MICROPROCESSOR

BEG233EC

Year:II Semester:II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical*	Theory**	Practical	
3	-		20	50	80	-	150

*Continuous

**Duration: 3hours

Course Objectives: The objective of this course is to provide fundamental knowledge to understand the opreation, programming and application of microprocessor.

1.Introduction: (6hours)

Evolution of microprocessor
Calculator and stored program computer
Von Neuman and Harbard architecture
Simple stored program computer architecture
Description of microprocessor architecture and applications

2. Microprocessor Instructions: (8hours)

2.1. Register transfer language (RTL)
2.2. Instruction and machine cycle
2.3. Addressing modes:Direct, indirect immedite, absolute, relative, indexed, register, stack and implied
2.4. RTLdesription of data transfer instructions, arithmetic instructions, logical instructions, branch inntructions,and miscellaneous instruction
2.5. Fetch and execution cycle, fetch-execution overlap
2.6. Timing diagram for register move,indirect read, indirect write and out instruation

3. Assembly Language Programming: (10hours)

3.1. Assembler instruction format:Opcodes, mnemonics and operands
3.2. Assembler operation:Sample assembly language program and code generation,one pass and two pass assembly
3.3. Macro assemblers, linking assembler directives

4. Bus Structure and Memory Devices: (4hours)

4.1. Bus structure, synchronous and asynchronous data bus, address bus, bus timing
4.2. Static and dynamic RAM,ROM
4.3. Programmable read only memory (PROM), ultraviolet electrically programmable memory(UVEPROM) and electrically erasable programmable memory (EEPROM)
4.4. SRAM and ROM interface requirements

5. Input/Output Interfaces: (7hours)

5.1. Serial communication
- 5.1.1 .Asynchronous interface: ASCH code, baud rate, start bit, stop bit, parity bit
- 5.1.2 Synchronous interface
- 5.1.3 Physical communication standard
- 5.1.4 8251Aprogrammable communication interface

5.2. Parallel communication
5.3. Data transfer wait interface
5.4. RS-232 and IEEE488-1978 general purpose interface standard
5.5. Keyboard and display controller

6. Interrupt: (4hours)

6.1. Introduction, interrupt vector and descriptor table
6.2. Interrupt service routine requirements
6.3. Interrupt priority:Maskable and non-maskable interrupts, software interrupts, traps and exception
6.4. Vectored, chained and polled interrupts structures
6.5. Interrupts in parallel and serial interfaces

7. Multiprogramming: (4hours)

7.1. Microprogramming, uni programming and multiprogramming
7.2. Process management and semaphore
7.3. Common procedure sharing
7.4. Memory managements and virtual memory

8. Introduction to Advanced Microprocessor Architecture: (2hours)

Laboratory

12 laboratory exercises using the microprocessor trainer kit and assembler.

References:

1. Ghosh,P.k., Sridhar P.R., "0000 to 8085:Introduction to Microprocessors for Engineers and Scientists", Second Edition, Prentice Hall of India Private Limited, 1997.
2. Lance, A. Leventhal., "Introduction to Microprocessors: Software, Hardware, and Programming", Eastern Economy Edition, Prentice Hall of India Private Limited, 1995.
3. Malvino, A.P.." An Introduction to Microcomputers" , Prentice Hall of India Private Limited,1995.

INSTRUMENTATION I

BEG232EC

Year:II Semester:II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	-	3/2	Theory	Practical*	Theory**	Practical	
			20	25	80	-	125

***Continuous**
****Duration: 3hours**

Course Objectives: To provide fundamental knowledge of instrumentation and measurements.

1. Introduction: (4 hours)

1.1 Instrumentation and components of Instrumentation
1.2 Transducting, signal conditioning and signal transmission.
1.3 Input and output device .
1.4 Type of signals

2. Measurement: (12hours)

2.1 Units and standards of measurements
2.2 Measuring instruments: Performance parameters, Dynamic parameter
2.3 Resistance measurement with Whetstone bridge
2.4 Inductance and capacitance bridges
2.5 Error in measurement and error type

3. Variables and Transducers: (10hours)

3.1 Physical Variables and their types (Electrical, Mechanical, Process, Bio-physical variable)
3.2 Types , principle of operation, input and output characteristics and application of transducers (resistive , capacitative, inductive, voltage and currents)
3.3 Calibrations and error in transducers

