<table>
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<th>S.No.</th>
<th>Course No.</th>
<th>Course Name</th>
<th>Lecture</th>
<th>Tutorial</th>
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<td>AEI-801</td>
<td>Analytical Instruments</td>
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<td>Project</td>
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UNIT-1:

PH CONDUCTIVITY & DISSOLVED COMPONENT ANALYSER

UNIT-2:

GAS ANALYSER

UNIT-3:

CHROMATOGRAPHY
Gas chromatography – liquid chromatography – principles, types and applications – high pressure liquid chromatography – detectors.

UNIT-4:

SPECTRO PHOTOMETERS

UNIT-5:

NUCLEAR MAGNETIC RASONCE AND RADIATION TECHNIQUES

REFERENCES:
UNIVERSITY OF JAMMU

COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-802       Course Title : Virtual Instrumentation
Duration of Exam : 3 hours  Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:
Basics of Virtual Instrumentation:
Historical Perspective, Need/ Advantages of VI, Defining VI, Block Diagram &
arquitecture of VI, Data Flow Techniques, Graphical Programming in Data Flow.
Comparison with conventional programming.

UNIT-2:
VI Programming Techniques:
VIs & Sub-VIs, Loops & Charts, Arrays, Clusters, Graphs, Case/Sequence Structures,
Formula modes, Local & Global Variables, String & File Inputs.

UNIT-3:
Data Acquisition Basics with VI:
ADC/DAC, DI/O, Counters/Timers, PC Hardware structures, timing interrupts, DMA,
Software & Hardware Installations.

UNIT-4:
Use of Analysis Tools:
Fourier Transforms, Power spectrum, Corelation methods, Windowing & Filtering.

UNIT-5:
Applications of VI:
Applications in process control projects, major equipments like Oscilloscopes,
Multimeter etc.

BOOKS RECOMMENDED:

References:
2. S.Gupta, JP Gupta, PC Interface for Data Acquisition & Process Control, 2nd Ed.
UNIT-1:
BASIC CONCEPTS
Definition and origin of robotics – different types of robotics – various generation of robots-degrees of freedom Asimov’s laws of robotics – dynamic stabilization of robots.

UNIT-2:
POWER SOURCES AND SENSORS

UNIT-3:
MANIPULATORS, ACTUATORS AND GRIPPERS

UNIT-4:
KINEMATICS AND PATH PLANNING
Solution of inverse kinematics problem multiple solution jacobian work envelope – hill climbing techniques – robot programming languages.

UNIT-5:
CASE STUDIES:

REFERENCES:
UNIVERSITY OF JAMMU

COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-803-B Course Title : Neural Networks & Fuzzy Systems
Duration of Exam : 3 hours Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:

Neural Networks & Fuzzy Systems: -
Neural & fuzzy intelligence, fuzziness as Multivalence, the dynamical systems to machine intelligence.

UNIT-2:

Neural Networks theory:-
Neurons as functions, signals monotonically, biological activation & signals, neuron fields, neuron signal functions, activation models, neuron dynamical systems, additive neuronals dynamics & additive neuronal feedback.

UNIT-3:

Unsupervised Learning:-
Learning as encoding, charge and quantization, four unsupervised learning laws, probability paces & random processor.

UNIT-4:

Supervised Learning:-
Supervised function estimation, supervised learning as operant conditioning, supervised learning as stochastic approximation.

UNIT-5:

Architectures and Equilibria:-

UNIT-6:

Fuzzy Associative memories:-
Fuzzy systems as between cube mappings, fuzzy and neural function estimators, fuzzy Hebb FAMS, Adaptive FAMS.

Book Recommended:
1 Neural networks & Fuzzy Systems by Bart Kos PHI Pub
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-803-C Course Title : Machine Vision
Duration of Exam : 3 hours Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:
Vision in Humans & Machines:
Visual System Mechanics, Visual Perception, Color perception

UNIT-2:
Image Processing:
Image characterization, Sampling & quantization, Spatial Frequency processes, Neighborhood/ Point processes, Image Processing & Machine vision

UNIT-3:
Computer Graphics:
Definitions, Graphic objects & procedures, Usefulness to machine vision.

UNIT-4:
Machine Vision:
Goals, Finite Image spaces, Applications like;
   a. Identification & Sorting of fish
   b. Object counting
   c. Vehicle License Plate Number sensing.

