INSTITUTE OF ENGINEERING & MANAGEMENT

(School of University of Engineering and Management, Kolkata)

DEPARTMENT OF ELECTRICAL ENGINEERING

SEMESTER WISE CURRICULAM

4th YEAR- 7th SEMESTER

Syllabus for B. Tech Admission Batch 2023-2027

Syllabus structure

Sl. No	Type of Course	Course Code	Course Name	L	T	P	S	Total Contact Hours	Credit Points
Theory									
1	Professional Elective Courses	PEC-EE 701	A. Digital Signal Processing B. Digital Control System C. Electric Drives	3	0	0		3	3
2	Open Elective Courses	OEC-EE 701	A. Embedded System B. VLSI Circuits	3	0	0		3	2
3	Open Elective Courses	OEC-EE 702	A. Big Data Analysis B. Computer Network	2	0	0		2	2
4	Humanities and Social Sciences including Management	HSMC-701	Human Resource Development & Organisational Behaviour	3	0	0		2	2
5	Humanities and Social Sciences including Management	ESPEE 701	Essential Studies for Professionals VII	2	0	0		2	0.5
SESSIONAL									
6	Project. Seminar and Industrial Training	PI-EE 781	Industrial Training/Internship				12w	-	4
7	Humanities and Social Sciences including Management	SDP 781	Skill Development for Professionals VII				2	2	0.5
8	Project. Seminar and Industrial Training	PWEE781	Project (Phase I)				6	6	3
Value Added Courses									
9	Massive Open Online Courses (MOOCs)	MOOCs	Massive Open Online Courses (MOOCs)						
10	Industry and Foreign Certification (IFC)	IFC	Industry and Foreign Certification (IFC)						
11	Mandatory Additional Requirements (MAR)	MAR781	Mandatory Additional Requirements (MAR)						
Total Credit Points of Semester				**13**	**0**	**0**	**8**	**20**	**17**

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus and Lesson Plan for B.Tech Admission Batch 2023-2027

Subject Name: Digital Signal Processing **Credit: 3** **Lecture Hours: 35**

Subject Code: PEC-EE 701 A

Pre-requisite: Basic knowledge of signals and systems, Fundamentals of Fourier and Laplace transforms, Basic calculus and linear algebra

Course Objective:

1. To impart a solid foundation in discrete-time signal processing including the analysis and design of LTI systems.
2. Understanding Z-transforms, DFTs, FFTs, and digital filter design
3. Exposure to DSP hardware and FPGA implementation.

Relevant Links:

Study Material 1 NPTEL **Coursera** Linkedin Learning

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**Discrete-time signals and systems** Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals -aliasing; Sampling theorem and Nyquist rate.	Aligns with signal processing in communication and control systems, foundational in courses by MIT, Coursera	9	Signal generation, convolution (manual and MATLAB), LTI system verification	Oppenheim & Schafer / Proakis & Manolakis	Ch. 1, 2
2	**Z-transform** z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using z-transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.	Used in DSP chip design, MATLAB DSP toolbox, IEEE courses on Z-transform and FFT	8	Z-transform and DFT computation, circular convolution, FFT with signal samples	Proakis & Manolakis	Ch. 3, 4, 5
3	**Discrete Fourier Transform** Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems	Industry filter design tools (e.g., FDA Tool in MATLAB), used in audio/image systems	5	FIR/IIR filter design using MATLAB, verification of frequency response	Proakis & Manolakis	Ch. 6, 7

4	**Design of Digital filters** Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low-pass, Band-pass, Band-stop and High-pass filters. Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multi-rate signal processing.	Matches Texas Instruments' DSP courses, Xilinx FPGA design flows	7	Writing basic code for DSP operations, mapping simple algorithms on FPGA	TMS320C54xx Docs / FPGA Literature	Manuals + Supplement Notes
5	**Applications of Digital Signal Processing** Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.		6			

Course Outcome:

Upon successful completion of this course, students will be able to:

CO1 Analyze and classify discrete-time signals and systems.

CO2 Apply Z-transform and convolution for system analysis.

CO3 Understand and implement DFT/FFT algorithms.

CO4 Design digital IIR and FIR filters. Familiarize with DSP processors and FPGA implementation of DSP algorithms.

Lesson Plan:

Module 1: Discrete-Time Signals and LTI Systems

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Introduction to discrete-time signals, sampling and reconstruction concepts
2	Periodic, energy, power signals; basic sequences (unit-step, ramp, etc.)
3	Arithmetic operations on sequences
4	Introduction to LTI systems and impulse response
5	Convolution concepts: graphical, analytical, overlap-add methods
6	Properties of convolution and interconnections of LTI systems
7	Stability and causality in LTI systems
8	Recursive and non-recursive systems

Module 2: Z-Transform, DFT, FFT

WORKING DAY	LESSON PLAN – DESCRIPTION
9	Definition of Z-transform, s-plane/z-plane mapping, ROC
10	Properties of Z-transform with examples
11	Inverse Z-transform: power series, contour, partial fractions
12	Convolution and correlation via Z-transform
13	DFT and IDFT definitions, twiddle factors, matrix form
14	Circular convolution: graphical and matrix methods
15	Linear filtering using DFT, aliasing error
16	Overlap-Save and Overlap-Add methods

17	FFT: Introduction, Radix-2 DIT and DIF algorithms
18	FFT butterflies, signal flow, bit reversal examples

Module 3: Filter Design

WORKING DAY	LESSON PLAN – DESCRIPTION
19	IIR vs FIR filters, system functions, difference equations
20	IIR filter design using impulse invariant and bilinear transforms
21	FIR filter design – linear phase concepts, number of taps
22	FIR filter design using rectangular and Hamming windows
23	FIR design using Blackman window; practical filter specification

