8. Input-Output Organization (4 Hours)
   8.1 Bus control
   8.2 Serial I/O: Asynchronous and synchronous modes, USART and VART

9. Parallel Data Transfer (4 Hours)
   9.1 Asynchronous and Synchronous program controlled
   9.2 Interrupt Driven and DMA modes
   9.3 Interrupt and DMA controller

10. Trends in Computer architecture (3 Hours)
   10.1 CISC
   10.2 RISC
   10.3 VLIW

11. ILP (4 Hours)
   11.1 Introduction to ILP
   11.2 Pipeline hazards: Structural hazards, Data and control hazards
   11.3 Reducing the effects of hazards

Practicals: Lab implementation of the following algorithms:

1. Addition
2. Subtraction
3. Unsigned and signed multiplication
4. Cache memory mapping

Reference Books:

1. J. P. Hayes, Computer Architecture and Organization, McGraw Hill, 3rd Ed., 1998
2. M. M. Mano, Computer System Architecture, Pearson, 3rd Ed., 2004
3. V. C. Hamacher, Z. G. Veranesic, & S. G. Zaky, "Computer Organisation", Tata McGraw Hill, Ed., 2002
4. W. Stallings, "Computer Organization and Architecture – Designing for Performance", Prer Hall of India, 7th Ed., 2007
5. D. A. Pattersen and J. L. Hennesy, "Computer Organization and Design: The Hardware Soft Interface", Elsevier, 2nd Ed., 2006

Mathematics-III
BEG201SH

Year: II Semester: III

Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	2	-	3	80	-	-	20	-	100	

Objectives: The purpose of this course is to round out the student's preparation more sophisticated applications with an introduction of linear algebra, a continuous of the study of ordinary differential equations and an introduction to vector algebra and Fourier series.

1.0 Matrices and Determinant. **14 Hrs**

1.1 Matrix and Determinant
1.2 Vector Space (Introduction), Dependent and Independent vectors
1.3 Linear Transformation
1.4 System of Linear Equations, Gauss elimination method only
1.5 Inverse of Matrix (Gauss Jordan Method)
1.6 Rank of the Matrix
1.7 Eigen Values of Matrix, Eigen Vectors and its applications

2.0 Laplace Transformation **10 Hrs**

2.1 Introduction
2.2 Laplace Transform of some Elementary Functions
2.3 Properties of Laplace Transform
2.4 Inverse Laplace Transforms
2.5 Application to differential equations.

3.0 Line, Surface and Volume Integrals **9 Hrs**

3.1 Definition of Line Integral
3.2 Evaluation of Line Integral
3.3 Evaluation of Surface and Volume Integrals
3.4 Diritchlet Integrals

4.0 Integral Theorems **6 Hrs**

4.1 Greens Theorem in the plane
4.2 Stoke's Theorem (without proof)
4.3 Gauss Divergence Theorem (without proof)
4.4 Consequences and Applications of Integral Theorems

5.0 Fourier Series **6 Hrs**

5.1 Periodic Function
5.2 Trigonometric Series
5.3 Fourier Series
5.4 Determination of Fourier Coefficients: Euler Formulae $(-\pi, \pi)$
5.5 Fourier Series in the Intervals $(0, 2\pi)$ and $(-l, l)$
5.6 Even and Odd Functions and their Fourier Series: Fourier Cosine & Sine Series
5.7 Half Range Function
5.8 Parsevals Formula
5.9 Fourier Series in Complex Form (Introduction)

Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics – 5th Edition, Wiley, New York.
2. A Text Book of Engineering Mathematics Vol. II – P. R. Pokharel.
3. A Text Book of Engineering Mathematics Vol. III – N. B. Khatakho & S. P. Pradhanang

Electronic Devices and Circuits

BEG230EC

Semester: II

Year: II

Teaching Schedule Hours/Week			Examination Scheme				Total
			Internal Assessment		Final		
Theory	Tutorial	Practical	Theory	Practical	Theory	Practical	
3	1	2	20	25	80	-	12

Course Objective: To introduce students about the working principles and applications o semi-conductor devices such as diodes, transistors, and FETs.