4. Signal Conditioning and Processing: (10hours)

4.1 Importance of Signal conditioning and processing
4.2 Signal amplification and Filtering
4.3 Instrumentation amplifier:Op-Amp in instrumentation
4.4 Interference signals and their elimination: shielding and grounding
4.5 Signal conversion (Analog-to-Digital, Digital-to-Analog)

5. Signal Transmission: (7hours)

5.1 Transmission media and their Types
5.2 Transmission scheme: Analog and Digital
5.3 Data transmission system and standards

6. Out put Device: (3hours)

6.1 Feature of output device
6.2 Indication instruments
6.3 Data recording system, strip- chart, X-Y display and plotter

Laboratory:

1. Measurement of physical variables using various bridges.
2. Conversion of physical variables into electrical signal.
3. Signal conditioning (amplification and filtering).
4. Error measurements in instrumentation system.
5. Observation of interference in instrumentation and their remedy.
6. Conversion of analog signal into digital and digital into analog signal.

References:

1. A.D.Helfrick and W.D.Cooper, "Modern Electronic Instrumentation and Measurement Techniques"Prentice Hall of India1996.
2. S.Wolf and R.E.M. Smith, "Student Reference Manual for Electronics Instrumentation Labortaries", Prentice-Hall of India 1996
3. A.K.Sawhney, "Acourse in Electronic Measurements and Instrumentation ", Dhanapat Rai and sons, India, 1998
4. C.S.Rangan , G.R. Sharma,and V.S.V.Main Instrumentation : Devices and System", Tata Mc Graw Hill, India, 1992
5. D.M.Considine, "Process Instruments and Controls Handbooks", MC Graw Hill 1985.

ELECTRONIC CIRCUIT I

BEG234EC

Year:II Semester:II

Teaching Schedule Hours/ Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessmen		Final		Total
			Theory	Practical*	Theory**	Practica	125
3	-	3/2	20	25	80	-	

*Continuous
**Duration: 3 hours

Course Objectives: To provide fundamental concept of electronics circuits. The course focuses more on understanding of amplifiers, operational amplifier, Oscillator and powe supplies.

1. Low frequency transistor Amplifier Circuits: (8 hours)

1.1 Review of low frequency AC and DCmodels,
1.2 Amplifier configuration CB,CE, and CC:expression for voltage gains and current gains, expression for input and output impedances
1.3 Single stage and multistage amplifiers: n-stage cascaded amplifiers, gain calculation, choice of configurationin a cascaded
1.4 Darling on -pair amplifier
1.5 Emitter follower amplifier

2. Unturned amplifiers: (6 hours)

2.1 Classification of amplifiers
2.2 Design of biasing circuits
2.3 Frequency and phase responses
2.4 RC Coupled amplifiers: frequency response of RC -stage

3. Large signal amplifiers: (6 hours)

3.1 Analysis of large signal model
3.2 Push -pull amplifiers, transformer coupled push-pull stage
3.3 Amplifiers efficiency:power amplifiers, power dissipation and heat sinks

4. Feedback amplifiers : (8 hours)

4.1 Negative feedback amplifiers
4.2 Feedback configurations
4.3 Feedback loop stability: bode plot analysis

5. Operational Amplifier Circuits: (6 hours)

5.1 Input offset voltage
5.2 Input bias and input offset currents
5.3 Output impedance
5.4 Differential and comon- mode input impedances
5.5 DC gain, bandwidth, gain-bandwidth product

5.6 Common-mode and power supply rejection ratios
5.7 Higher frequency poles, settling time
5.8 Slew rate

6. Oscillator Circuits: (6 hours)

6.1 Operation amplifier based relaxation oscillators
6.2 Voltage-to-frequency converters
6.3 Sinusoidal oscillators
6.4 Conditions for oscillators
6.5 Amplitude and frequency stabilization
6.6 Swept frequency oscillators
6.7 Frequency synthesizers
6.8 Function generators

7. Power Supplies and Voltage Regulators: (5 hours)

7.1 Half-wave and full-wave rectifiers
7.2 Capacitive filtering
7.3 Zener diodes, band gap voltage references, constant current diodes
7.4 Zener diode voltage regulators
7.5 Series transistor- Zener diode voltage regulators
7.6 Voltage regulators with feedback
7.7 IC voltage regulations

