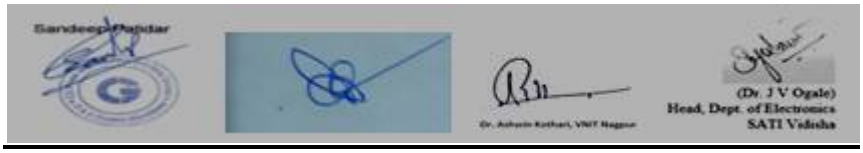
SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE)
VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	**Course Title**	**Course Code**	**Credits - 3**			**Theory Paper**
			L	**T**	**P**	
DE-7	Process Control-II	EI-1881 (A)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	**Subject Name & Title**	**Maximum Marks Allotted**					**Total Marks**
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work/ Assignment	
EI-1881 (A)	Process Control-II	70	20	10	-	-	100

Course Objectives	The purpose of the proposed course is to present control theory that is relevant to the analysis and design of computer-controlled systems, with an emphasis on basic concepts and ideas.
Prerequisite Knowledge	Signals and System Analysis, Feedback Control System
Course Description	Analysis and design of discrete-time control systems, implementation of control systems using digital electronic systems. Applications to electrical systems.
Course Outcomes	Students will **CO-1** Acquire knowledge of different Transforms, process and systems. **CO-2** Apply knowledge to model continuous-time and discrete-time subsystems **CO-3** Analyze the stability of digital process control system. **CO-4** Able to identify and resolve implementation issues for computer-based control systems



Syllabus

UNIT-I

Digital Computer as a controller in process control loop, advantages and disadvantages of sampled-data control systems, Block diagram of sampled data / digital control system, discrete time signal, sampling of continuous signal, signal reconstruction, Folding / Aliasing, Ideal sampler, Sampling theorem & Nyquist frequency, Data conversion techniques uses of A/D, D/A and ZOH elements and First order Hold

UNIT-II

Definition and determination of the Z-plane and Z-transform, Mapping between S-plane and Z-plane, Z-transform theorems, The inverse Z-transform, Z-transform of system equations, Solution of linear difference equations using Z-transform, The pulse transfer function , Block diagram reduction for systems interconnected through samplers.

UNIT-III

Stability analysis of discrete systems in z-plane, stability analysis by using Bilinear transformation, Jury's stability test, Routh's test , steady-state error analysis of sampled-data control systems. Digital implementation of PID controller, Root locus Analysis.

UNIT-IV

State Space Analysis of Discrete Time Control System :State space representation of discrete time systems, Solution of discrete time state space equations, Pulse transfer function matrix, Eigen Values, Eigen Vectors, Discretization of continuous time state space equations.

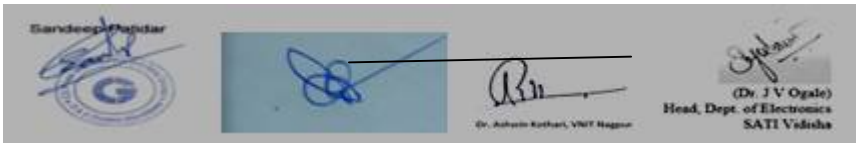
UNIT-V

Programmable Logic Controller: Architecture, Ladder Programming, Distributed Control System: Architecture, Fuzzy logic controller (FLC) – block diagram and computational steps, SCADA .

References:

1. Kuo, "Digital Control System", Oxford Press.
2. K Ogata, "Digital Control System", PHI.
3. William Bolton ,"Programmable Logic Controllers"

Text Book- Digital Control System Analysis and Design, by C. L. Phillips, H. T. Nagle:



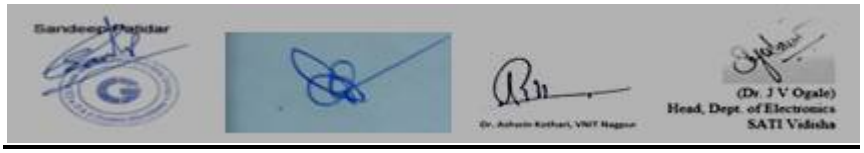
SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 3			Theory Paper
			L	T	P	
DE-7	Sensors and Actuators	EI-1881 (B)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work/ Assignment	
EI-1881 (B)	Sensors and Actuators	70	20	10	-	-	100

Course Description	This course is a study of sensors and actuators. How different sensor and Actuator works.
Prerequisite Knowledge	Basics of instrumentation, transducer.
Course Objectives	Upon completion of this course, the student will be able to: 1. To enable the students to learn various types of sensors, types of calibration, selection criteria and characteristics of the sensors. 2. To provide the knowledge of various actuators used in Industry. 3. To impart students with the knowledge of generalized sensor actuation systems. 4. To impart the students with the benefits of Robotic systems for an automating process.
Course Outcomes	This course primarily contributes to EI program outcomes that develop students abilities to: **CO1** Select a sensor/ actuator with suitable architecture, specifications for a given real world problem. **CO2** Design sensor actuation system for an industry automation problem. **CO3** Perform analysis, maintenance, calibration and troubleshooting of the sensor systems. **CO4** Suggest a Robotic based automation for Industry application..



Syllabus

Unit-I

Introduction to sensors: Sensors: Classification, Selection Criteria, Signal Conditioning, Calibration, Sensors characteristics. Principle of Operation: Linear and Rotational Sensors**,** Magnetic sensors, Optoelectronic sensors, Thermal sensors, Sensors used for closed loop position control, Sensors for interaction with the environment, Introduction to smart sensors, wireless sensors. Applications and circuitry arrangement of various sensors

Unit-II

Introduction to Actuators: Classification, Selection Criteria, Actuators characteristics. Principle of Operation: Electrical Actuators, Electromechanical Actuators, Electromagnetic Actuators, Magnetostrictive actuator, Hydraulic and Pneumatic Actuators, Hydraulic and Pneumatic Actuators, Smart Material Actuators. Advanced actuators: Ultrasonic motors, artificial muscles, Micro and Nano actuators. Applications and Circuitry arrangement of various actuators.

Unit-III

Introduction to Pneumatic System: components of a pneumatic actuation system, Compressors, Compressed air Treatment unit, Pneumatic Valves. Application of pneumatics system in automation, Modeling a Pneumatic System for automation, limitations of pneumatics system.

Unit-IV

Introduction to Hydraulics System: components of a hydraulic actuation System, Pumps, Motors and Valves, Application of hydraulic system in automation, hydraulic circuit design for automation, limitations of hydraulic system

Unit-V

Industrial Robotic System Robot Control Systems, End Effectors, Sensors in Robotics, Industrial Robot Applications, Robot Programming overview.

Text Books:

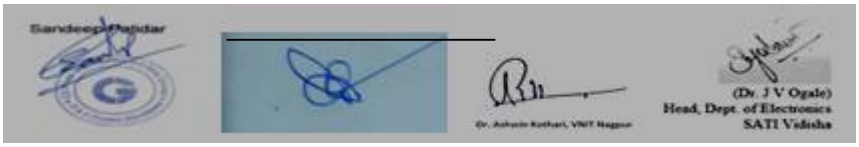
1. Hydraulics and Pneumatics by Andrew Parr, JAICO Publishing Home, Ahmedabad
2. Robotics and Control by R. K. Mittal and I. J. Nagrath, McGraw Hill Education (India) Private Limited.
3. The Mechatronics Handbook, CRC Press.
4. Sensors & Actuators by Clarence W de Silva, CRC Press.

Reference Books:

1. Micro and smart systems – K J Vinoy, G K Ananthasuresh, S Gopalakrishnan, K N Bhat, Wiley
2. Industrial Automation and Robotics by Er. A. K. Gupta and S. K. Arora, University Science Press, Laxmi Publishing Pvt. Ltd.