Module 4: DSP Processor and FPGA

WORKING DAY	LESSON PLAN – DESCRIPTION
24	Architecture of TMS320C5416/6713 DSP processor
25	Instruction set and writing basic assembly programs
26	Introduction to FPGA architecture and design flow
27	Sub-systems and algorithm mapping on FPGA
28	Case study and design example on FPGA-DSP integration
29	Revision and Q&A

Module 5: Applications of Digital Signal Processing

WORKING DAY	LESSON PLAN – DESCRIPTION
30	Correlation Functions and Power Spectra,
31	Stationary Processes,
32	Optimal filtering using ARMA Model,
33	Linear Mean-Square Estimation,
34	Wiener Filter.
35	Revision and Q&A

Text Books:

1. **John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, 4th Edition, Pearson Education.**
2. **Sanjit K. Mitra*, Digital Signal Processing: A Computer-Based Approach*, 4th Edition, McGraw-Hill.**

Reference Books:

1. **Alan V. Oppenheim and Ronald W. Schafer, Discrete-Time Signal Processing, 3rd Edition, Pearson Education.**

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3		1	1						1
CO2	3	3	1	2	2						1
CO3	2	3	3	2	2						1
CO4	2	3	3	2	2						2

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus and Lesson Plan for B.Tech Admission Batch 2023-2027

Subject Name: Digital Control System **Credit: 3** **Lecture Hours: 40**

Subject Code: PEC-EE 701B

Pre-requisite: control systems, discrete-time signals and systems, and Laplace/Z-transform techniques.

Course Objective:

The purpose of learning this course is-

1. To find Z-tranaform and inverse Z-transform of systems.
2. To carry out the analysis and design of digital control systems
3. To design compensators for digital control system to achieve desired specifications.
4. To represent digital control systems using state space models.
5. To analyze the effect sampling on stability, controllability and observability.
6. To design digital controllers for industrial applications.
7. To solve numerical problems on the topics studied.

Relevant Links:

Study Material 1 **Study Material 2**	**nptel**	coursera	linkedin learning

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**Discrete Representation of Continuous Systems:** Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modelling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.	Aligned with industrial automation and embedded digital controllers	6	Sample-and-hold modeling, quantization, and ZOH in MATLAB	Ogata, Kuo	Ogata Ch. 1, Kuo Ch. 2
2	**Discrete System Analysis:** Z Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z-plane. Solution of Discrete time systems. Time response of discrete time system.	Matches with modeling and analysis of discrete-time systems in DSP applications	6	Z-transform and inverse operations, pulse transfer functions	Ogata, Kuo	Ogata Ch. 2–3
3	**Stability of Discrete Time System** Stability analysis by Jury test.Stability analysis using bilinear transformation. Design of digital control system with deadbeat response. Practical issues with deadbeat response design.	Used in control systems for aerospace and robotics; Jury's test widely adopted	4	Jury test implementation and stability check using MATLAB	Ogata	Ch. 4
4	**State Space Approach for discrete time systems** State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability,	Related to modern control theory and model-based design in Mechatronics	10	Controllability and observability verification using MATLAB	Kuo, Ogata	Kuo Ch. 5, Ogata Ch. 5

	Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability.					
5	**Design of Digital Control System** Design of Discrete PID Controller, Design of discrete statefeedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.	Widely used in PLC, embedded, and motion control design platforms	8	PID tuning, state feedback design, observer simulation	Ogata	Ch. 6
6	**Discrete output feedback control** Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems	Reflects current research in fast output sampling, periodic feedback in smart grids	8	FOS-based controller and output feedback design in simulation tools	Research articles + Kuo supplementary	Supplementary Notes

Course Outcome:

CO1: Apply Z-transform techniques and obtain discrete-time representations of continuous-time systems, including pulse transfer functions and sampled-data models.

CO2: Analyze the performance and stability of discrete-time control systems using time-domain response, z-plane concepts, Jury stability criterion, and bilinear transformation.

CO3: Develop and evaluate state-space models of discrete-time systems and examine their controllability, observability, reachability, reconstructibility, and Lyapunov stability.

CO4: Design and analyze digital controllers, including PID controllers, state-feedback controllers, observers, compensators, and output-feedback control schemes for discrete-time systems.

Lesson Plan:

Module 1: Discrete Representation of Continuous Systems

Working Day	Lesson Plan – Description
1	Introduction to Digital Control Systems, advantages and applications of digital control.
2	Continuous-time and discrete-time signals and systems.
3	Sampling process and sampling theorem.
4	Sample and Hold (S/H) circuit and its characteristics.
5	Mathematical modeling of Sample and Hold circuit.
6	Effects of sampling and quantization in digital control systems.
7	Choice of sampling frequency and sampling period.
8	Zero-Order Hold (ZOH) and ZOH equivalent of continuous systems.

Module 2: Discrete System Analysis

Working Day	Lesson Plan – Description
9	Introduction to Z-transform and its properties.
10	Computation of Z-transform of standard signals.
11	Inverse Z-transform techniques.
12	Advanced Z-transform and important theorems.
13	Pulse Transfer Function (PTF) and its derivation.
14	Closed-loop pulse transfer function analysis.
15	Mapping between s-plane and z-plane.
16	Solution of discrete-time systems using Z-transform.
17	Time response analysis of discrete-time systems.

Module 3: Stability of Discrete-Time Systems

Working Day	Lesson Plan – Description
18	Concept of stability in discrete-time systems.
19	Jury Stability Criterion and construction of Jury table.
20	Numerical problems on Jury stability analysis.
21	Bilinear transformation and stability analysis.
22	Deadbeat response design concept.
23	Design procedure for deadbeat controllers and practical limitations.

