particular course is not offered during the program period (of two years), the CPGP may approve an equivalent course, on the recommendation of the advisor and the Dept Chairman.
In the exceptional case of the students not in a position to complete the requirements within two years, they have to extend their stay by one or two semesters as the case may be, pay the fees like any other student, once again register for the course(s) and successfully complete as per the normal requirements.

2.8 Dissertation/ Project Work
For MTech: Minor Project/ Dissertation
Every M.Tech. student is required to register for 4 credits of Minor Project along with other courses during the third semester and, 10 credits of Dissertation during the fourth semester after completing all the course requirements, under a faculty member, within or outside the Department, and that particular faculty member will be referred to as the student’s M.Tech. Advisor. The Dissertation can be a logical continuation of the Minor Project.

In order to earn the credits for the Dissertation, the students are strongly encouraged to work full-time as an intern in a project hosted at outside industry or Institution of calibre, in which case, the student is required to have an external M.Tech. Co-Advisor. It is necessary that a small write up about the dissertation and a statement that it is of M.Tech. level dissertation at the University is submitted by the M.Tech. Advisor to the CPGP through the Chairman for approval. The other administrative requirements are also to be satisfied to get the approval of the Dean/ Principal for carrying out the dissertation outside the University.

Towards the end of completing the dissertation work, the M. Tech. student is required to submit a Dissertation Report, documenting all the results, including system design, implementation, theory, experiments, and performance evaluation, as applicable. The dissertation report is submitted to the M.Tech. Advisor. Wherever applicable, an evaluation (qualitative or quantitative) by the M.Tech. Co-Advisor will be also taken into account by the M.Tech. Advisor.

The CPGP, may invite external experts to help the final evaluation of the students’ dissertations. The CPGP will assign each M.Tech. Student's report to a Committee (which is usually headed by the Chairman of that Department and consists of the M.Tech. Advisor(s) and senior faculty of the Department). In case the M.Tech. Advisor and the Chairman are same, the Vice Chairman of the Department will head the Committee. There are two parts to the evaluation. In the first part, which is open to public, all M.Tech. students are required to briefly present their work. In the second part, which is closed-door (with just the Committee members in attendance), a thorough discussion about the dissertation may be carried out, at the conclusion of which, for each Student, the Committee will assign a numerical score out of a maximum of hundred. After completing the evaluation of all the M.Tech. students in that specialization, all the M.Tech. Advisors in that specialization and the Chairman meet and assign every student a letter grade. If the dissertation is not satisfactory, the student will be asked to continue the dissertation and appear for the assessment later and an “I” grade will be given.

For MCA: Minor Project/ Major Project
Every MCA student is required to register for 2 credits of Minor Project along with other courses during the fifth semester and, after completing all the course requirements, 15 credits of Major Project during the sixth semester, under a faculty member, within or outside the Department, and that particular faculty member will be referred to as the student’s MCA Advisor.

In order to earn the credits for the Major Project, the students are strongly encouraged to work full-time as an intern in a project hosted at outside industry or Institution of calibre, in which case, the student is required to have an external MCA Co-Advisor. It is necessary that a small write up about the Major Project and a statement that it is of MCA level Project at the University is submitted by the MCA Advisor to the CPGP through the Chairman for approval. The other administrative requirements are also to be satisfied to get the approval of the Dean/ Principal for carrying out the dissertation outside Amrita.
Towards the end of completing the Major Project, the MCA student is required to submit a Project Report, documenting all the results, including system design, implementation, theory, experiments, and performance evaluation, as applicable. The Project Report is submitted to the MCA Advisor. Wherever applicable, an evaluation (qualitative or quantitative) by the MCA Co-Advisor will be also taken into account by the MCA Advisor.

