COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In
Electronics & Telecommunication

Course Structure
Fourth Year

VIII Semester

Paper Code	Name of the Subject
BEET6	VLSI Technology & Process Modeling
BEET7	Satellite Communication System
BEET8	Semico nductor device and modeling
BEET9	Project
BEET6P	VLSI Technology & Process Modeling Practical

Syllabus

BEET 6 VLSI TECHNOLOGY & PROCESS MODELING

1. A REVIEW OF MICROELECTRONICS AND AN INTRODUCTION TO MOS TECHNOLOGY

Introduction to integrated circuit technology, The integrated circuit (IC) era, Metal-oxide-semico nductor (MOS) and related VLSI technology, Basic MOS transistors, Enhancement mode transistor actio n, Depletion mode transistor action, Depletion mode transistor action, nMOS fabrication, CMOS fabrication, Thermal asp ects of processing, BiCMOS technology, Production of E-beam masks.

2. SUBSYSTEM DESIGN AND LAYOUT

Switch logic, Gate (restoring) logic – The inverter; Two-input nMOS; CMOS and BiCMOS Nand Gates;Two-inp ut nMOS, CMOS and BiCMOS Nor Gates; Other forms of CMOS logic, Examples of structured design (combinational logic) – A parity generator; Bus arbitration logic for n-line bus; Multiplexers (data selectors); A general logic function blo ck; A fo ur-line Gray code to binary code converter; The programmable logic array (PLA), Some clocked sequential circuits – Two-phase clocking; Charge storage; Dynamic register element; A dynamic shift register.

3. SUBSYSTEM DESIGN PROCESSES

Some general considerations, An illustration of design processes – The general arrangement of a 4-b it arithmetic processor; The design of a 4 – bit Shifter, Observations.

4. SOME CMOS DESIGN PROJ ECTS

Introduction to project work, CMOS project 1 – an incrementer / decrementer, CMOS project 2 – left / right shift serial / parallel register, CMOS project 3 – a comparator for two n-b it numbers , CMOS/BiCMOS pro ject 4 – a two-phase non-overlapping clock generator with b uffered output o n both phases, CMOS projects 5 – design of a latch – an event-driven latch element for EDL systems.

5. ULTRA-FAST VLSI CIRCUITS AND SYSTEMS – INTRODUCTION TO GAAS TECHNOLOGY

Ultra-fast systems, Gallium arsenide crystal structure, Technology Development, Device modeling and performance estimation, MESFET-based design, GaAs MESFET classes of logic.

BEET7: SATELLITE COMMUNICATION SYSTEM

1. PRINCIPLES OF SATELLITE COMMUNICATIONS:

Evolution and Growth of Communication Satellite, Synchronous Satellite, International Regulation and Frequency Co-ordination, Satellite Frequency Allo cation and Bank Spectrum, General and Technical Characteristics o f a Satellite Communication System, Advantages of Satellite Communication, Active and Passive Satellite , Advent of Digital Satellite Co mmunication, Mod em and Cod ec, Review Questions, Reference.

2. DIGITAL SATELLITE TRANSMISSION:

Advantages of Digital Co mmunication, Byte, Baud , Elements of Digital Satellite Communication Systems, Digital Base band Signals, Digital Modulation Techniq ues, Satellite Digital Link Design, Time Division Multiplexing , UST, 24- Channel System, Review Questions, Reference.

3. MULTIPLE ACCESS TECHNIQUES:

Introduction, Time Division Multiple Access (TDMA), TDMA, Frame Structures, TDMA Burst Structures, TDMA Frame Efficiency, TDMA Super frame, TDMA Frame Acquisition and Synchronization, TDMA Comp ared to FDMA, TDMA Burst Time Plan, Multiple Beam (Satellite Switched) TDMA Satellite Systems, Beam Hopping (Transponder Hopping) TMDA, Code Division Multiple Access (CDMA) and Hybrid Access Techniques, Suggested References, Review Questions.

4. DEMAND ASSIGNMENT MULTIPLE ACCESS TECHNIQUES:

Introduction , Erlang call congestion (Blocking or B) Formula, Demand Assignment Control , DA-FDMA (Spade) System, Demand Assignment TDMA (DATDMA) Digital Speech Interpolation, Review Questions, References.

5. SPREAD SPECTRUM TECHNIQUE AND CODE DIVISION MULTIPLE ACCESS:

Intro duction , Process Gain and Jam Margin, J/S Ratio and Antijam Margin, Direct Sequence Spread Spectrum Techniques , PN Sequence, DS- CDMA, Frequency Hop ping Spread Spectrum Communication System (FM-SS), Frequency Hopping Spread Spectrum Code- Division Multiple Access (FH-SS-CDMA), Synchronizatio n, Application of Spread Spectrum Techniques, Hybrid Systems, Review Questions.