Module 4: State Space Approach for Discrete-Time Systems

Working Day	Lesson Plan – Description
24	State-space representation of discrete-time systems.
25	State transition equation and solution of state equations.
26	State-space analysis and system response.
27	Lyapunov stability analysis of discrete-time systems.
28	Concept of controllability and controllability tests.
29	Reachability analysis and numerical examples.
30	Observability concepts and observability tests.
31	Reconstructibility and its significance.
32	Effect of pole-zero cancellation on controllability.
33	Effect of pole-zero cancellation on observability.

Module 5: Design of Digital Control Systems

Working Day	Lesson Plan – Description
34	Design of discrete PID controllers.

Working Day	Lesson Plan – Description
35	Tuning and implementation of digital PID controllers.
36	Design of discrete state-feedback controllers.
37	Pole placement techniques in discrete systems.
38	Design of set-point tracking controllers.
39	Design of discrete observers for LTI systems.
40	Design of discrete compensators and performance evaluation.

Module 6: Discrete Output Feedback Control

Working Day	Lesson Plan – Description
41	Introduction to output feedback control.
42	Design of discrete output feedback controllers.
43	Fast Output Sampling (FOS): concept and advantages.
44	Mathematical formulation of FOS-based control.
45	Periodic output feedback controller design.
46	Stability and performance analysis of output feedback systems.
47	Industrial applications and case studies of digital control systems.
48	Course review, numerical problem solving, and discussion.

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	0	1	0	0	0	1
CO2	3	3	2	2	2	1	1	0	0	0	1
CO3	3	3	2	2	2	0	1	0	0	0	1
CO4	3	2	2	2	2	1	1	0	0	0	1

Text Book:

- **K. Ogata, *Discrete-Time Control Systems*, Pearson Education, 2nd Edition**
- **B.C. Kuo, *Digital Control Systems*, Oxford University Press**

Reference Books:

G.F. Franklin, J.D. Powell, M. Workman, *Digital Control of Dynamic Systems*, Pearson

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus and Lesson Plan for B.Tech Admission Batch 2023-2027

Subject Name: Electrical Drives **Credit: 3** **Lecture Hours: 35**

Subject Code: PEC-EE 701C

Pre-requisite: Electrical Machines, Power Electronics

Course Objective:

1. To understand basic concept, classification and principle of operation of Electric Drive.
2. To understand methods of starting and braking of Electric Drive.
3. To understand methods of control of speed of DC and AC machines
4. To solve problem related to Electric Drive

Relevant Links:

Study Material	https://nptel.ac.in/courses/108104140	https://www.coursera.org/learn/electrical-concepts	**https://www.linkedin.com/learning/electrical-systems-panel-boards-frequency-drives-and-transformers/what-do-electricians-mainly-use-in-their-work?u=229219690**

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**DC motor characteristics** Review of emf and torque equations of DC machine, review of torque-speed characteristics of separately excited dc motor, change in torque-speed curve with armature voltage, example load torque-speed characteristics, operating point, armature voltage control for varying motor speed, flux weakening for high speed operation.	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/ **Industry:** MATLAB, PSIM	3	Not applicable	Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.	**1, 2**
2	**Chopper fed DC drive** Review of dc chopper and duty ratio control, chopper fed dc motor for speed control, steady state operation of a chopper fed drive, armature current waveform and ripple,	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/ **Industry:** MATLAB, PSIM	**4**	Not applicable	Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa	**4**

	calculation of losses in dc motor and chopper, efficiency of dc drive, smooth starting.				Publishing House.	
3	**Multi-quadrant DC drive** Review of motoring and generating modes operation of a separately excited dc machine, four quadrant operation of dc machine; single-quadrant, two-quadrant and four-quadrant choppers; steady-state operation of multi-quadrant chopper fed dc drive, regenerative braking.	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/ **Industry:** MATLAB, PSIM	6	1.Model and simulate the speed control of a DC motor using a chopper-controlled drive in electric vehicles. Focus on how speed is controlled in response to varying loads and terrain	Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.	**5**

4	**Closed-loop control of DC Drive** Control structure of DC drive, inner current loop and outer speed loop, dynamic model of dc motor – dynamic equations and transfer functions, modeling of chopper as gain with switching delay, plant transfer function, for controller design, current controller specification and design, speed controller specification and design.	**International Academia:** https://ocw.mit.edu/courses/6-685-electric- machines-fall-2013/ **Industry:** MATLAB, PSIM	**6**	1.Simulat e the speed control of an induction motor by adding external resistance in the rotor circuit using a chopper. This is used in variable-speed drive systems, such as those in rolling mills, crushers, or conveyors.	Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.	**6**
5	**Induction motor characteristics** Review of induction motor equivalent circuit and torque-speed characteristic, variation of torque-speed curve with (i) applied voltage, (ii) applied frequency and (iii) applied voltage and frequency, typical torque-speed curves of fan and pump loads, operating point, constant flux operation, flux weakening operation.	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/ **Industry:** MATLAB, PSIM	6	1.Model and simulate the performance of a brushless DC motor in an electric vehicle or a high- efficiency fan.	Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.	**7, 8, 9**
6	**Scalar control or constant V/f control of induction motor** Review of three-phase voltage source inverter, generation of three-phase PWM signals, sinusoidal modulation, space	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/	5		Electric Drives Concepts and Applications, Vedam Subrahmanyam,	**7**

	vector theory, conventional space vector modulation; constant V/f control of induction motor, steady-state performance analysis based on equivalent circuit, speed drop with loading, slip regulation	**Industry:** MATLAB,			2nd Edition, TMH.	
7	**Control of slip ring induction motor** Impact of rotor resistance of the induction motor torque-speed curve, operation of slip-ring induction motor with external rotor resistance, starting torque, power electronic based rotor side control of slip ring motor, slip power recovery.	**International Academia:** https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/ **Industry:** MATLAB,	**5**		Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.	**7, 8, 9**

Course Outcome:

CO1. Understand the fundamental principles of electric drives and their applications in various industries and systems.

