CODE: A1EC405T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations APRIL 2026

Artificial Intelligence & Machine learning

Time: 3 Hours Branch: ECE **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	Define Machine Learning	2M	CO1	L2
	b	Analyze the need for clustering?	2M	CO1	L4
	c	Compare training and testing data.	2M	CO2	L3
	d	Define Maximum Likelihood Estimation.	2M	CO2	L1
	e	In a binary classification dataset, there are 12 positive and 4 negative samples. Calculate the entropy of the dataset.	2M	CO3	L4
	f	Explain about Bagging?	2M	CO3	L2
	g	Define Gradient Boosting.	2M	CO4	L1
	h	Explain about Bayesian Network?	2M	CO5	L3
	i	Analyze is the purpose of the Expectation Maximization algorithm?	2M	CO5	L3
	j	Explain latent variables in EM.	2M	CO6	L1
PART-B					
UNIT-I					
2		Derive Principal Component Analysis (PCA) with mathematical formulation.	10M	CO1	L4
OR					
3		Compare overfitting and underfitting	10M	CO1	L3
UNIT-II					
4		Derive backpropagation equations	10M	CO2	L3
OR					
5		Analyze about Bayesian Estimation	10M	CO2	L3
UNIT-III					
6	a	Analyze the problem of instability in decision trees with suitable examples.	5M	CO3	L4
	b	Examine and analyze the effectiveness of different stopping criteria used in decision tree construction.	5M	CO3	L3
OR					
7		For a spam email classifier, the following values are observed: TP = 140, TN = 180, FP = 35, FN = 45. Compute accuracy, precision, recall, specificity, and F1-score, and interpret the results.	10M	CO3	L3
UNIT-IV					
8		Derive the classification rule for Naive Bayes and explain its limitations.	10M	CO4	L3
OR					
9		Compare clustering algorithms: partitional, hierarchical, BIRCH, CURE, and density	10M	CO4	L2
UNIT-V					
10	a	Explain the reinforcement learning framework.	5M	CO5	L2
	b	Describe the steps involved in the Expectation Maximization algorithm	5M	CO6	L2
OR					
11		Analyze Q-learning in detail and compare it with SARSA.	10M	CO6	L4

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CODE: A1EC601	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations APRIL 2026

DIGITAL SIGNAL PROCESSING

Branch: ECE

Time: 3 Hours **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	What is meant by a Linear Time-Invariant (LTI) system? State its properties	2M	CO1	BTL4
	b	What is BIBO stability? State the condition for stability in terms of impulse response	2M	CO1	BTL1
	c	What is aliasing in sampling?	2M	CO2	BTL2
	d	Give any two applications of DFT	2M	CO2	BTL4
	e	Convert analog to digital system using impulse invariant method: H(s)=2/(s+2)	2M	CO3	BTL3
	f	Analyze the transfer function of a 4th-order Butterworth low-pass filter.	2M	CO4	BTL4
	g	Discuss the different types of windows used in FIR filter design?	2M	CO5	BTL1
	h	Find the windowed impulse response. If $h_d(n)$ = {1,2,1} & window w(n)={0.5,1,0.5}	2M	CO5	BTL3
	i	Define the purpose of the Index Register in TMS320C5X	2M	CO6	BTL1
	j	Explain the role of the Parallel Logic Unit (PLU).	2M	CO6	BTL1
PART-B					
UNIT-I					
2	a	Compute the convolution graphically of two sequences: $x(n) = \{1,1,1\ 1\}$ and $h(n) = \{2,2\}$.	10M	CO1	BTL3
OR					
3	a	Compute Z-Transform and Inverse Z-Transform using DTFT.	5M	CO1	BTL4
UNIT-II					
4	a	Compute the circular convolution of the following sequences using DFT and IDFT. $x(n) - \{1,2,3,4\}$, $h(n) - \{1,1,1,1\}$	5M	CO2	BTL3
OR					
5	a	Explain Radix-2 Decimation-in-Frequencyy (DIF) FFT algorithm with flow graph for an 8-point sequence. of $x(n) = \{1,0,0,0,0,0,0,0\}$	5M	CO2	BTL3
UNIT-III					
6	a	Design a Chebyshev Type-I digital low-pass filter using the impulse invariant transformation method for the following specifications: αp=1 dB, αs=20 dB,ωp=0.2π rad/sample, ωs=0.6π rad/sample, T=1 sec, Determine the order of the filter, analog transfer function H(s), and digital transfer function H(z).	10M	CO3	BTL3
OR					
7	a	Obtain the direct form I, direct form II, cascade, and parallel form realizations for the system: y(n)=−0.1y(n−1)+0.2y(n−2)+3x(n)+3.6x(n−1)+0.6x(n−2)	5M	CO4	BTL3