3 Pneumatic Instrumentation, Majumdhar

4 Industrial Hydraulics, Pipenger.



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE)
VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 3			Theory Paper
			L	T	P	
DE-7	Wireless Networks	EI-1881 (C)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1881 (C)	Wireless Networks	70	20	10			100

Course Objectives	To expose the students to understand wireless communication principles and to study the recent trends adopted in cellular systems and wireless standards.
Prerequisite Knowledge	Basic knowledge of Analog & Digital Communication and Modulation Technique.
Course Description	This course covers the concept necessary to design a Wireless communication system. It Introduces Radio Propagation and Transmission Principles used in different wireless communication system.
Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* **CO-1**Aware about most advanced standards, the future of digital wireless communication systems & networks. **CO-2**Understand cellular concept, mobile radio environment, **CO-3**Understand and analyze signals generation, modulation & processing, multiuser systems. **CO-4**Able to measure interference and provides solution for reduction.

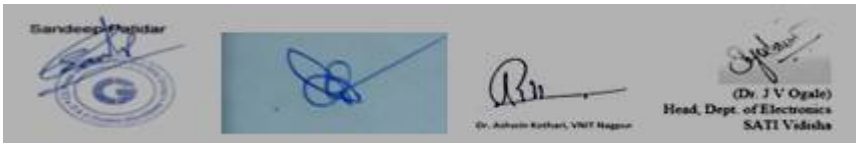
Syllabus

Unit I

Contents Introduction to wireless digital communication systems; block diagram of a typical RF transceiver, radio propagation and cellular engineering concepts; frequency reuse, frequency management and channel assignment, handoff and handoff strategies, trunking theory, coverage and capacity improvements,

Unit II

medium access techniques, FDMA, TDMA, CDMA, SDMA. Modulation methods: Multiple access technologies: Comparison of TDMA, FDMA and CDMA technologies based on their signal separation techniques, advantages, disadvantages and application areas, spectral efficiency calculations for these techniques.



Unit III

Basic digital modulation methods; ASK, PSK and FSK; Quadrature multiplexing and its applications; advanced modulation methods QPSK, QAM, MSK, GMSK, applications of differential coding, OFDM, MIMO.

Unit IV

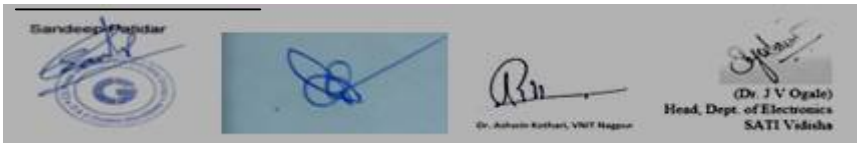
Spread Spectrum methods: basics; generation and properties of PN sequences, DS-SS system analysis; slow and fast FH-SS system;

Unit V

performance analysis. Interference measurement and reduction, co-channel and other interference, Diversity methods for Mobile Wireless Radio Systems, concepts of diversity branch and signal paths, combining and switching methods, C/N and C/I ratio improvements, average Pe improvements

Suggested Text Books

1. Theodore Rappaport, “Wireless Communication: Principles and Practices”, Pearson Education 2nd edition
2. Feher, “Wireless Digital Communication”, PHI
3. John Proakis, “Digital communication”, Tata- McGraw-Hill, 3rd edition
4. Simon Haykin , ”Digital communication”, Wiley
5. Simon Haykin, “Communication systems”, Wiley, 4th edition



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 3			Theory Paper
			L	T	P	
OC-5	Operating Systems & Computer Networks	EI-1882(A)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work/ Assignment	
EI-1882(A)	Operating Systems & Computer Networks	70	20	10	-	-	100

Course Description	This course is a study of the operating systems services and functions and multi programming, CPU switching algorithms. Concepts of memory management and process management and scheduling, concepts of virtual memory and deadlocks avoidance and study of I/O Systems & I/O Interface. Distributed Systems & Network types.
Prerequisite Knowledge	Basic of Computers
Course Objectives	Upon completion of this course, the student will be able to: 1. General understanding of structure of modern computers 2 .Purpose, structure and functions of operating systems 3. Illustration of key aspects of I/O Systems. 4. Understanding of Distributed Systems & Remote Sensing.
Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* 1. Describe the general architecture of computers 2. Describe, contrast and compare differing structures for operating systems 3. Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, Scheduling, I/O and files. 4. Understanding of Distributed Systems & Remote Services.