CO2. Understand the performance and characteristics of various electric machines and their associated drives.

CO3. Understand the principles and operation of different power electronic converters used in electric drives and apply this knowledge to select and design suitable converters for specific applications.

CO4. Analyze and solve problems related to Electric Drives

Lesson Plan:

Week	Topic	Core Theoretical Concepts	Simulation/Lab Focus	Key Reference

1	**DC Motor Characteristics**	EMF/Torque equations, torque-speed curves, armature voltage control, flux weakening.	N/A	Dubey (Ch 1, 2)
2	**Chopper Fed DC Drive**	Duty ratio control, steady-state operation, current ripple, efficiency.	N/A	Dubey (Ch 4)
3	**Multi-Quadrant DC Drive**	Motoring/generating modes, 4-quadrant chopper topologies, regenerative braking.	EV speed control under varying terrain/load.	Dubey (Ch 4)
4	**Closed-loop DC Control**	Cascaded current/speed loops, plant modeling, PI controller design.	Rotor resistance control of IM for industrial drives.	Dubey (Ch 5)
5	**IM Characteristics**	Equivalent circuit, V/f variation, fan/pump loads, constant flux vs. flux weakening.	N/A	Dubey (Ch 6)
6	**Scalar (V/f) Control**	3-phase VSI, PWM/SVM generation, steady-state V/f analysis.	BLDC motor performance (EV/High-efficiency fan).	Subrahmanyam (Ch 5)
7	**Slip Ring IM Control**	Rotor resistance impact, starting torque, slip power recovery schemes.	N/A	Dubey (Ch 7, 8, 9)

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	0	1	0	0	0	1
CO2	3	3	2	2	2	1	1	0	0	0	1
CO3	3	3	2	2	2	0	1	0	0	0	1
CO4	3	2	2	2	2	1	1	0	0	0	1

Text Books:

1. Fundamental of Electrical Drives, G.K. Dubey, 2nd Edition, Narosa Publishing House.
2. Electric Drives Concepts and Applications, Vedam Subrahmanyam, 2nd Edition, TMH

Reference Books:

1. Electric Drives Concepts and Applications, Vedam Subrahmanyam, 2nd Edition, TMH.
2. A first course on Electrical Drives, S.K. Pillai, New Age International Publication.
3. Electric Drives, N.K. De, P.K.Sen, PHI Learning Pvt. Ltd.

Syllabus for B.Tech Admission Batch 2023-2027

Subject Name: Embedded System **Credit: 2** **Lecture Hours:** 40
Subject Code: OECEE701A

Relevant Links:

Study Material	nptel	coursera	**linkedin**

Course Objective:

The purpose of learning this course is-

1. To introduce the Building Blocks of Embedded System.
2. To Educate in Various Embedded Development Strategies.
3. To Introduce Bus Communication in processors, Input/output interfacing.
4. To impart knowledge in various processor scheduling algorithms.
5. To introduce Basics of Real time operating system and example tutorials to discuss on one real time operating system tool.

Detailed syllabus

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**Introduction to Embedded systems**: Introduction – Features – Microprocessors – ALU - Von Neumann and Harvard Architecture CISC and RISC - Instruction pipelining. Microcontroller: characteristics and Features, Overview and architectures of Atmel 89C52 and Microchip PIC16F877 and 18F452. Examples of embedded Systems: Bar-code scanner, Laser printer, Underground tank monitoring.		**10**	NA	Embedded Systems Architecture, Programming and Design, Ral Kamal TMH, 2008	Chapter 1,2
2	**PIC Microcontroller:** PIC Microcontrollers: 16F877 Architecture and Instruction Set. External Interrupts, Timers, watch-dog timer, I/O port Expansion, analog-to-digital converter, UART, I2C and SPI Bus for Peripheral Chips, Accessories and special features		**8**	NA	Embedded Systems Architecture, Programming and Design, Ral Kamal TMH, 2008	Chapter 3,4
3	**Software architecture and RTOS:** Software Architecture: Round Robin- Round Robin with interrupts -Function Queue. Scheduling Architecture RTOS: Architecture -Tasks and Task States -Tasks and Data -Semaphores and Shared Data Message Queues -Mail Boxes and pipes -Timer Functions -Events -Memory Management Interrupt Routines		**8**	NA	Embedded Systems Architecture, Programming and Design, Ral Kamal TMH, 2008	Chapter 5

4	**Basic design using a real time operating system**: Overview. General principles. Design of an embedded system.		**6**	NA	Embedded Systems Architecture, Programming and Design, Ral Kamal TMH, 2008	Chapter 3,7
5	**Software development tools and debugging techniques:** Development Tool: Cross-Compiler, Cross-Assemblers, Linker/locator. PROM Programmers, ROM Emulator, In-Circuit Emulators. Debugging Techniques. Instruction set simulators. The assert macro. Testing using laboratory tools.		**8**	NA	Embedded Systems Architecture, Programming and Design, Ral Kamal TMH, 2008	Chapter 12

