

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2026

Subject Name: **Digital Circuits 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	Simplify the Boolean expression $F(A,B,C)=A'B+AB'+ABC'$ using Boolean algebra laws.	2M	CO1	L1
	b	What is canonical form of Boolean functions?	2M	CO1	L1
	c	Compare PROM, PLA & PAL.	2M	CO2	L1
	d	List any 4 advantages of using a carry look-ahead adder.	2M	CO2	L1
	e	Write a Verilog code for a 4-to-1 multiplexer using behavior modelling?	2M	CO3	L2
	f	Explain the difference between structural and behavioral modeling in Verilog.	2M	CO3	L1
	g	What is edge triggering in flip flops?	2M	CO4	L1
	h	Mention data types used in Verilog HDL.	2M	CO4	L1
	i	Evaluate the key advantages of FPGAs over traditional PLDs.	2M	CO5	L1
	j	Develop a sequence detector for the sequence "101".	2M	CO5	L1

PART-B

UNIT-I

2		Design a combinational circuit that converts a 2-bit binary input into its Gray code equivalent. Derive the Boolean equations for each output bit.	10M	CO1	L3
---	--	--	-----	-----	----

OR

3	a	Represent +35 and -35 in sign magnitude, sign 1's complement and sign 2's complement representation.	5M	CO1	L3
	b	Minimize the following function: $F(A,B,C,D,E) = \sum(0,2,4,6,9,13,21,23,25,29,31)$ using K-map	5M	CO1	L3

UNIT-II

4		Implement a 3-to-8 decoder using 2-to-4 decoders.	10M	CO2	L6
---	--	---	-----	-----	----

OR

5	a	With neat block diagram, explain BCD adder circuit.	5M	CO2	L6
	b	Construct and explain Full adder using Two Half adders and one OR gate	5M	CO2	L6

UNIT-III

6	a	Draw and explain in detail about VHDL design flow.	5M	CO3	L2
	b	Develop a Verilog code for 2X1 Multiplexer using Behavioural modelling.	5M	CO3	L6

OR

7		Differentiate between synthesizable and non-synthesizable Verilog constructs.	10M	CO3	L2
---	--	---	-----	-----	----

UNIT-IV

8		Design a mod-6 synchronous counter using JK flip-flops. Provide the state diagram and excitation table.	5M	CO4	L6
---	--	---	----	-----	----

OR

9	a	Convert JK flip flop into SR flip flop.	5M	CO4	L2
	b	Explain the working of the following i) J-K flip-flop ii) S- R flip-flop iii) D flip-flop	5M	CO4	L3

UNIT-V

10		Evaluate the design trade-offs between CPLD and FPGA architectures in terms of speed, logic density, and application area.	10M	CO5	L3
----	--	--	-----	-----	----

OR

11		Construct a FSM for a traffic signal controller (red-green-yellow cycle).	10M	CO5	L6
----	--	---	-----	-----	----

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2026

SUBJECT NAME: ELECTRONIC DEVICES AND CIRCUITS

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	Define diffusion capacitance and transition capacitance.	2M	CO1	BTL1
	b	Define the term drift current?	2M	CO1	BTL1
	c	Explain the base width modulation.	2M	CO2	BTL2
	d	What is thermal runaway? How it can be avoided?	2M	CO2	BTL1
	e	Define h-parameter for a transistor.	2M	CO3	BTL1
	f	What is meant by body effect?	2M	CO3	BTL1
	g	Explain why FET is called a voltage-controlled device.	2M	CO4	BTL1
	h	Define pinch-off voltage in JFET.	2M	CO4	BTL2
	i	Draw the small-signal equivalent circuit of a MOSFET in CS configuration?	2M	CO5	BTL1
	j	Define the transconductance of MOSFET.	2M	CO5	BTL1
PART-B					
UNIT-I					
2	a	Discuss about effect of temperature on PN junction diode.	5M	CO1	BTL2
	b	A full-wave rectifier uses a transformer with secondary $V_{rms} = 12$ V, A capacitor filter of $1000 \mu\text{F}$ is connected across a load resistor of $1 \text{ k}\Omega$. (i) Calculate the DC output voltage, (ii) Find the ripple factor.	5M	CO1	BTL3
OR					
3	a	Explain the working of full wave bridge rectifier with circuit diagram and waveforms. Derive the relations for its ripple factor and efficiency.	10M	CO1	BTL3
UNIT-II					
4	a	Draw a voltage divider bias circuit and derive an expression for its Stability factor (S).	10M	CO2	BTL2
OR					
5	a	Illustrate and explain active region, saturation region and cut-off region in transistor Characteristics, mention the application of a transistor in each region.	5M	CO2	BTL4
	b	Draw and explain self-bias circuit. Mention its advantages over fixed bias circuit.	5M	CO2	BTL4
UNIT-III					
6	a	Draw the small signal model for conventional Common emitter amplifier and determine the expressions for voltage gain and input impedance.	10M	CO3	BTL3
OR					
7	a	Compare the three transistor amplifiers CB, CC, CE in terms of Voltage gain, Current gain, input impedance and output impedance.	5M	CO3	BTL3
	b	Determine I_C , I_E and α for a transistor circuit having $I_B=15\mu\text{A}$ and $\beta=150$.	5M	CO3	BTL2