The CPGP, may invite external experts to help the final evaluation of the students’ Project Works. The CPGP will assign each MCA Student’s report to a Committee (which is usually headed by the Chairman of that Department and consists of the MCA Advisor(s) and senior faculty of the Department). In case the MCA Advisor and the Chairman are same, the Vice Chairman of the Department will head the Committee. There are two parts to the evaluation. In the first part, which is open to public, all MCA students are required to briefly present their work. In the second part, which is closed-door (with just the Committee members in attendance), a thorough discussion about the Project Work may be carried out, at the conclusion of which, for each Student, the Committee will assign a numerical score out of a maximum of hundred. After completing the evaluation of all the MCA students in that specialization, all the MCA Advisors in that specialization and the Chairman meet and assign every student a letter grade. If the Project Work is not satisfactory, the student will be asked to continue the dissertation and appear for the assessment later and an “I” grade will be given.

3. Grading
3.1 Award of Grades
Based on the performance in each course, a student is awarded at the end of the semester a letter grade in each of the courses registered, in a ten point scale. The letter grades, the corresponding grade points and the ratings are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Points</th>
<th>Ratings</th>
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</thead>
<tbody>
<tr>
<td>A+</td>
<td>10</td>
<td>Outstanding</td>
</tr>
<tr>
<td>A</td>
<td>10</td>
<td>Excellent</td>
</tr>
<tr>
<td>B+</td>
<td>9</td>
<td>Very Good</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>Good</td>
</tr>
<tr>
<td>C+</td>
<td>7</td>
<td>Above Average</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>Average</td>
</tr>
<tr>
<td>D</td>
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<td>Pass</td>
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<tr>
<td>F</td>
<td>0</td>
<td>Failure</td>
</tr>
<tr>
<td>FA</td>
<td>0</td>
<td>Failed due to lack of attendance</td>
</tr>
<tr>
<td>I</td>
<td>0</td>
<td>Incomplete</td>
</tr>
<tr>
<td>W</td>
<td>-</td>
<td>Withheld</td>
</tr>
</tbody>
</table>

Note:
1. “FA” grade once awarded stays in the record of the student and is not deleted even after he/she completes the course successfully later.
2. The “I” grade will be subsequently changed into an appropriate grade when the student passes the supplementary examination.
3. A+ shall be given only for exceptionally good performance
4. The student has to successfully complete all the course requirements before carrying out the Dissertation/Major Project. In case of failures, they shall credit the courses as and when offered.
5. In case of students obtaining F grade, they will be allowed to appear for the supplementary examination for those subjects.
6. If necessary, the student will be allowed to continue beyond four / six semesters, as per the University norms, to successfully complete the courses.

3.2 Semester Grade Point Average (SGPA)
On completion of a semester, each student is assigned Semester Grade Point Average (SGPA) which is computed as below for all courses registered by the student during that semester.

Semester Grade Point Average = \( \frac{\sum (C_i \times Gp_i)}{\sum C_i} \)

where \( C_i \) is the number of credits for \( i^{th} \) course in that semester and \( Gp_i \) is the grade points earned by the student for that course.
3.3 Cumulative Grade Point Average (CGPA)
The overall performance of a student at any stage of the program is evaluated by the Cumulative Grade Point Average (CGPA) up to that point of time.

\[ \text{CGPA} = \frac{\sum (C_i \times Gp_i)}{\sum C_i} \]

where \( C_i \) is the number of credits for the \( i^{th} \) course and \( Gp_i \) is the grade points earned by the student for that course.

The summation is over all the courses registered by the student and evaluated during all the semesters up to that point of time including the failed courses.

The CGPA is rounded off to two decimals. The ranking of the students in a batch at any intermediate or final stage is based on CGPA.

4. Revaluation of Answer Papers
When the semester results are published, in case any student feels aggrieved, he/she can request for revaluation of answer scripts of the end semester examination. For this purpose, the student has to submit a request in the prescribed form to the Controller of Examination within three working days from the publication of results through the Chairman of the Department. The answer paper will be shown to the candidate in the presence of the faculty who valued the answer script and the Chairman concerned. After going through the answer book and the marks awarded, if the candidate desires revaluation, it will be done by the Chairman concerned along with the faculty who valued the answer script. When the revaluation is completed, the results will be published and the revised grade will be awarded to the student. Revaluation will be allowed only for theory-based courses.