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Acquire a basic knowledge about fundamentals of microcontrollers and programming and system control to perform a specific task.
CO2. Acquire knowledge about devices and buses used in embedded networking and develop programming skills in embedded systems for various applications.
CO3. Acquire knowledge about basic concepts of circuit emulators.
CO4. Acquire knowledge about Life cycle of embedded design and its testing

Lesson Plan:

Module	Working Day	Lesson Plan – Description
Module 1: Introduction to Embedded systems		
	1	**Syllabus discussion: Overview of the course structure, objectives, and outcomes**

	2	Introduction – Features – Microprocessors
	3	ALU - Von Neumann and Harvard Architecture
	4	CISC and RISC - Instruction pipelining
	5	Microcontroller: characteristics and Features
	6	Overview and architectures of Atmel 89C52
	7	Microchip PIC16F877 and 18F452
	8	Examples of embedded Systems: Bar-code scanner
	9	Laser printer
	10	Underground tank monitoring.
Module 2: PIC Microcontroller		
	11	IoT Networking Basics: Overview of internet communications, M2M communication
	12	MQTT Protocol: Basics, message structure, application examples in IoT
	13	CoAP and REST API: Introduction to CoAP, RESTful architecture, use in lightweight IoT systems
	14	Other Communication Protocols: RFID, IEEE 802.15.4, Zigbee; Comparison and use cases
	15	LoRa and Bluetooth: Low-power wireless technologies for IoT, application scenarios
	16	6LoWPAN and WiFi: Features and benefits for IoT, integration in IoT devices
	17	gRPC Protocol: Introduction, role in IoT communication, practical examples
	18	IoT Connectivity Technologies: Comparative study, design considerations
	19	Standards in IoT: International standards and regulations, role in global IoT deployment

	20	Lab Session on IoT Protocols: Practical implementation of MQTT and CoAP, network simulation tools
Module 3: Software architecture and RTOS		
	21	Introduction to Arduino Programming: Basics of Arduino IDE, simple LED and sensor programming
	22	Integration of Sensors: Interfacing analog and I2C sensors with Arduino, practical examples
	23	ESP8266 WiFi Module: Features, applications, connecting to Arduino for IoT projects
	24	Introduction to Python for IoT: Basics of Python programming, Python libraries for IoT
	25	MicroPython Programming: Overview, examples with ESP8266 and sensors
	26	Introduction to Raspberry Pi: Setup, features, basic IoT applications using Raspberry Pi
	27	Introduction to Pico: Features of Raspberry Pi Pico, IoT examples using MicroPython
	28	Implementation of Raspberry Pi using MicroPython: Part 1
	29	Implementation of Raspberry Pi using MicroPython: Part 2
	30	Lab Session on Microcontrollers: Hands-on integration of sensors and WiFi modules, IoT project simulation
Module 4: Basic design using a real time operating system		
	31	Introduction to Cloud Computing: Overview of cloud models and implementation, role in IoT data management
	32	IoT Data Storage and Analytics: Methods for storing and analyzing IoT data, challenges and solutions
	33	Machine Learning in IoT: Overview of ML concepts for IoT, applications in predictive analytics

	34	Selected ML Algorithms in IoT: Implementing algorithms like k-NN, regression, real-world use cases
	35	Cloud Platforms for IoT: Examples like AWS IoT Core, Google Cloud IoT, practical examples and integration
	36	IoT Analytics: Part 1
	37	Lab Session on Cloud Analytics: Uploading IoT data to the cloud, visualizing data using analytics tools
Module 5: Software development tools and debugging techniques		
	38	Home Automation and Precision Agriculture: Smart homes (lights, appliances, security systems), agriculture (irrigation, crop monitoring)
	39	Smart Vehicles and Traffic Management: IoT in autonomous vehicles, traffic optimization systems
	40	Smart Grid and Energy Optimization: IoT in energy management, examples of smart grids
	41	IoT in Healthcare: Wearable health monitoring devices, remote health diagnostics
	42	Real-World Design Constraints: Scalability, security, cost issues, overcoming real-world IoT challenges
	43	Capstone Project Review: Discussion of project ideas, course wrap-up, future trends in IoT
	44	Advanced IoT Applications: Exploration of cutting-edge IoT applications and technologies

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	-	-	-	-	-	2
CO2	3	3	2	1	2	-	-	-	-	-	1
CO3	3	3	3	2	3	-	-	-	-	-	1
CO4	3	3	3	2	2	-	-	1	-	-	2
CO5	3	2	3	2	3	-	-	1	1	-	2

Text Books

1. G. K. Dubey, “Fundamentals of Electrical Drives”, CRC Press, 2002.
2. R. Krishnan, “Electric Motor Drives: Modeling, Analysis and Control”, Prentice Hall, 2001.

Reference Books

1. Bimal K. Bose, “Modern power electronics and AC drives”, Prentics Hall, 2002.
2. W. Leonhard, “Control of Electric Drives”, Springer Science & Business Media, 2001.