Course Contents: [8 hrs]

1. **Semiconductor diode**
   - 1.1 Review of p-n junction diode
   - 1.2 Analysis of diode circuits
   - 1.3 Applications of p-n junction diode
     - 1.3.1 Clipping and Clamping circuits
     - 1.3.2 Rectification (half wave, full wave and bridge rectifier)
   - 1.4 Types of diode (Schottky, varactor, tunnel, zener)
   - 1.5 Zener diode as a voltage regulator

[18hrs]

2. **Bipolar Junction Transistor**
   - 2.1 Construction of a BJT
   - 2.2 Ebers-Molls Equation
   - 2.3 Basic Transistor Equation
   - 2.4 CB, CC, CE Configurations
   - 2.5 Load line analysis
   - 2.6 Transistor as an amplifier
   - 2.7 Types of biasing
   - 2.8 Biasing stabilization and thermal runaway
   - 2.9 Small signal analysis (h-parameter and r_e' model)
   - 2.10 High Frequency t-model

3. **Applications of BJT** [11hrs]
   - 3.1 Power amplifiers (Class A, B, C, AB and efficiency calculation)
   - 3.2 BJT as a switch
   - 3.3 Cascaded amplifier (Single stage and multistage)
   - 3.4 Untuned amplifier
     - 3.4.1 Frequency and phase response of RC coupled amplifier
   - 3.5 Differential Amplifiers

4. **Field Effect Transistors** [8hrs]
   - 4.1 **Junction field effect transistor (JFET)**
     - 4.1.1 Construction and characteristics
     - 4.1,2 Biasing of JFET
     - 4.1.3 Small signal analysis of JFET
     - 4.1.4 UJT as an oscillator
   - 4.2 **MOSFET**
     - 4.2.1 Construction, characteristics and types
     - 4.2.2 Biasing of MOSFET
     - 4.2.3 NMOS (Depletion and enhancement type)
     - 4.2.4 Introduction to CMOS

Practicals (In Trainer kits, Multisim and P-Spice):

1. Measurement of characteristics of diode, zener diode
2. Rectifier circuits
3. Measurement of input and output characteristics of CE configurations
4. Single stage BJT amplifier
5. Measurement of input and output characteristics of JFET
6. Measurement of input and output characteristics of MOSFET

Reference Books:

1. A. S. Sedra & K. C. Smith, "*Microelectronic Circuits*", 6th Edition, Oxford University Press
2. Theodorre S. Bogart, "*Electronic Devices and Circuits*"
3. Millman & Halkias, "*Electronic Devices and Circuits*", McGraw Hill
4. Robert Boylestad, "*Electronic Devices and Circuits*"
5. M. N. Horenstein, "*Microelectronic Circuits and Devices*", Second Edition, Prentice Hall

Computer Organization and Design
BEG271CO

Year: II Semes

Teaching Schedule Hours/Week			Examination Schedule			
			Internal Assessment		Final	
Theory	Tutorial	Practical	Theory	Practical	Theory	Practical
3	1	2/2	20	25	80	

Course Objective: To introduce students about the organization of computer structure and implementation of its architecture.

Course Contents:

1. Overview of Computer Architecture and Organization (3 Hours)
   - 1.1 Introduction
   - 1.2 Contrast between computer architecture and organization
   - 1.3 Fundamentals of computer architecture
   - 1.4 Organization of Von-Neumann machine

2. Computer Instruction (4 Hours)
   - 2.1 Instruction format
   - 2.2 Instruction cycle
   - 2.3 Instruction types and addressing modes

3. Computer Arithmetic (5 Hours)
   - 3.1 Representation of integers and real numbers
   - 3.2 Algorithm of Addition, Subtraction, Multiplication and Division

4. Memory system organization and Architecture (4 Hours)
   - 4.1 Memory system hierarchy
   - 4.2 Main memory Organization
   - 4.3 Cache memory
   - 4.4 Virtual memory

5. Interfacing and Communication (4 Hours)
   - 5.1 I/O fundamentals
   - 5.2 I/O techniques
   - 5.3 Interrupt
   - 5.4 Memory system design and interfacing
   - 5.5 Buses

6. Device subsystem (3 Hours)
   - 6.1 External storage system
   - 6.2 RAID architecture

7. Control Unit Design (7 Hours)
   - 7.1 Instruction sequencing
   - 7.2 Instruction Interpretation
   - 7.3 Control memory
   - 7.4 Hardwired control
   - 7.5 Micro-programmed control
   - 7.6 Micro-programmed computers