UNIT-IV					
8		Determine the frequency response of FIR filter defined by y(n)=0.25x(n)+x(n-1)+0.25x(n-2).Calculate the phase delay and group delay.	10M	CO5	BTL3
OR					
9	a	Draw the direct form and Linear phase implementation of the FIR system having difference equation: y(n) = x(n) – 2x(n-1) + 3x(n-2) – 10x(n-6)	10M	CO5	BTL3
UNIT-V					
10	a	Investigate the memory organization of TMS320C5X and its effect on execution speed.	5M	CO6	BTL4
	b	**Utilize Auxiliary Register ALU (ARAU) to generate effective addresses for a given data sequence.**	5M	CO6	BTL3
OR					
11	a	Differentiate the roles of CALU, ARAU, and PLU in enhancing computational efficiency.	5M	CO6	BTL4
	b	Demonstrate the data movement between functional units using the bus structure of TMS320C5X	5M	CO6	BTL3

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CODE: 23A05M02 | **R23** | **H.T.No:** | | | | | | | | | | |

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations MAY 2026

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Time: 3 Hours Branch: ECE (Minor) **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	Define Agent Environment in AI.	2M	CO1	BTL2
	b	List any four applications of AI.	2M	CO1	BTL3
	c	Define Greedy Best-First Search.	2M	CO2	BTL2
	d	Define Depth First Search (DFS).	2M	CO2	BTL2
	e	What is Backward Chaining in AI?	2M	CO3	BTL2
	f	What is a Rule-Based System?	2M	CO4	BTL2
	g	What is Naïve Bayes classifier?	2M	CO4	BTL2
	h	Define reinforcement learning.	2M	CO5	BTL2
	i	How is AI used in the Finance sector?	2M	CO5	BTL3
	j	Define AI bias.	2M	CO6	BTL3
PART-B					
UNIT-I					
2	a	List Various applications of AI	5M	CO1	BTL2
	b	Discuss about Goal based agent.	5M	CO1	BTL2
OR					
3	a	Compare and contrast Simple & Model based agents	10M	CO1	BTL3
UNIT-II					
4	a	Demonstrate BFS and DFS techniques with diagram	10M	CO2	BTL2
OR					
5	a	Formulate A*search with example.	10M	CO2	BTL4
UNIT-III					
6	a	Differentiate Forward and backward chaining	5M	CO3	BTL3
	b	Demonstrate Bayesian classification	5M	CO3	BTL3
OR					
7		Illustrate Propositional Logic.	10M	CO3	BTL3
UNIT-IV					
8		Demonstrate Decision Tree algorithm with example	10M	CO4	BTL4
OR					
9	a	Explain about supervised, unsupervised, reinforcement learning	5M	CO4	BTL2
	b	Demonstrate k-NN algorithm	5M	CO4	BTL4
UNIT-V					
10	a	Explain about Future trends: AGI and ethical AI	5M	CO5	BTL2
	b	Demonstrate AI in Robotics	5M	CO5	BTL3
OR					
11		Demonstrate role of AI in Vision, Healthcare and Finance	10M	CO6	BTL3

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CODE: A1EC602T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations APRIL 2026

Microwave and Optical Communications

Branch: ECE

Time: 3 Hours **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	What are TE and TM modes?	2M	CO1	BTL2
	b	What are TE modes?	2M	CO1	BTL3
	c	List types of attenuators.	2M	CO2	BTL2
	d	What is a magic tee?	2M	CO2	BTL3
	e	Explain the key phenomenon taking place in TRAPATT diode?	2M	CO3	BTL3
	f	Describe the short notes on power ratio method.	2M	CO3	BTL2
	g	Recall the V-number or normalized frequency of a fiber?	2M	CO4	BTL1
	h	Explain the term "mode field diameter" in single-mode fibers.	2M	CO4	BTL2
	i	What are the two types of LED configurations used in optical communication systems?	2M	CO5	BTL1
	j	What are the characteristics of hetero-structure LEDs?	2M	CO5	BTL1
PART-B					
UNIT-I					
2	a	Explain wave propagation in a rectangular waveguide. Derive the expression for propagation constant.	10M	CO1	BTL3
OR					
3	a	Discuss dispersion in waveguides and its effect on signal transmission.	10M	CO1	BTL6
UNIT-II					
4	a	Derive the scattering matrix for common microwave passive devices such as attenuator, phase shifter, and tee junctions.	10M	CO2	BTL3
OR					
5	a	Explain the working of a reflex klystron oscillator. Discuss bunching process, power output, and efficiency.	10M	CO2	BTL5
UNIT-III					
6	a	Model the calorimetric Technique used for measuring microwave medium power.	10M	CO3	BTL3
OR					
7	a	Develop the significance of the attenuation in microwave measurements techniques and the methods to measure it.	10M	CO3	BTL3
UNIT-IV					
8		Categorize the intrinsic and extrinsic absorption losses in detail.	10M	CO4	BTL4
OR					
9	a	An optical fiber link of length 8 km is used to transmit optical power. The mean optical power launched into the fiber is 120μW, and the mean optical power measured at the fiber output is 3μW. Determine the following: (a) The total signal attenuation (loss) in decibels (dB) over the 8 km fiber, assuming no connectors or splices are present. (b) The attenuation per kilometer of the optical fiber, expressed in dB/km.	10M	CO5	BTL3