UNIT-IV					
8	a	Explain the construction and working of Enhancement MOSFET with VI characteristics.	10M	CO4	BTL3
OR					
9	a	Explain the working of a depletion type MOSFET with its characteristics	5M	CO4	BTL2
	b	Design a JFET biasing circuit using self-bias method for $I_D=4$ mA, $I_{DSS} = 10$ mA, $V_P = -5$ V.	5M	CO4	BTL3
UNIT-V					
10	a	Draw the small signal equivalent circuit of a Common gate MOS amplifier and derive the expressions for its voltage gain, input impedance and output impedance.	10M	CO5	BTL4
OR					
11	a	Evaluate the role of source resistance in stability and gain reduction of MOS amplifiers	5M	CO5	BTL2
	b	Construct the small-signal equivalent model of a MOSFET amplifier with un-bypassed source resistance and calculate input resistance.	5M	CO5	BTL2

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B. Tech II Year I Semester Supplementary Examinations June 2026

Subject Name: **Probability and Complex Variables**

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	Explain probability with axioms?	2M	CO1 L1
	B	State Baye's theorem	2M	CO1 L2
	C	What is interval conditiongin	2M	CO2 L1
	D	Write the properties of characteristic function.	2M	CO2 L3
	E	Define first order central moments for X and Y	2M	CO3 L1
	F	Define joint probability distribution function.	2M	CO3 L1
	G	State Cauchy Riemann equations in Cartesian form.	2M	CO4 L3
	H	Define harmonic function	2M	CO4 L1
	I	State Cauchy's integral theorem.	2M	CO5 L1
	J	Find the residue of $f(z) = \frac{ze^z}{(z-1)(z-2)^2}$ at its pole.	2M	CO5 L1
PART-B				
UNIT-I				
2	A	Three cards are drawn from a pack of 52 well shuffled cards, Find the probability that a) 3 are spades, b) 2spades and 1 diamond .	5M	CO1 L2
	B	A bag I contains 2 white and 3 red balls and another bag II contains 4 white and 5 red balls. One ball is drawn at random from of the bags and is found to be red. Find the probability that it was drawn from the bag II.	5M	CO1 (L1, L3)
OR				
3	A	10 coins are thrown simultaneously. Find the probability of getting at least a) seven heads , b) six heads	5M	CO1 L2
	B	If $f(x) = \begin{cases} k(1-x^2), & \text{for } 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ be the density function of the random variable X ,then find i) k , ii) $P(0.1 \leq x \leq 0.2)$ and ii) $P(x \geq 0.5)$	5M	CO1 L2
UNIT-II				
4	a	If the joint pdf is given as $f_{XY}(x,y) = Ae^{-(2x+y)}$ for $x \geq 0, y \geq 0$, (i) Find the value of A and (ii) the marginal density functions.	5M	CO2 L2
	B	If X be a random variable with pdf $f_X(x) = \frac{1}{10}, -5 \ll x \ll 5$. Find i) E(X) ii) E(X ²)	5M	CO2 L2
OR				
5	A	Find the value of k for the function given below to be a valid pdf. $f_{X,Y}(x,y) = \begin{cases} k(x^2 + 4y^2), & -1 < x < 1 \text{ and } 0 \leq y < 2 \\ 0, & \text{elsewhere} \end{cases}$	5M	CO2 (L1, L5)
	B	i) Find a constant (in terms of a) so that the function $f(x,y) = \begin{cases} be^{-(x+y)}, & 0 < x < a \text{ and } 0 < y < \infty \\ 0, & \text{otherwise} \end{cases}$ is a valid joint density function Find an expression for the joint distribution function	5M	CO2 (L1, L5)

UNIT-III					
6	A	Consider two random variables such that $Y = -4X + 20$. The mean value and variance of X are 4 and 2 respectively. Find the correlation between X and Y.	5M	CO3	L2
	B	Write the Properties of jointly Gaussian random variables?	5M	CO3	L3
OR					
7	A	Let X and Y be random variables having joint density function $f(x,y) = \begin{cases} X+Y & \text{for } 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$ Find a) Var (X) , b) Var (Y) c) σ_{XY} d) ρ	10M	CO3	L3
UNIT-IV					
8	A	Show that the function $f(z) = \sqrt{ xy }$ is not analytic at the origin Although the C-R equations are satisfied at the origin	10M	CO4	L3
OR					
9	A	If $f(z)$ is a regular function of z , prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) f(z) ^2 = 4 f'(z) ^2$	5M	CO4	(L1, L3)
	B	Construct the analytic function $f(z)$ whose imaginary part is $3x^2y - y^3$	5M	CO4	L4
UNIT-V					
10	A	Evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$	10M	CO5	L3
OR					
11	A	Evaluate $\int_{A(1,1)}^{B(2,9)} f(z) dz$ where $f(z) = x^2 + ixy$ along i) the straight line AB ii) the curve $c : x=t, y=t^3$	10M	CO5	L3