6. SATELLITE ORBITS AND INCLINATION:

Introduction, Synchronous Orbit, Orbital Parameters, Satellite Location With Respect to the Earth , Look Angles, Earth Coverage and Slant Range, Eclipse Effects, Satellite Placement in Geostationary Orbit, Station Keeping, Satellite Stab ilization, Review Questions, References.

7. COMMUNICATION SATELLITE SUBSYSTEMS:

Intro duction, Electric Po wer Supply, Attitude and Orbit Control , Prop ulsion Sub System, Repeaters, Antenna Systems, Telemetry , Tracking and Command (TTC) Subsystem, Thermal Control System, Structure Subsystem, Reliability of Satellite Subsystems, Review Questions, References.

8. SATELLITE EARTH STATIONS:

Intro duction, Earth Station Design Requirement, Earth Station Subsystems, Monitoring and Co ntrol, Frequency Coordination , Small Earth Station, Very Small Aperture Terminals (VSATs), Mobile and Transport Earth Stations, Earth Stations in Near Future, TVRO Systems (Television Receive Only Systems), Review Questions, References.

9. SATELLITE AND CABLE TRANSMISSION SYSTEMS:

Introduction, Cable Channel Frequencies, Head- End Eq uipment, Distrib ution of the Signal , Important Cable Television Network Specificatio ns, Network Architecture, Optical Fiber CATV Systems, Indian Perspective, Future of Cable TV Systems, Reference.

10. SPEECH CODING TECHNIQUES:

Introduction, Some Facts abo ut Speech, Digital Speech Quality and International Digital Telephony Standards, Basic Speech Coding Methods, Lo w Bit Rate Speech Coding, Audio Coding, Hardware Technology in Speech Coding, Sp eech Coder Performance.

Semiconductor device and modeling

BEET8 : SEMICONDUCTOR DEVICES AND MODELING

1. BASIC SEMICONDUCTOR PHYSICS

Introduction, Solis-state Structure, Band Structure, Electrons and Hole: Semiconductor Statistics, Intrinsic; Extrinsic and Comp ensated Semiconductors, Electron and Hole Mobility's and Drift Velocities, Hall Effect and Magnetoresistance.

2.P-N JUNCTIONS, SCHOTTKY BARRIER JUNCTIONS, HETEROJUNCTIONS AND OHMIC CONTACTS

Introduction, p-n Junction Under Zero Bias Condition, Current Voltage Characteristics of an Ideal p-n Junction (The Diode Equation), Tunneling and Tunnel Diodes, Junction Breakdown – Breakdown Mechanisms; Impact Ionization and Avalanche Breakdown, Schottky Barriers, Current Voltage Characteristics of Schottky Diodes – Thermionic Emission Model; Current Voltage Characteristics: Thermionic Field Emission & Field Emission; Small-Signal Circuit of a Schottky Diode

3. BIPOLAR JUNCTION TRANSISTORS

Principle of Operation, Minority Carrier Profiles in a Bipolar Junction Transistor, Current Components and Current Gain, Base Spreading Resistance and Emitter Current Crowding in Bip olar Junction Transistor, Effects of Non-Uniform Doping in the Base Region: Graded Base Transistors, Output Characteristics of Bipolar Junction Transistors and Early effect, Ebers-Moll Model, Bipolar Junction Transistor as a Small Signal Amplifier: Cutoff Frequencies, Bipolar Junction Transistor as a Switch, Bipolar Junction Transistors in Integrated Circuits.

4. FIELD EFFECT TRANSISTORS

Introduction, Surface Charge in Metal Oxide Semiconductor Capacitor, Capacitance-Voltage Characteristics of an MIS Structure, Metal Oxide Semiconductor Field-Effect Transistors (MOSFETs), Velocity Saturation Effects in MOSFETs, Short Channel and Nonideal Effects in MOSFETs, Subthreshold Current in MOSFETs, MOSFET Capacitances and Equivalent Circuit, Enhancement-and Depletion-Mode MOSFETs Complementary MOSFETs (CMOS) and Silico n on Sapphire, Metal Semi-conductor Field-Effect Transistors.

BEET9

Pro ject Guideline

Thinking up a Project

You are ex pected to come up with your own idea for a project. A wide range of topics is acceptable so long as there is substantial computing content and project is predominantly of a practical, problem-solving nature. You migh t take up an interest which you already have in your stream of engineering. You may do your project in any reputed organization or a dep artment. Individually or a group of maximum 4 students can take up a project. The project is a vehicle for you to demonstrate th e required level of competence in your chosen field of Bachelors.

Start thinking about your project right in the beginning. If you want to do the project in industrial environment start your correspondence fairly early to find an organization, which is ready to accept you You must submit an outline of your project (two or three pages) to your guide within one month of start of the project work. This must include the Title, Objective, Methodology (main steps to carry out a project), ex pected output and organization where you intend to carry out the project.