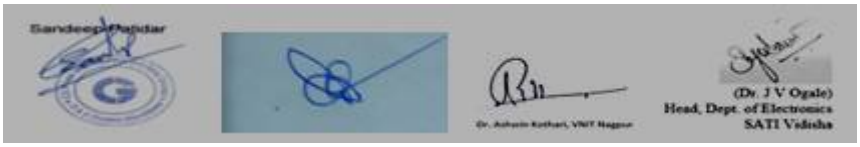
Syllabus

Unit-I

Introduction to the principles of operating systems and concurrent programming. Operating system services, multiprogramming, time sharing system, storage structures, system calls, and multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluate on, multiple processor scheduling

Unit-II

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, paging combined with Segmentation. Concepts of virtual memory, demand and page replacement algorithms, allocation of frames, thrashing, demand segmentation.



Unit-III

Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

Unit-IV

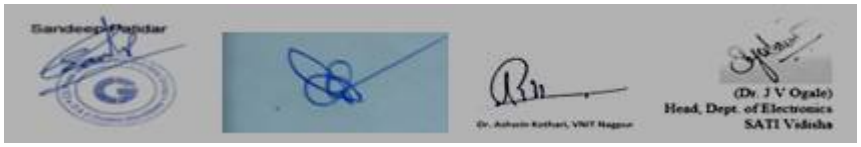
I/O systems : Overview, I/O Hardware, Application, I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations, Performance.

Unit-V

Distributed Systems: Background, Motivation, Topology, Network Types, Communication, Design Strategies, Networking, Network Operating Systems, Distributed Operating Systems, Remote Services, Design Issues.

Text Books:

1. Operating System Concepts, Abrahum Silberschatz & Galvin, John Willy & Sons.
2. Operating Systems, Sibshankar Holder & Alex A Arvind, Pearson Education.
3. An Introduction to Operating System, Harry M Dietel, Pearson Education.
4. Operating System: Principle and Designm Pavitra Pal Choudhry PHI Learning.
5. Operating Systems: Internals & Design Principles, 6th Edition, Pearson Education.



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE)
VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	**Course Title**	**Course Code**	**Credits - 3**			**Theory Paper**
			L	**T**	**P**	
OC-7	Quality And Reliability Of Electronic Systems	EI-1882(B)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	**Subject Name & Title**	**Maximum Marks Allotted**					**Total Marks**
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1882(B)	Quality And Reliability Of Electronic Systems	70	20	10	-	-	100

Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* CO1 Understand the relevance of reliability concepts for electronic systems CO2 Develop systematic procedure to Investigate a failure CO3 Plot and interpret reliability and survival graphs from the data of a given product CO4 Identify the methods to determine the system availability and maintenance

Syllabus.

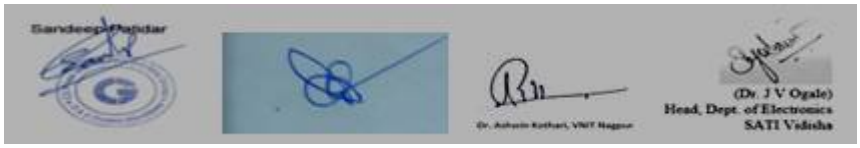
UNIT-I

Introduction: Definition and Importance of Quality and Reliability.

Concepts of Reliability Causes of failure, Life characteristic pattern, Modes of failure, Measures of Reliability, Derivation of the Reliability Function, Reliability Specifications.