G. K. Dubey, “Power Semiconductor Controlled Drives”, Prentice Hall, 1989.

Syllabus and Lesson Plan for B.Tech Admission Batch 2023-2027

Subject Name: VLSI Circuits **Credit: 2** **Lecture Hours: 40**

Subject Code: OEC-EE 701 B

Pre-requisite: Analog and Digital Electronics

Pre-requisite: Analog and Digital Electronics

Course Objective:

The purpose of learning this course is-

1. To design digital systems
2. To understand and implement verilog code.
3. To analyse Design of Arithmetic function

Relevant Links:

Study Material	nptel	coursera	**linkedin**

Detailed Syllabus

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**Introduction and Fundamental concepts:** MOS, PMOS, CMOS, and BiCMOS, Technologies, VLSI systems, CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and	**International Academia:** https://www.aicte.gov.in/sites/default/files/Final_ECE.pdf **Industry:** PSpice	9		Debaprasad Das, VLSI design, 2nd Edition, Oxford University Press	**2,3**

	dynamic logic structures interconnect analysis, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies, VLSI architecture.					
2	**VLSI Circuit Design Processes:** VLSI design flow, MOS layers, Stick diagram, Design rules and layout, Lambda-based	**International Academia:** https://www.aicte.gov.in/sites/default/files/Final_ECE.pdf **Industry:** MATLAB, PSIM	**9**		Debaprasad Das, VLSI design, 2nd Edition, Oxford University Press	**3, 4, 5**

	design rules for wires, contacts and transistors, Layout diagrams for NMOS and CMOS inverters and gates, Scaling of MOS circuits, limitations of scaling. FSM & HDL, different modeling styles in Verilog, Data types and objects, Dataflow.					

3	**Gate Level Design:** Logic gates and complex gates, switch logic, alternate gate circuits, sheet resistance R_s and its concept to MOS, area capacitance calculations, inverter delays, Fan-in and Fan-out	**International Academia:** https://www.aicte.gov.in/sites/default/files/Final_ECE.pdf **Industry:** MATLAB, PSIM	7		Debaprasad Das, VLSI design, 2nd Edition, Oxford University Press	**6, 8, 9**
4	**Packaging and Testing:** Types of IC packages, package models, Flip-chip package, CMOS	**International Academia:** https://www.aicte.gov.in/sites/default/files/Final_ECE.pdf	**5**		Debaprasad Das, VLSI design, 2nd Edition, Oxford	**13, 14, 15**

	testing, need for testing, Test principles, Design strategies for test, chip level and board level test techniques, FPGA, Xilinx				University Press	

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Apply arithmetic function

CO2. Obtain the Algorithmic State Machine Charts,

CO3. Design of memories

CO4. Obtain simulation, Synthesis, Place and Route, and Back Annotation

Lesson Plan:

Module	Working Day	Lesson Plan – Description
Module 1: Introduction and Fundamental concepts:		
	1	**Introduction and Fundamental concepts:**

		MOS, PMOS,
	2	CMOS, and BiCMOS, Technologies,
	3	VLSI systems, CMOS devices and circuits,
	4	standard CMOS fabrication processes,
	5	CMOS design rules, static and dynamic logic structures interconnect analysis,
	6	CMOS chip layout, simulation and testing,
	7	low power techniques,
	8	design tools and methodologies,
	9	VLSI architecture.
Module 2: VLSI Circuit Design Processes:		
	10	VLSI design flow, MOS layers,
	11	Stick diagram, Design rules and layout,
	12	Lambda-based design rules for wires, contacts and transistors,
	13	Layout diagrams for NMOS and CMOS inverters and gates,
	14	Scaling of MOS circuits, limitations of scaling.
	15	FSM & HDL,
	16	FSM & HDL,
	17	different modeling styles in Verilog,
	18	Data types and objects, Dataflow.

Module 3: Gate Level Design		
	19	Logic gates and complex gates,
	20	switch logic, alternate gate circuits,
	21	sheet resistance R_s and its concept to MOS,
	22	sheet resistance R_s and its concept to MOS,
	23	area capacitance calculations,
	24	inverter delays,
	25	Fan-in and Fan-out
Module 4: Packaging and Testing		
	31	Types of IC packages, package models,
	32	Flip-chip package, CMOS testing, need for testing,
	33	Test principles, Design strategies for test,
	34	chip level and board level test techniques,
	35	FPGA, Xilinx
	36	FPGA, Xilinx

CO-PO mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	–	1	–	–	–	–	–	2
CO2	2	3	3	2	3	–	–	1	–	–	2
CO3	2	3	2	3	2	–	–	–	–	–	2
CO4	2	2	3	2	3	–	–	1	1	–	3

Text Books

1. Kang, Leblebici, CMOS Digital Integrated Circuits Analysis & Design, 3rd Edition, PHI.
2. Debaprasad Das, VLSI design, 2nd Edition, Oxford University Press

Reference Books

1. N. Weste and K. Eshranghian, Principles of CMOS VLSI Design, Addison Wesley. 1985
2. L. Glaser and D. Dobberpuhl, The Design and Analysis of VLSI Circuits, Addison Wesley, 1985
3. C. Mead and L. Conway, Introduction to VLSI Systems, Addison Wesley, 1979.
4. J. Rabaey, Digital Integrated Circuits: A Design Perspective, Prentice Hall India, 1997.
5. D. Perry, VHDL, 2nd Ed., McGraw Hill International, 1995.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2023-2027

Subject Name: Big Data Analysis **Credit: 2** **Lecture Hours: 48**

Subject Code: OEC-EE 702 A

Pre-requisite: Data base management system

Course Objective(s):

The purpose of learning this course is-

1. Understand big data for business intelligence.
2. Learn business case studies for big data analytics.
3. Understand nosql big data management.
4. Perform map-reduce analytics using Hadoop and related tools

Course Outcomes:

At the end of this course, students will demonstrate the ability to

C**O1** Describe big data and use cases from selected business domains
C**O2** Explain NoSQL big data management
C**O3** Install, configure, and run Hadoop and HDFS
C**O4** Perform map-reduce analytics using Hadoop

Detailed Syllabus

Module	Content	Hour
1	What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.	8
2	Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.	8
3	Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures	9
4	MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats	10
5	Hbase, data model and implementations, Hbase clients, Hbase examples, praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.	7

6	Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.	6
Total		48

Suggested Learning Resources:

Text Books

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging
2. V.K. Jain, Big Data and Hadoop, Khanna Publishing House, New Delhi (2017)

Reference Books:

1. V.K. Jain, Data Analysis, Khanna Publishing House, New Delhi (2019).
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
4. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
6. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
8. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.