UNIT-V					
10	a	Compare the PIN and APD diodes.	5M	CO5	BTL4
	b	Outline the major considerations for optical system design for digital link.	5M	CO5	BTL2
OR					
11	a	Categorize the LEDs and laser diodes as light sources in optical communication systems.	5M	CO5	BTL4
	b	Explain the structure and working of surface-emitting LEDs with neat diagrams.	5M	CO5	BTL2

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CODE: A1HS606f	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations APRIL 2026

Renewable Energy Sources

Branch: CSE & ECE

Time: 3 Hours **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	Define energy.	2M	CO1	BTL1
	b	List examples of conventional energy sources.	2M	CO1	BTL1
	c	List solar energy technologies.	2M	CO2	BTL1
	d	What are solar thermal devices?	2M	CO2	BTL1
	e	Define efficiency of PV cell.	2M	CO3	BTL1
	f	Define wind energy.	2M	CO4	BTL1
	g	List types of batteries.	2M	CO5	BTL1
	h	What is biomass energy?	2M	CO5	BTL1
	i	Define fuel cell.	2M	CO6	BTL1
	j	What is energy density?	2M	CO6	BTL1
PART-B					
UNIT-I					
2	a	Define energy and classify different energy sources.	5M	CO1	BTL2
	b	Apply methods to reduce energy consumption.	5M	CO1	BTL3
OR					
3	a	Explain the overview of non-conventional energy resources and their importance in modern energy systems.	10M	CO1	BTL3
UNIT-II					
4	a	Apply solar energy principles to design a solar water heating system for domestic use.	10M	CO2	BTL3
OR					
5	a	Define solar energy and solar radiation.	5M	CO2	BTL1
	b	Analyze advantages and limitations of solar energy.	5M	CO2	BTL3
UNIT-III					
6	a	Explain wind energy for electricity generation.	5M	CO3	BTL4
	b	Explain working of solar PV system.	5M	CO3	BTL3
OR					
7	a	Explain performance and durability of solar photovoltaic devices.	10M	CO4	BTL2
UNIT-IV					
8		Explain biomass energy conversion techniques and applications.	10M	CO5	BTL2
OR					
9	a	Describe types of batteries.	5M	CO4	BTL2
	b	Explain biomass energy for power generation.	5M	CO4	BTL2
UNIT-V					
10	a	Explain working of fuel cells.	5M	CO6	BTL2
	b	Explain concept to product development in energy systems.	5M	CO6	BTL3
OR					
11	a	Explain working of flywheel and supercapacitor energy storage systems.	10M	CO6	BTL2

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CODE: A1EC603T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B. Tech III Year II Semester Regular Examinations APRIL 2026

VLSI Design

Time: 3 Hours Branch: ECE **Max. Marks: 70**

Instructions:

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10 marks

PART-A					
1	a	Why NMOS passes weak logic '1' and strong logic '0'?	2M	CO1	BTL3
	b	What are the different regions of MOS transistor operation?	2M	CO1	BTL1
	c	Draw the BiCMOS inverter circuit.	2M	CO2	BTL3
	d	Define layout diagram.	2M	CO2	BTL2
	e	Define transmission gate.	2M	CO3	BTL1
	f	Define fan-out in CMOS circuits.	2M	CO4	BTL1
	g	What is a parity generator?	2M	CO5	BTL1
	h	What is full-custom design style?	2M	CO5	BTL3
	i	Define fault model.	2M	CO6	BTL1
	j	List any two design guidelines for testability.	2M	CO6	BTL3
PART-B					
UNIT-I					
2	a	What is threshold voltage of a MOS device and explain its significance.	5M	CO1	BTL2
	b	An NMOS transistor is operating in saturation region with the following parameters V_{gs}=5V,V_{tn}=1.2V,W_L =110, $\mu_n C_{ox}$=110 $\mu_A v^2$. Find the transconductance of the device.	5M	CO1	BTL3
OR					
3		Explain the basic fabrication process steps of CMOS technology with neat diagrams.	10M	CO1	BTL4
UNIT-II					
4		Explain lambda (λ)-based design rules for wires, contacts and Transistors.	10M	CO2	BTL3
OR					
5		Explain the VLSI design flow in detail from system specification to fabrication with a neat block diagram.	10M	CO2	BTL2
UNIT-III					
6	a	Analyze fan-in and fan-out in CMOS circuits.	5M	CO3	BTL3
	b	Explain wiring capacitances and their effects.	5M	CO3	BTL2
OR					
7	a	Derive delay expressions for CMOS inverter and explain influencing factors.	10M	CO3	BTL3
UNIT-IV					
8		Analyze gate array-based ASICs.	10M	CO4	BTL4
OR					
9	a	Compare full-custom and standard cell design styles.	5M	CO4	BTL3
	b	Analyze low power design parameters.	5M	CO4	BTL3
UNIT-V					
10	a	Explain BIST architecture	5M	CO5	BTL5
	b	Analyze observability and controllability.	5M	CO5	BTL3
OR					
11		Analyze DFT techniques with observability and controllability.	10M	CO6	BTL3

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