Arranging a Guide

When you have an idea of your project, even a tentative one, approach a suitable person who has interest and expertise in that area. The Guide may be a person with M.E. / M.Tech or a B.E./ B.Tech having a working experience of 3 years in relevant field.

Working with the Guide

The Guide's role is to provide support and encou ragement to direct the student's attention to relevant literature, to provide technical assistance occasionally, to read and comment on the draft report and to give guidance on the standard and amount of work required. The Guide is not responsible to teach an y new skills and language required for project work or for arran ging any literature or equipment. . Rest you can workout your own arran gement. The students, who are content to carr y out their work largely without supervision, should keep their Guide in touch with what they are doing. A student should not remain silent for months and then appear with a complete project work unknown to supervisor. In such circu mstances, the Guide cannot be counted on to give an automatic seal of his approval. If a project produces a piece of software, the Guide would normally expect to see a demonstration of the software in action.

The main purpose of the report is to explain what you did in your project. The reader should be able to see clearly what you set out to do and what you achieved. It should

describe the problem addresses and explain why you tackled it in the way you did. It should include your own assessment of how successful the project was.

Resist temptation to include pages of padding. If the project consists of developing an application in area with which a computer scientist would not be familiar – such as chemical testing, stock & shar es – it might be necessary to include some explanatory company/ organization profile for whom you h ave done the work must not appear in chapters and must go to appendix part.

The work that is presented for examiners should be your own. The presentation of another person's work, design or program as though they are your o wn is a serious examination offence. Direct quotation form the work of others (published or un published) must always be clearly identified as such b y bein g placed in quotation marks, it is essential that reader should be able to see wh ere the other work ends and your begins.

Sometimes a project containing good work is marred by a report, which is turgid, obscure and simply ungrammatical. In such cases, it is very difficult to find out the work done during the project. An examiner cannot be kind enough to look properly on a project that is almost unreadable.

Some important points for carrying out a project

The organizations or companies offer you a placement for project work out of good will or to get some useful work done. Usually the companies do not provide you everything required by you. You must settle this right in the b eginning of the project with the business that what will you get from them and what you have to arran ge yourself.

Some times a complication arises due to the fact that some aspect of your project work is considered confidential by the company. If this is so, it is your responsibility to get whatever clearance is necessar y from th e organization righ t in the beginning as essential parts like system analysis and design, flow charts etc. can not be missing from a project report.

Make sure you allow enough time for writing report. It is strongly recommended that do some writing work as you carry out the project rather than leaving write up until the end. You must allow at least a month to finally write the report. There has to be enough time for the supervisor to read and comment on it and for student to make changes (sometimes ex tensive) on the basis of the comments. You may have to prepare two or three drafts before the final submission. Remember that it is mainly the p roject reports that get examined. An external supervisor receives a pile of project reports written by people who he does not know. If a project produced some software he even may not get time to see it running. In most cases he forms his judgment purely on the basis of the report. Please make your report as readable as possible content wise as well as presentation wise.

1. **Introduction:** This must contain background, any previous work done in the area of your project, your objective and other relevant material that may be helpful to further explain your project work.
2. **The existing system:** The study of the present system; problems in existing system.
3. **System design:** The proposed system; Any specific problem encountered at how you handled them.
4. **Implementation of the system:** Implementation issues and their justification.
5. **Conclusions:** Any shortcoming; your assessment of your work; comparison of your work with similar works; silent featu res of your work any feature modification. Real times applications of your project work.

References must be given at the end following any standard way of giving references.

For example:

Lan gd rof, 'Theor y of Alternating Current Machiner y" Tata McGraw Hill, July 2003.

Finally, your project work is your brainchild and nobody knows about it more than you. Be confident to explain your work at the time of viva and b e honest to accept any short falls.

The Project Report Details

The report should be p repared with the Word Processing software. They should be printed on A4 size (Executive Bond) paper. A margin of 1.5 inches must be allowed on left hand side for binding. The pages should be numbered. The report should be typed in the 12-font size with vertical spacing of 1.5

A report should be hard bound (light green cover with golden print on the cover). The title of the project should be clearly visible on the cover.

The cover page should be as figures b elow. The first page should be title page containing the title, the candidates name, Enrolment Number, and Name of University. Second page is a certificate from the supervisor. The 3rd page is for the acknowledgement. Fourth page gives the contents of the project report. Fifth page should be an abstract of the project followed by the chapters. You must ensure that all pages are legible. Where the project

has produced software for a personal computer, you should include a CD inside the back cover of the repo rt, along with instructions in the report how to run it.

Cover Page
Project Title
A Project Report

Submitted in partial fulfillment
of the degree of Bachelor of
Technology

Supervisor's Name
Student's Name

LOGO

Sai Nath University
Ranchi, Jharkhand.

(Year)

B.Tech (Electronic & Telecommunication) – VIII Sem