Alan Gates, "Programming Pig", O'Reilley, 2011.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus and Lesson Plan for B.Tech Admission Batch 2023-2027

Subject Name: Computer Network **Credit: 2** **Lecture Hours: 40**

Subject Code: OEC-EE 702 B

Pre-requisite: Analog Communication, Digital Communication, Wireless Networks, Embedded systems, Operating Systems

Course Objective:

To expose the students to the following:

1. Learn the functions of the different layer of the OSI Protocol.
2. Able to draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. Able to develop the network programming for a given TCP/IP protocol.

Relevant Links:

Coursera Hyperlinked	Nptel	LinkedIn Learning:	**Infosys Springboard:**

Detailed Syllabus

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	7		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 1, Ch 2
2	Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	8		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 10, Ch 11, Ch 12, Ch 13, Ch 14, Ch 15, Ch 16, Ch 17, Ch 18
3	Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	Academic Mapping: CTE Model Curriculum for6(aicte-india.org)	6		Data Communication and Networking, 4th Edition, Behrouz A.	Ch 19, Ch 20, Ch 21, Ch 22

		Industry Mapping:			Forouzan, McGrawHill	
4	Transport Layer-Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	6		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 23, Ch 24
5	Application Layer-Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	6		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 25, Ch 26, Ch 27, Ch 29

Course Outcome:

Upon completion of this course, students should be able to:

1. CO1: Remember functional block diagram of different network.
2. CO2: Explain the functions of the different layer of the OSI Protocol
3. CO3: Apply TCP/IP protocol for the network programming
4. CO4: Analyze the configuration of DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open-source available software and tools

TEXT BOOK:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.

REFERENCE BOOKS:

1. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
2. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
3. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
4. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2023-2027

Subject Name: Human Resources Development & Organisational Behaviour

Credit: 3 **Lecture Hours: 24**

Subject Code: HSMC- 701

Relevant Links:

Study material	Coursera	nptel	LinkedIn Learning	Infosys Springboard

List of Faculty Members handling the Subject –

1. Prof. Riya Barui
2. Prof. Dr. Samapika Das Biswas

Pre-requisite: English, Basic knowledge of Management

Course Objectives:

1. Develop an understanding of the fundamental concepts of Organizational Behaviour, including personality, attitude, and individual behaviour in organizational contexts.
2. Examine group dynamics and enhance interpersonal, teamwork, and communication skills for effective organizational functioning.
3. Analyze the causes and implications of organizational politics and apply ethical and strategic approaches to managing workplace challenges.
4. Understand various organizational design structures and evaluate their effectiveness in achieving organizational goals.

Detailed syllabus

Module	Topic	Sub-topics	Mapping with Industry & International Academia	Lecture Hours	Corresponding Lab Assignment / Activity	Text Book	Mapped Chapter
1	**Organizational Behaviour**	Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB.	**International Academia:** Harvard Business School Online, MIT OpenCourseWare. ***AICTE-prescribed syllabus:***	2	Case study on organizational behaviour in a leading company.	Organizational Behaviour – Robbins & Judge	1

			https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Employee behaviour, organizational effectiveness, workplace culture.				
2	**Personality and Attitudes**	Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction.	**International Academia:** Coursera (People Management), Wharton. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Recruitment, personality assessment, employee satisfaction.	2	Personality assessment and attitude survey.	Robbins & Judge	5
3	**Perception**	Definition, Nature and Importance, Factors influencing Perception, Perceptual electivity, Link	**International Academia:** MIT Sloan. ***AICTE-prescribed syllabus:***	2	Case study on perceptual errors in managerial decisions.	Robbins & Judge	6

		between Perception and Decision Making.	https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Decision-making, perception bias in organizations.				
4	**Motivation**	Definition, Theories of Motivation - Maslow's Hierarchy of Needs Theory, McGregor's Theory X & Y, Herzberg's Motivation-Hygiene Theory, Alderfer's ERG Theory, McClelland's Theory of Needs, Vroom's Expectancy Theory.	**International Academia:** Harvard Business Review. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Employee motivation and reward systems.	4	Compare motivation theories; prepare employee motivation plan.	Robbins & Judge	7, 8
5	**Group Behaviour**	Characteristics of Groups, Types of Groups, Stages of Group Development, Group Decision-Making.	**International Academia:** Stanford GSB. ***AICTE-prescribed syllabus:***	2	Group discussion and team-building exercise.	Robbins & Judge	9

			https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Team management and collaboration.				
6	**Communication**	Communication Process, Direction of Communication, Barriers to Effective Communication.	**International Academia:** MIT Sloan. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Business communication and workplace collaboration.	2	Role play and communication simulation.	Robbins & Judge	11
7	**Leadership**	Definition, Importance, Theories of Leadership Styles.	**International Academia:** Harvard Leadership Initiative. ***AICTE-prescribed syllabus:***	2	Leadership style self-assessment and case study.	Robbins &Judge	12

			https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Leadership in project and people management.				
8	**Organizational Politics**	Definition, Factors contributing to Political Behaviour.	**International Academia:** Harvard Business Review. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Organizational power and influence.	2	Case analysis on organizational politics.	Robbins & Judge	13

9	**Conflict Management**	Traditional vis-a-vis Modern View of Conflict, Functional and Dysfunctional Conflict, Conflict Process, Negotiation – Bargaining Strategies, Negotiation Process.	**International Academia:** Yale Negotiation Program. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Workplace conflict resolution and negotiation.	2	Negotiation role-play and conflict-resolution exercise.	Robbins & Judge	14
10	**Organizational Design**	Various Organizational Structures and their Effects on Human Behaviour, Concepts of Organizational Climate and Organizational Culture.	**International Academia:** MIT Sloan. ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Vol.%20I_UG.pdf **Industry Mapping:** Organizational restructuring and culture.	4	Analyze the organizational structure of a company.	Robbins & Judge	15, 16

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

CO1: Explain the fundamental concepts of Organizational Behaviour, including personality, attitude, and individual behaviour in organizations.