5. Award of Degree
5.1 Distinction
In order to get the M.Tech. / MCA Degree with Distinction, the candidate has:

- To pass all the subjects in the first attempt within the specified period of two/three years obtaining a CGPA of 8.5 and above.

OR

- To pass all the subjects in the first attempt obtaining a CGPA of 8.5 and above completing the program within three/four years (up to one year more) provided officially permitted to break the course.

OR

To pass all the subjects in the first attempt obtaining a CGPA of 8.5 and above and complete the project work before the end of the fifth/seventh semester (up to one semester extension) provided the extension is officially permitted by the CGP due to administrative reasons.

5.2 First Class
To pass all the subjects in the first attempt within the specified period of two/three years obtaining a CGPA between 7.00 and 8.49

OR

To pass all the subjects obtaining a CGPA of 8.5 and above taking one semester extra (due to failures etc.)

OR

As told to redo the project work within one semester extra and obtains a CGPA of 8.5 and above.

5.3 Pass Class
Such of those students who are not covered under 5.1/5.2 will be awarded the degree without any class or distinction.

6. Duration, Appeals and Amendments
6.1 Duration
The normal period of completion of the M.Tech. program is 2 years, at most an extension of up to one more year may be permitted. In the case of MCA, the normal period of completion is three years; at most an extension of up to one more year may be permitted.

6.2 Appeals and Amendments
An M.Tech. / MCA student may petition to the CGP, for a waiver/substitution of any of the M.Tech. Degree requirements. Escalation steps for such petitions consist of forwarding to the Vice Chancellor, whose decision will be final and binding.

7. Attendance
1. Leave shall be availed by students only under unavoidable circumstances. It is mandatory that
students apply in the prescribed form before proceeding on leave. Leave letter recommended by the class advisor shall be submitted to the Chairman of the Department who will normally grant the leave. Unauthorized absence will be treated as breach of discipline. Request for leave for more than three consecutive days on medical ground must be supported by a proper medical certificate. In non-medical cases, requests for leave for more than three consecutive days must be countersigned by the parent/guardian. Leave granted will not be counted as attendance.

2. Students going on official duties such as representing the School for sports and cultural activities, or presenting papers in seminars will be eligible for “duty leave” on the recommendation by faculty advisor and Chairman of the Department. Duty leave will be counted as equivalent to attendance for administrative purposes limited to five working days per semester, provided the information is sent to all the faculty concerned at least one week in advance.

3. Attendance of the students will be marked by the teacher during every period of a course.

4. Finalization of attendance for every course shall be done three working days before the last instruction day of the semester. Any student failing to secure a minimum of 90% attendance in a course will not be eligible to appear for the end semester examination in that course. The names of students not eligible to appear for the examination will be published.

5. If the attendance of a student falls short of 90% in any course due to continuous absence caused by accident, prolonged illness, or unforeseen circumstances, such case may be considered by the Dean concerned for condonation of absence based on the request of the student supported by required documents and recommendation of the class advisor and Chairman of the Department concerned. However, in such cases, the student must have duly applied for leave in time. The overall attendance of a student in such a case shall not fall below 75%. Condonation will be considered only in the case of those students who have proved themselves to be otherwise regular by attending at least 90% of the class during the semester excluding the period of long leave. Any student who has missed classes for genuine reasons (including on duty leave) will have to submit extra assignments etc (on holidays, late evenings etc) as prescribed by the faculty, to make up for the missed classes. The students will be eligible for the waiver on duty leave if and only if they complete the extra work load to the satisfaction of the faculty concerned and, the faculty concerned certifies accordingly in the students final leave application.