Laboratory

There shall be laboratories exercises on amplifiers, oscillators, and power supplies

Reference Book:

1.0 W. Stanely "Operational Amplifiers with Linear Integrated CIRCUITS",Charles E. Merrill Publishing Company, Toronto,1984.
2.0 J. G.Graeme, "Application of Amplifiers: Third Generation Technique" The burr-Brown Electronic Series, Mc Graw -Hill, New York,1973
3.0 P.E.Allen and D.R.Holberg, "COMS Analog Circuit Design", Holt, Rinehart and Winston, Inc., New York,1987
4.0 A. S. Sedra and K.C. Smith,"Microelectronic Circuits", 2nd Edition, Holt, Rinehart and Winston, Inc., NewYork .

ELECTROMAGNETICS

BEG235EC

Year:II Semester:II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical*	Theory**	Practical	
3	1	3/2	20	25	80	-	125

*Continuous

** Duration: 3hours

Course Objectives: The objectives of this course is to provide the knowledge to understand the fundamental laws of static and dynamic electric and magnetic fields and apply electromagnetic fields and waves theory in the generation, transmission and measurement techniques.

1. Introduction: (3hrs)

Scalars and vectors
Vector algebra
Coordinate system
Scalar and vector operations in different coordinate systems

2. Coulomb's Law and Electric Field Intensity: (3hrs)

2.1 Coulomb's law
2.2 Electric field intensity
2.3 Field due to point charges and continuous charge distribution
2.4 Field of a line charge and sheet of charge

3. Electric Flux Density and Gauss's Law: (2hrs)

3.1 Electric flux density
3.2 Gauss' s law in integral form
3.3 Application of gauss' s law
3.4 Boundary condition at a conductor surface

4. Divergence: (2hrs)

4.1 Concept of divergence
4.2 Maxwell's first equation and applications
4.3 Vector operator
4.4 Divergence theorem and application

5. Energy and Potential: (3hrs)

5.1 Electric energy
5.2 Potential and Potential difference
5.3 Potential field of a point charge and system of charges
5.4 Potential gradient
5.5 Electric intensity as the negative gradient of a scalar potential
5.6 Conservative fields
5.7 Electric energy density

6. Electrostatic Field in Material Media: (2hrs)

6.1 Polarization
6.2 Free and bound charge densities
6.3 Relative permittivity
6.4 Capacitance calculations

7. Boundary Value Problems in Electrostatics: (5hrs)

7.1 Laplace's and Poisson's equations
7.2 Uniqueness th0eorem
7.3 One-dimensional and two-dimensional boundary value problems

7.4 Relaxation methoda and numerical integration
7.5 Graphical field plotting
7.6 Capacitance calculations

8. Current and current density: (2hrs)

8.1 Conversation of charge
8.2 Continuity of current
8.3 Point form of Ohm's law
8.4 Relaxation time constant

9. Magnetostatics: (3hrs)

9.1 Biot-Savart's law
9.2 point form Magnetic intensity and magnetic induction
9.3 Ampere's circuital law
9.4 Applications

10. Curl: (3hrs)

10.1 Introduction
10.2 Stoke's theorem
10.3 Magnetic flux and magnetic flux density
10.4 Ampere's law in point form
10.5 Scalar and vector magnetic potentials
10.6 Derivation of steady magnetic field laws
10.7 Boundary value problems

11. Magnetic force and material: (1hr)

11.1 Magnetic force
11.2 Magnetization and permeability
11.3 Magnetic boundary condition
11.4 Magnetic circuits

12. Time- Varying fields and Maxwell's Equations: (3hrs)

12.1 Faraday's law
12.2 Inadequacy of Ampere's law with direct current
12.3 Conflict with continuity equation
12.4 Displacement current
12.5 Maxwell's equation in point form, Maxwell's equation in integral form
12.6 Retarded potential

13. Wave Equation: (8hrs)

13.1 Wave motion in free space, perfect dielectric, and lossy medium
13.2 Wave impedance, Skin effect, A..C..resistance
13.3 Poynting vector
13.4 Reflection and transmission coefficient
13.5 Standard wave ratio
13.6 Impedance matching
13.7 Radiation from a dipole antenna
13.8 Wave guides

14. Transmission Lines: (4hrs)

14.1 Types of transmission mediums
14.2 Characteristics impedance
14.3 Power and signal transmission capability of lines
14.4 Field and lumped circuit equivalents
14.5 Traveling and standing waves, reflection, termination, and impedance matching
14.6 Short and long lines
14.7 Graphical solution of transmission lines

15. Introduction to Microwaves: (1hr)

Laboratory

Six laboratory exercises to demonstrate the concept of electromagnetics and using simulation software.