UNIT-II

Failure Analysis Technique Failure investigation, Data collections, Data forms, Data Sources Reliability Analysis, Use of Probability distributions, Calculation of performance parameters, Survival curves and their Calculation, Calculation of failure rate, application of Weibull Distribution.



UNIT-III

System Reliability & Modeling: Types of Systems, Series, Parallel, Series-Parallel, and Parallel-Series system, Standby Systems , Types of Standby redundancy. Reliability of different systems, nature of reliability problems in electronic equipment, selection of components.

UNIT-IV

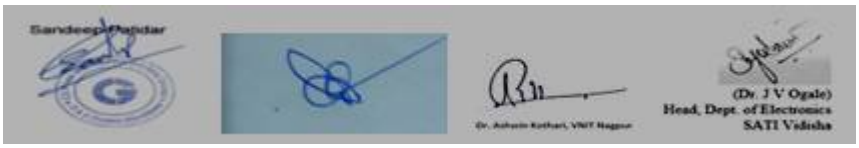
Simulation & Reliability Prediction: Generation of Random Numbers, Generation of random observations from a probability distribution, Applicability of Monte-Carlo Method, Simulation languages.

UNIT-V

Maintainability and Availability Objectives of maintenance, designing for optimum maintainability and measure of maintainability Availability: Uptime ratio, down time ratio and system availability.
Quality Reliability and Safety Reliability and Quality Control, Quality Circles, Safety factor, increasing safety factors and Case Studies

Suggested Text Books

1. A.K.Govil, Reliability Engineering, TMH, 1983
2. B.S.Dhillion, Reliability Engineering in Systems Design and Operation, Van Nostrand Reinhold Co., 1983



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE)
VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 3			Theory Paper
			L	**T**	**P**	
OC-7	Spectral Estimation	EI-1882(C)	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1882(C)	Spectral Estimation	70	20	10	-	-	100

Prerequisite Knowledge	Signals & Systems, DSP
Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* CO1 Estimate the spectrum of data sequence using non-parametric methods and evaluate the quality of the spectral estimate CO2 Analyze maximum entropy, minimum variance and Burg's parametric methods for AR, MA, and ARMA models. CO3 Compare adaptive filter principles for noise cancellation and signal enhancement using LMS&RLS algorithms CO4 Apply estimation technique for radar signal detection in noise(Neyman – Pearson criterion and Baye's theory)

Syllabus.

UNIT-I

Power Spectral Density: Energy spectral density of deterministic signals, Power spectral density of random signals, Properties of PSD.

UNIT-II

PSD Estimation : Non-parametric methods Estimation of PSD from finite data, Nonparametric methods : Periodogram properties, bias and variance analysis, Blackman Tuckey method, Window design considerations, time-bandwidth product and resolution - variance trade-offs in window design, Refined periodogram methods : Bartlet method, Welch method

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UNIT-III

PSD Estimation: Parametric methods: Parametric method for rational spectra:- Covariance structure of ARMA process, AR signals, Yule-Walker method, Least square method, Levinson-Durbin Algorithm, MA signals, Modified Yule-Walker method, Twostage least square method, Burg method for AR parameter estimation.

UNIT-IV

Parametric method for line spectra:- Models of sinusoidal signals in noise, Non-linear least squares method, Higher order Yule-Walker method, MUSIC and Pisarenko methods, Min-norm method, ESPRIT method.

UNIT-V

Filterbank methods: Filterbank interpretation of periodogram, Slepia base-band filters, refined filterbank method for higher resolution spectral analysis, Capon method, Introduction to higher order spectra.

Suggested Text Books

1. J.G.Proakis: DSP Principles, Algorithms and Applications,PHI,1992.
2. Steven M.Kay: Modern Spectral Estimation, Theory and Applications,PHI, 1988.
3. Simon Haykin:Adaptive Filters,4th Edition,Pearson Education Asia,New Delhi, 2002.