8. Abbreviations used in this Booklet

Course Classification

FC - Foundation Core
SC - Subject Core
E - Electives
P/F - Pass/Fail

Course Codes

CN - Computational Engineering & Networking
RW - Remote Sensing and Wireless Sensor Networks
CV - Computer Vision and Image Processing
VL - VLSI Design
BM - Biomedical Engineering
PE - Power Electronics
ES - Embedded Systems
CY - Cyber Security
ED - Engineering Design
ME - Manufacturing Engineering
WN - Wireless Networks and Applications
CS - Computer Science and Engineering
CL - Chemical Engineering
TF - Thermal and Fluids Engineering
AT - Automotive Engineering
PR - Power and Energy
NT - Nano Technology
MM - Molecular Medicine
NS - Nanoscience and Technology
CA - Computer Applications
WP - PG Diploma in Wind Power Development
WR - PG Diploma in Wind Resource Assessment
HU - Humanities
MA - Mathematics
SS - Sciences
M.TECH - ENGINEERING DESIGN

Department of Mechanical Engineering

This program is designed to enable an engineering graduate to develop specific capabilities in design, synthesis and analysis of a wide variety of mechanical engineering systems. The program focuses on developing design methodologies which involve high degree of research orientation supplemented with practical insights. Besides core courses (which are mandatory), a variety of electives are also offered to suit the taste of each individual student so that he/she can specialize in a particular area of Engineering Design. The students are periodically assessed by the teachers who are experts in chosen area of Engineering Design, to ensure quality of education. On the whole, the Masters Program is committed to produce design engineers with excellent creative capabilities and calibre to solve real life problems curtailing to industry requirements, in tune with the objectives envisioned by the University.

CURRICULUM

First Semester

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<th>Type</th>
<th>Course</th>
<th>LTP</th>
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<td>FC</td>
<td>Applied Engineering Mathematics</td>
<td>400</td>
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<td>ED600</td>
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*Non Credit Course

Second Semester

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<td>Finite Element Methods</td>
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<tr>
<td>E</td>
<td></td>
<td>Elective I</td>
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Credits 21

Third Semester

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<td>ED798</td>
<td>P</td>
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Credits 14

Fourth Semester

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Total Credits 65

List of Courses

Foundation Core

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Subject Core

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<td>Finite Element Methods</td>
<td>300</td>
<td>3</td>
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<td>ED654</td>
<td>Mechanical Behavior of Engineering Materials</td>
<td>301</td>
<td>4</td>
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<td>ED655</td>
<td>Seminar</td>
<td>001</td>
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<td>ED661</td>
<td>Engineering Design Lab I</td>
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<td>ED662</td>
<td>Engineering Design Lab II</td>
<td>002</td>
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<td>ED663</td>
<td>Engineering Design Lab III</td>
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<td>2</td>
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</tbody>
</table>

Credits 21

Dr. K. Sankaran
Registrar
Amrita Visha Vidyapeetham
Amrita Nagar, COIMBATORE - 641 112

**TEXT BOOKS/REFERENCES:**

**ED600 THEORY OF ELASTICITY 4-0-0-4**


**TEXT BOOKS/REFERENCES:**

Lab Practice: Use of programming languages and Matlab to solve optimization problems.

TEXT BOOKS/REFERENCES:

Lab: Solving Vibration Problems using MATLAB.

TEXT BOOKS/REFERENCES:

ED652 SELECTION OF MATERIALS AND PROCESSES


TEXT BOOKS/REFERENCES:

ED653 FINITE ELEMENT METHODS


TEXT BOOKS/REFERENCES:

ED654 MECHANICAL BEHAVIOR OF ENGINEERING MATERIALS


TEXT BOOKS/REFERENCES:
ED662  ENGINEERING DESIGN LAB-II  0-0-2-2

Computer Aided Engineering Lab
Finite Element Analysis :
Exercises covering structural analysis, dynamic analysis using and
thermomechanical coupled analysis FEA packages- Finite element
modelling of metal forming and metal cutting operation.
Computational Fluid Dynamics:
Computational Fluid Dynamic analysis of steady, unsteady and
turbulent flows
Mechanism Modelling and Analysis:
Design synthesis of simple mechanisms like sewing machine, grass
cutter etc. using synthesis tools. Force analysis of simple mechanisms.

ED663  ENGINEERING DESIGN LAB-III  0-0-2-2

Experimental Engineering Lab.
Design of Experiments:
Introduction to Design of Experiments, Factorial Design .Response
surface methods.
Practical Stress Analysis:
Verification of stresses under mechanical loading using strain gauges,
Calibration of torsional load cell, Modal testing and extraction of modal
parameters.
Machine Condition Monitoring:
Machine condition monitoring studies using FFT analyzer and virtual
instrumentation tools.