References:

1. W.H. Hayt, "Engineering Electromagnetic", Tata McGraw-Hill Book Company, New Delhi.
2. J.D. Kraus and K.R.Carver, "Electromagnetics"

ELECTRICAL MACHINE AND DRIVES

BEG224EL

Year:II Semester:II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	-	3/2	Theory	Practical*	Theory**	Practical	125
			20	25	80	-	

** Duration: 3 hours

Course Objectives: The Course objective is to apply the principles of electric and magnetic electric and magnetic circuits for electromechanical energy conversion. Able to understand the principles of rotating and non- rotating electrical machines.

1. Introduction: (3hrs)

1.1 Magnetic circuits and Ampere s law
1.2 Ferromagnetic materials: magnetic saturation, non-linearity, hystersis
1.3 Types of magnetic circuit
1.4 Effect of dc and ac, hysteresis and eddy currents, energy losses and laminations
1.5 Self andmutual inducances
1.6 Electromagnets

2. Transformers: (6hrs)

2.1 Magnetically coupled circuits
2.2 Effects of secondary current in ideal transformer
2.3 Transformer reactances and equivelent circuits
2.4 Air core vs iron core transformers
2.5 Losses in transformer, opencircuiy and short circuit tests
2.6 Series and parallel connection of winding
2.7 Audio transformer, power transformers, auto transformers and instrumentation transformers
2.8 Three phase transformers

3. DC Machines: (4hrs)

3.1 Construction of dc machine
3.2 Magnetic circuit, air-gap flux pattern and its effects
3.3 Torque production and voltage generation
3.4 Armature winding:lap and wave windings
3.5 Field excitiation: shunt, series and compound fields
3.6 Armature rection
3.7 Commutation, interpoles
3.8 Losses, cooling, rating and heating

4. DC Motors: (5hrs)

4.1 Torque/ speed characteristics of shunt, series and compound field motors
4.2 Armature reaction and motor operation
4.3 Communication problems, pole face compensating windings
4.4 Speed regulation and control in dc motors
4.5 Effectof field excitation and armature voltage

4.6 Reverse rotation
4.7 Starting and speed control of motors, armature voltage and shunt field control

5. DC Generators: (4hrs)

5.1 Voltage/ Speed/ load characteristics
5.2 Shunt,series and compound field machines
5.3 Seperate and self-excited machines, voltage build-up in self excited generators
5.4 Automatic voltage regulation

6. Synchronous and induction machines: (6hrs)

6.1 Flux and MMF waves in synchronous machine
6.2 Salient pole and cylindrical rotor structures
6.3 Open-circuit and short-circuit characteristics
6.4 Genreator voltage regulation with real and reactive power loads
6.5 Generators synchronization, load and power factor control, torque angle
6.6 Synchronous motor: equivalent circuit, starting, V-curves, variable power factor,torque angle, load limits

7. Fractional Horsepower (fhp) Drives: (6hrs)

7.1 Single phase AC motors: split phase, capacitor start/ run, shaded pole
7.2 Servo-type motors and their drivers
7.3 Stepper motors and electronic drivers
7.4 Permanent magnet DC and AC motors
7.5 AC synchro system for servo applications

8. DC Drives: (5hrs)

8.1 Static variable DC voltage drives using diode and controlled rectifier
8.2 2-quadrant reversible voltage drives
8.3 2-quadrant reversible voltage and power floe drives

9. AC Drives: (6hrs)

9.1 Scharge variable speed motor
9.2 Soft-start AC starter-controller for induction motors
9.3 Variable frequency supplies for AC drives: rotating synchronous and induction generators, pulse width modulated supplies and cycle- convertors

Laboratory:

1. Study of reversible DCmotor drive system
2. Study of PWM controller for an AC machine

References:

1. E.Fitzgerald, C.Kinsley, and S. Dumans, "Electric Machinery" Tata Mc Graw-Hill India Limited,1984.
2. M.G.Say,"A.C. Machines"