UNIT-5:
Objects & Regions:
   a. Thresholding: Optimum & Class variance
   b. Segmentation
   c. Mensuration

UNIT-6:
Recognition:
Representation & Pattern/Feature Analysis.

UNIT-7:
Image Sequences:
Frame-to-Frame Analysis, Image Trackers & Data Management.

UNIT-8:
Vision Systems:
Survey, Knowledge based vision: VISIONS, ACRONYM & SCERPO etc. Model based vision: VITREO & PARVO,

Recommended Books:
1. Fundamentals of Machine Vision by Harley R Myler, Prentice Hall of India
UNIT:1
Patient monitoring system: system concept, bedside patient monitors, central monitors, average reading heart monitor, intensive care monitoring, ambulatory monitoring.
Biotelemetry: single channel & multichannel telemetry, telephone & computer based telemetry.

UNIT:2
Magnetic resonance imaging system: principles of NMR imaging system, image reconstruction techniques, basic NMR components, applications, advantages & disadvantages of NMR, imaging techniques, Biological effects of NMR imaging.

UNIT:3
Computer applications in medical field: biomedical computer applications, computerized patient monitoring system, computer aided ECG analysis, computerized catheterization laboratory, basics of Computer Axial Tomography (CAT).

UNIT:4

UNIT:5
Regulation of water & electrolyte balance, kidney structure, filtration & reabsorption, renal acid base control, artificial kidney, dialysis system.

UNIT:6
Biosignal conversions wave & averaging: sampling basics, simple conversion systems, conversion requirements for biomedical signals, signal conversion ckt.s, basics of signal averaging, signal averaging as a digital filter, software for signal averaging, limitations of signal averaging.

Books Recommended:

1) R.S. Khandpur: handbook of Biomedical Instrumentation (TMH)
2) L.Cromwell & F. Weibell: Biomedical Instrumentation & Measurements (PHI)
3) W.J. Tmpkins: Biomedical Digital Signal Processing (Eastern Economy Education)
4) Cass & Brown: Introduction to Biomedical Equipment Technology
5) J.G. Webster: Medical Instrumentation, 3rd edition, Johan Wiley.
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(Examination to be held in 2006, 2007 and 2008)

Course No. : AEI-803-E  Course Title : Instrumentation for Agriculture & Food Processing
Duration of Exam : 3 hours  Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT: 1
Introduction, necessity of Instrumentation and control for Food processing and Agriculture, Sensor Requirements; Remote sensing, Biosensors in agriculture, Standards for food quality. Soil science and sensors; pH conductivity, resistivity, temperature, soil moisture and salinity, ion concentration, measurements, methods of soil analysis. Instrumentation for environmental conditioning of seed germination and growth.

UNIT: 2

UNIT: 3
Application of SCADA for Dam parameters and control. Water Distribution and Management Control, auto-drip Irrigation System. Irrigation Canal Management, upstream and downstream control concept, Supervisory control.

UNIT: 4
Green Houses and Instrumentation; Ventilation Cooling and Heating, Wind speed, temp. And humidity, rain gauge, carbon and dioxide enrichment measurement and control.

UNIT: 5
Automation in Earth Moving Equipment and Farm Implements, Pneumatic, Hydraulic and Electronic Control Circuits in Harvesters, cotton pickers, tractor etc. Application of SCADA and PLC in packaging industry.

UNIT: 6

Books Recommended:

1) Industrial Instrumentation – Patranabis, TMH
2) Instrumentation Handbook – Process Control by B.G. Liptak
3) Process Control and Instrumentation Technology by C.D. Johnson.
4) Outline of Chemical Technology By M. Gopal Rao, Marshall sitting (3/e)
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-804-A Course Title : Micro-Controller & Its Applications
Duration of Exam : 3 hours Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:

UNIT-2:

UNIT-3:
16 bit microcontrollers: Intel 8096-architecture-modes of operation-addressing modes- instruction set-simple programs.

UNIT-4:

UNIT-5:

BOOKS RECOMMENDED
2. 16-bit Embedded Controller Handbook : Intel (Intel Corporation. USA 1989)
3. Design with microcontrollers : John B. Peatman (Tata Mc Graw Hill Pubs.)
### UNIVERSITY OF JAMMU

COURSE SCHEME FOR THE B.E 8th SEMESTER

**APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING**

(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

<table>
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<tr>
<th>Course No.</th>
<th>AEI-804-B</th>
<th>Course Title</th>
<th>Process Dynamic &amp; Control</th>
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<td>(b) Sessional Internal Assessment: 40</td>
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#### UNIT-1:
**Process**
Basic components, diagrammatic representation, symbol and terminology.