ED655  SEMINAR  0-0-1-1

The student in consultation with the faculty advisor has to select a
topic related to Engineering Design, write a paper and present it.

ED700  CONTINUUM MECHANICS  3-0-0-3

Introduction to continuum mechanics: Vectors and tensors, Stress
Principles, Kinematics of Deformation and Motion, Fundamental Laws
and Equations: Continuum models in solid Mechanics: Linear
Elasticity: Elasto-Statistics and Elasto-Dynamics Nonlinear elasticity:
Elasto-Plasticity, Visco-elasticity, Hypo- and Hyper -elasticity
Continuum models in heat Transfer: Conduction and Radiation,
Nonlinear models, Transport phenomena problems: Momentum,
Energy, and Mass transport.

TEXT BOOKS/ REFERENCES:
3. Martin H Saed, "Elasticity: Theory, Application and Numeric's",
4. Michael Lai W, David Rubin and Erhard Kremp, "Introduction to
Tensar Calculus and Continuum Mechanics", Fourth Edition,
5. Roger Temam and Allan Miranville, "Mathematical Modeling in

ED701  RELIABILITY ENGINEERING  3-0-0-3

Concept and definition of reliability-reliability mathematics-failure
distributions, hazard rate function; bathtub curve, hazard models-
exponential, Rayleigh, Weibull, Normal, Lognormal distributions-MTTF,
MTBF, median time to failures-failure models-Reliability of systems-
serial and parallel configurations-mixed configuration-K-out-of-n-
systems-redundancy-types-stand by systems-Reliability of complex
configurations-event-space method-path tracing and decomposition
methods-use of tie sets and cut sets-three-state devices-Markov
analysis-physical reliability models-random stress and random
strength-static models-dynamic models-periodic loads-random loads-
Design for reliability-Reliability allocation-derating-maintainability-
Design for maintainability-Availability, maintenance and spare
provision-failure data analysis-reliability testing-types-test time
calculations-bum-in, acceptance testing for reliability-identifying failure
distribution-parameter estimation.

TEXT BOOKS/ REFERENCES:
1. Charles Ebeling, "An Introduction to Reliability and Maintainability
2. Richard E. Barlow, Frank Proschan, "Mathematical Theory of
Reliability", SIAM, 1996.
3. Massimo Lazzaroni, "Reliability Engineering: Basic Concepts and
4. Alessandro Birohini, "Reliability Engineering: Theory and

ED702  MODELLING, SIMULATION AND
ANALYSIS OF ENGINEERING SYSTEMS

Introduction to linear systems, principle of super position-Modelling
of engineering systems-mechanical, electrical, fluid, thermal and mixed
discipline systems-Free, forced and transient response of first and
second order systems-Solution of differential equation using Laplace
Transforms-Time domain and Frequency domain analysis-State space
representation-System characteristics from state space
representation-Solving the state equations-Stability criterion through
the state transition matrix-Control system design in state space-Linear
optimal control.

TEXT BOOKS/ REFERENCES:
1. Philip D. Cha, James J. Rosenberg and Clive L. Dym,
"Fundamentals of Modelling and Analysis of Engineering
2. Woods Robert L. and Lawrence Kent L., "Modelling and
3. Ashish Thwari, "Modern Control Design with MATLAB

ED703  ADVANCED MECHANISM ANALYSIS  3-0-0-3
AND DESIGN

Review of fundamentals of kinematics - Mobility Analysis - Formation
of one D.O.F. multiloop kinematic chains, Network formula - Gross
motion concepts. Computer aided kinematic analysis - Euler
parameters - Co-ordinates of a body, Identities with Euler parameters.
Spatial Kinematics - Relative constraints between two vectors -
Relative constraints between two bodies - Concept of equivalent
mechanisms. Synthesis of mechanisms - Three position and four
position synthesis - Chebyshev spacing of precision points - Computer
aided synthesis. Curve theory - Velocities and accelerations -

TEXT BOOKS/REFERENCES:

ED704  THEORY OF PLASTICITY  3-0-0-3


TEXT BOOKS/REFERENCES:

ED705  TRIBOLOGY  3-0-0-3


TEXT BOOKS/REFERENCES:

ED706  PRODUCT LIFECYCLE MANAGEMENT  3-0-0-3


TEXT BOOKS/ REFERENCES:

ED707  FRACTURE MECHANICS  3-0-0-3

TEXT BOOKS/REFERENCES:

ED706 THEORY OF PLATES AND SHELLS 3-0-0-3

Introduction - Formulation of governing equations and associated boundary conditions by equilibrium and energy methods, Rectangular plates - Solution of equation by double and single series, Circular plates - Symmetric and asymmetric loading cases, Continuous Plates, Plates with various plan forms, Plates with variable flexural rigidity, Plates on elastic foundation. Numerical and Approximate Methods - finite difference method - finite element method, energy methods and other variational methods. Introduction, Theory of Surfaces - first and second fundamental forms - principal curvatures, Formulation of governing equations in general orthogonal curvilinear coordinates based on classical assumptions - various shell theories, Membrane theory - governing equations - shells of revolution - application to specific geometric shapes - ax symmetric and non-ax symmetric loading cases. General theory of shells - governing equations and associated boundary conditions for specific geometry of shells (cylindrical, conical and spherical shells) - classical solutions - finite difference and finite element methods applied to shell problems.

TEXT BOOKS/REFERENCES:

ED709 COMPUTATIONAL FLUID DYNAMICS 3-0-0-3


TEXT BOOKS/REFERENCES:

ED710 DESIGN FOR MANUFACTURE AND ASSEMBLY 3-0-0-3


TEXT BOOKS/REFERENCES:

ED711 MECHANICS OF COMPOSITE MATERIALS 3-0-0-3

Composite materials and its characteristics-Analysis of an orthotropic lamina-Analysis of laminated composites-Fracture mechanics Determination of strain energy release rate-Manufacturing Process Testing of Composites-Stress analysis - interlaminar stresses at free edge effects-Failure Criteria-Whitworth nulmayer failure criteria Vibration and stability analysis - Introduction to Design of Composite Structures - Introduction to Structural -Design and Analysis

TEXT BOOKS/REFERENCES:

ED712 RANDOM Vibrations 3-0-0-3

Concept of probability - Theory of random variables - Probability structure of random variable - Stationary and non-stationary random process - Calculus of random processes - Spectral decomposition of random process - Gaussian, Poisson and Markov process - Response of single degree of freedom, multi degree of freedom and continuous systems to random excitation - Failure modes in random vibration level crossing statistics- First excursion failure-Rice formula - Fatigue failure - Palmgren - Miner cumulative damage law - Application to civil, mechanical and ocean structures - Introduction to non linear random vibration.

TEXT BOOKS/REFERENCES:

ED713 COMPUTER AIDED PRODUCT DEVELOPMENT 3-0-0-3

Introduction to New Product design - Creativity and Innovation - concept design - parametric sketching - constraints- Feature based modelling - synchronous technology - contemporary software - Kernel and graphics engine - Hardware requirements - data exchange formats. Computers in Design - Assembly modelling - creation of BOM-issues in large assemblies - associative features - Sheet metal components, nesting and development - plastic parts with draft and shrinkage allowance - Reverse engineering of components - tolerance analysis - check for interferences and mass property calculations. Computers applications in tool design - mould design - jigs and fixtures design - mechanism design and analysis - Rapid tooling - Computer aided inspection. Computers in Design Productivity - customisation using various software like visual basic, pro/program, script, LISP etc. to write applications like design of shafts, gears etc. Managing product design data - version control - library creation - catalogue making - standardization for design - collaborative design among peer groups - design optimization for geometry - Design check, approval and validation. - introduction to design patenting rules.

TEXT BOOKS/REFERENCES:

ED714 MICRO-ELECTRO-MECHANICAL SYSTEMS 3-0-0-3


TEXT BOOKS/REFERENCES:

ED715 MACHINE CONDITION MONITORING 3-0-0-3

TEXT BOOKS/REFERENCES:

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