APPLIED MATHEMATICS

BEG204HS

Year:II Semester:II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	-	-	Theory	Practical*	Theory**	Practical	100
			20	-	80	-	

* Continuous

** Duration: 3 hours

Course Objectives: The aim of this course is to expose students to theory of complex variables, Fourier and Z-transforms applied to signal processing. The course also impacts the fundamentals knowledge on Wave and Diffusion equations with coordinate system

1. Complex Variables **(6hours)**

1.1. Function of Complex Variables
1.2. Taylor Series, Laurent Series
1.3. Singularities, Zeros and Poles
1.4. Complex integration
1.5. Residues

2. Z-Transforms **(12hours)**

2.1. Definition of Z-Transform
2.2. One sided and two sided transform
2.3. Linear Time Invariant Systems,rssponse to the unit spike
2.4. Properties of Z-Transform
2.5. Region of Convergence, relation to casulaty
2.6. Difference equation and solutions of difference equations, Representation of System Transfer Function in Z-domain
2.7. Inverse Z-Transform
2.8. Parseval s Theorm

3. The Fourier Series, Integral and Transform **(15hours)**

3.1. Periodic Functions, even and odd functions
3.2. Fourier series for arbitrary range and for complex function
3.3. Magnitude and phase spectra
3.4. The Fourier Integral, the inverse Fourier Intrgral
3.5. Fourier sine and cosine transforms,
3.6. Forward and Inverse Fourier transforms
3.7. Magnitude, energy and phase spectrum

4. Partial differential equations **(8hours)**

4.1. Wave equation
4.2. Diffusion equation
4.3. Laplace equation in two and three diminsions
4.4. Polar,Cylindrical and Spherical cocrdinates

5. Linear Programming **(4hours)**

5.1. Simplex method
5.2. Canonical forms
5.3. Optimal values

References

1. E.Kreyszig,"Advanced Engineering Mathematics ",Wiley,US
2. J.G.Proakis and D.G.Manolakis, "*Digital Signal Processing*", Prentice Hall of India

APPLIED SOCIOLOGY

BEG395MS

Year: II **Semester:II**

Teaching Schedule Hours/ Week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory	Practical		
L	P	T	Duration	Marks	Duration	Marks				
3	0	0	3	80			20		100	

1. Introduction: (4hours)

1.1 Definition of sociology
1.1 Evolution of sociology
1.2 Relationship of sociology with other social sciences
1.3 Application of sociology in addressing contemporary issues

2. Language of sociology: (14hours)

Society and Culture
Tribe, Caste &Ethnicity
Community and Institutions
Homogenous &Heterogeneous
Norms and Values
Co-operation &Conflict
Status & Roles
Competition & Conflict
Association and Group

3. Fundamental concepts in sociology: (14hours)

3.1 Social system
3.2 Social structure: family, caste and ethnic group, religions festivals
3.3 Social process
3.4 Socialization
3.5 Social and Cultural change
3.6 Social stratification
3.7 Social problem and social control

4. Nepalese Culture and Society: (12hours)

4.1 Historical ideological and political dimension of Nepalese culture and society
4.2 Caste system in Nepal
4.3 Ethnic groups and inter relationship among them
4.4 Religions and festivals in Nepal
4.5 Social stratification in Nepalese Societies on the basis of Caste, gender, Ethnicity and Age

5. Community Development: (16hours)

5.1 Meaning
5.2 Nature and History
5.3 Development Approaches
5.4 Community organizing for people's empowerment
5.5 Communications and community Education
5.6 Community mobilization
5.7 Indigenous and appropriate Technology

5.8 Ecology and Environment
5.9 Community participation in development activities
5.10 Gender differences and role of Women in energy conservation & development, social cycle Modernization and Globalization
5.11 Application of knowledge of sociology with special reference energy, policy, legal issues and practices, identification of issues & resolution

Recommended Books:

- Inkels Alex, "What is Sociology? Introduction in the discipline and profession, Prentice Hall of India"
- Foster G.M. ,"Traditional Culture and impact of Technological Change"
- Mair L.,"Applied Sociology, Anthropology"
- Gsanlender A.W., "Applied Sociology opportunity and Problems"
- Regmi Rishikeshav Raj " Dimenshion of Nepali society and Culture"
- Gurung Sant Bahadur:"Rural Develoment Approach in Nepal" Deva Publications Kathmandu