#### UNIT-2:
**Process Characteristics**

#### UNIT-3:
**Controller Characteristics**
Characteristics of on-off, proportional, integral, derivative modes and their combinations.

#### UNIT-4:
**Automatic control**
Single and combined modes in closed loop, static error, velocity error, dynamic behavior of feedback control processes for different modes, IAE, ISE, IATE criteria, tuning of controllers.

#### UNIT-5:
**Controller Hardware**
Electronic pneumatic and hydraulic controllers implementing, single and composite modes of controllers.

#### UNIT-6:
**Final control elements**
Control valves, types, function, electrical, pneumatic hydraulic-actuators. Solenoid, E-P Converter.

#### BOOKS RECOMMENDED:
1. D.P.Eckman Automatic process control
2. D.P.Eckman Industrial instrumentation
4. Coughanwr & Koppel Process systems analysis and control
5. Patranabis Principles of process control
6. G.Stephanopoulos Chemical process control, PHI
7. Peter Harriot Process Controls, TMGH.
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-804-C Course Title : Industrial Data Communications
Duration of Exam : 3 hours Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:
Basics:
ISO/OSI Layer model, LAN etc.

UNIT-2:
Field Bus Systems:
Profibus, Interbus, Modbus & CAN etc.

UNIT-3:
Communication Protocols:
Token-Passing, Master-Slave procedures, TCP/IP & Industrial Ethernet.

UNIT-4:
Communication Mediums:
RS-232, RS-485 RS-422 & Fibre-optics, etc.

UNIT-5:
Networking of PLCs.

UNIT-6:
Role of Information Technology:
RIP & OSPF router technologies, OLE for process control (OPC), Active-X, DCOM,
Virtual Private Networks etc.

Books Recommended:
1. L.M.Thompson, Industrial Data Communications, Fundamentals & applications, 3rd
3. Jonas Berge, Field buses for Process Control, Engineering, Operations & Maintenance,
   ISA Process.
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-804-D  Course Title : Computer Networks &Distributed Control System
Duration of Exam : 3 hours  Max. Marks : 140
(a) Semester Exam: 100
(b) Sessional Internal Assessment: 40

UNIT-1:
DATA NETWORK FUNDAMENTALS

UNIT-2:
INTERNET WORKING

UNIT-3:
DISTRIBUTED CONTROL SYSTEMS

UNIT-4:
DCS CASE STUDY
Study of any one popular DCS available in market – Factors to be considered in selecting DCS – Case studies DCS.

UNIT-5:
HART ABD FIELD BUS

REFERENCES

UNIT 1:
AN OVERVIEW
Instructions of operating systems-multiprogramming-time sharing-multiuser operating systems-system calls-basic structure of operating systems.

UNIT 2:
PROCESS MANAGEMENT:
Concept of processes – interprocess communication – racing synchronization-mutual exclusion-scheduling implementation issues – IPC in multiprocessor systems – case study of process management in UNIX and WINDOWS-NT.

UNIT 3:
MEMORY MANAGEMENT
Memory partition-segmentation-paging-virtual memory concepts-relocation algorithms-buddy systems-free space management-memory management in DOS, UNIX and WINDOWS – case study.

UNIT 4:
DEVICE MANAGEMENT AND FILE SYSTEMS:
I/O controller – device handler-driver – disk scheduling – concurrency-dead lock and starvation – various I/O devices – files system design – directory management – case study with DOS and UNIX.

UNIT 5:
MODERN OPERATING SYSTEMS:
Concepts of distributed operating systems – real time operating systems – OS/2.

REFERENCES
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COURSE SCHEME FOR THE B.E 8th SEMESTER
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
(EXAMINATION TO BE HELD IN 2006, 2007 AND 2008)

Course No. : AEI-805          Course Title : Major Project
Max. Marks : 440
(a) Practical : 400
(b) Tutorial : 40

SYLLABUS:

The student will complete their assigned project (AEI-704) work of design / fabrication initiated in the 7th semester and submit a detailed project report individually.