CO2: Analyze group behaviour and demonstrate effective interpersonal and communication skills in organizational settings.

CO3: Evaluate organizational politics and recommend appropriate ethical and strategic responses to workplace situations.

CO4: Assess different organizational design structures and propose improvements to enhance organizational effectiveness.

Lesson Plan:

Module 1: Organizational Behaviour: Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

Sl. No.	Day	Description	Recommended books for the topic
1	Lecture-1	Define Organizational Behaviour, its importance, and historical background.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

2	Lecture-2	Discuss key OB concepts, challenges, and future opportunities.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 2: Personality and Attitudes: Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

Sl. No.	Day	Description	Recommended books for the topic
3	Lecture-3	Explain the meaning of personality and its key determinants and traits.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
4	Lecture-4	Describe how personality develops and influences workplace behavior.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
5	Lecture-5		**Text Books:**

		Examine types of attitudes, their impact on job satisfaction, and organizational outcomes.	Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 3: Perception: Definition, Nature and Importance, Factors influencing Perception, Perceptual electivity, Link between Perception and Decision Making. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

Sl. No.	Day	Description	Recommended books for the topic
6	Lecture-6	Define perception and explain its nature and significance in organizational behaviour.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
7	Lecture-7	Identify key factors that influence perception and the concept of perceptual selectivity.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

8	Lecture-8	Analyze the link between perception and decision-making in the workplace.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 4: Motivation: Definition, Theories of Motivation - Maslow's Hierarchy of Needs Theory, McGregor's Theory X & Y, Herzberg's Motivation-Hygiene Theory, Alderfer's ERG Theory, McClelland's Theory of Needs, Vroom's Expectancy Theory. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

Sl. No.	Day	Description	Recommended books for the topic
9	Lecture-9	Define motivation and its relevance in influencing employee behavior and performance.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
10	Lecture-10	Discuss content theories of motivation including Maslow's, McGregor's, Herzberg's, Alderfer's, and McClelland's models.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

11	Lecture-11	Explain Vroom's Expectancy Theory and its application in understanding motivation at work.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 5: Group Behaviour: Characteristics of Group, Types of Groups, Stages of Group Development, Group Decision Making. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

12	Lecture-12	Describe the characteristics, types, and stages of group development in organizations	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
13	Lecture-13	Explore group decision-making processes and their impact on organizational effectiveness.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 6: Communication: Communication Process, Direction of Communication, Barriers to Effective Communication. . (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

14	Lecture-14	Explain the communication process and its directional flow within an organization.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
15	Lecture-15	Identify common barriers to effective communication and strategies to overcome them.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 7: Leadership: Definition, Importance, Theories of Leadership Styles. . (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

16	Lecture-16		**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education

		Define leadership and its importance in guiding and influencing teams	Organizational Behavior, Luthans, Fred, McGraw Hill
17	Lecture-17	Discuss major theories and styles of leadership in organizational settings.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 8: Organizational Politics: Definition, Factors contributing to Political Behaviour. . (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

18	Lecture-18	Define organizational politics and its role in workplace dynamics.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
19	Lecture-19		**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education

		Analyze key factors that contribute to political behavior in organizations.	Organizational Behavior, Luthans, Fred, McGraw Hill

Module 9: Conflict Management: Traditional vis-a-vis Modern View of Conflict, Functional and Dysfunctional Conflict, Conflict Process, Negotiation – Bargaining Strategies, Negotiation Process. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

20	Lecture-20	Compare traditional and modern views of conflict, including functional and dysfunctional aspects.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
21	Lecture-21	Examine the conflict process along with negotiation strategies and the negotiation process.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

Module 10: Organizational Design: Various Organizational Structures and their Effects on Human Behaviour, Conceptsof Organizational Climate and Organizational Culture. (Prof. Riya Barui Prof. Dr. Samapika Das Biswas)

22	Lecture-22	Introduce various organizational structures and their influence on employee behavior.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
23	Lecture-23	Explain the concept and significance of organizational climate in shaping workplace experiences.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill
24	Lecture-24	Discuss organizational culture and its role in guiding values, beliefs, and practices within an organization.	**Text Books:** Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education Organizational Behavior, Luthans, Fred, McGraw Hill

CO–PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	–	2	–	–	–	–	2	1	1	–	2
CO2	–	2	–	–	–	–	2	3	3	2	2
CO3	–	3	1	–	–	–	3	2	2	2	2
CO4	–	3	2	1	–	1	2	2	2	3	2

Suggested Learning Resources:

Text Books:

1. Organizational Behavior, Robbins, S. P. & Judge, T.A, Pearson Education
2. Organizational Behavior, Luthans, Fred, McGraw Hill

Reference Books:

1. Understanding Organizations – Organizational Theory & Practice in India, Shukla, Madhukar, PHI
2. Principles of Organizational Behaviour, Fincham, R. & Rhodes, P. , OUP
3. Management of Organizational Behavior Leading HumanResources, Hersey, P., Blanchard, K.H., Johnson, D.E.- PHI