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2026

Subject Name: **SIGNALS, SYSTEMS AND STOCHASTIC PROCESSES**

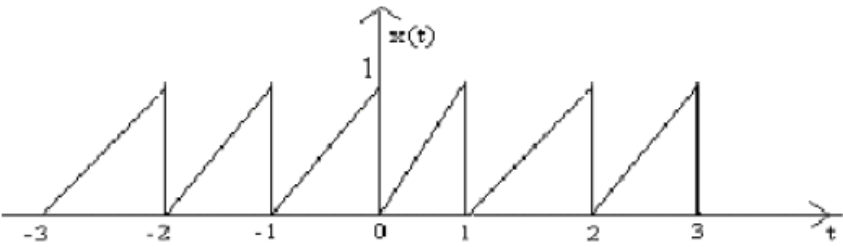
BRANCH: ECE

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	Define energy and power signals with examples.	2M	CO1	L1
	b	Write Dirichlet conditions for Fourier series	2M	CO1	L1
	c	Explain the concept of region of convergence for Laplace transforms.	2M	CO2	L2
	d	Find the Fourier transform of the signal $x(t) = 20 \sin(20t)$.	2M	CO2	L2
	e	Give the relationship between Bandwidth and Rise time.	2M	CO3	L2
	f	Define system bandwidth.	2M	CO3	L1
	g	What is Poisson process?	2M	CO4	L2
	h	Define Time average and Ergodicity?	2M	CO4	L1
	i	Define Cross-Power Spectrum function.	2M	CO5	L1
	j	What is the relationship between autocorrelation and PSD?	2M	CO5	L2
PART-B					
UNIT-I					
2	a	Explain the analogy between vectors and signals in terms of orthogonality and evaluation of component.	5M	CO1	L3
	b	Explain the various operations on signals?	5M	CO1	L3
OR					
3	a	Find the Trigonometric Fourier series for the sawtooth waveform $x(t)$ shown in Figure 1. Also, obtain Exponential Fourier series from Trigonometric Fourier series.	10M	CO1	L4
 <p style="text-align: center;">Figure 1</p>					
UNIT-II					
4	a	Determine the inverse Laplace of the following functions. (i) $1/s(s+1)(s+3)$, (ii) $3s^2 + 8s + 6 / (s+8)(s^2 + 6s + 1)$.	10M	CO2	L3
OR					
5	a	Find Inverse Laplace Transform of $X(s) = \frac{5s+3}{s(s^2+4s+13)}$ $\text{Re}(s) > 0$.	5M	CO2	L4

	b	Explain about effects of under sampling.	5M	CO2	L3
UNIT-III					
6	a	Define the Signal bandwidth and System bandwidth.	5M	CO3	L3
	b	Explain the ideal characteristics of LPF, HPF, BPF and BSF using their Magnitude and Phase responses.	5M	CO3	L3
OR					
7	a	Obtain conditions for the distortion less transmission through a system.	10M	CO3	L3
UNIT-IV					
8	a	List and explain the properties of Autocorrelation.	5M	CO4	L3
	b	Given the auto correlation function for a stationary ergodic process with no periodic components is $R_{XX(\tau)} = 25 + 4/(1 + 6\tau^2)$. Find mean and variance of process X(t).	5M	CO4	L4
OR					
9	a	Discuss in detail about: (i) First order stationary random process. (ii) Second order & Wide - Sense Stationary Random Process	5M	CO4	L3
	b	Prove that the random process $x(t) = \cos(\omega_l t + \theta)$ in ω_{SS} if is assumed that ω_l is a constant and θ is uniformly distributed variable in the interval $(0, 2\pi)$.	5M	CO4	L3
UNIT-V					
10	a	Explain about cross power spectrum density and its properties with proofs.	10M	CO5	L3
OR					
11	a	State and prove any four properties of PSD.	5M	CO5	L3
	b	A stationary random process x(t) with zero mean and auto correlation function $R_{xx}(\tau) = 3e^{-2 \tau }$ is applied to a system of transfer function $H(\omega) = \frac{1}{2 + j\omega}$ Determine PSD of the response?	5M	CO5	L4

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2026

Subject Name: Universal Human Values

Time: 3 Hours

Branch: CSE & ECE

Max. Marks: 70

Instructions:

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

PART-A					
1	a	Why is happiness considered more important than prosperity?	2M	CO1	L1
	b	Explain the role of relationships in holistic development.	2M	CO1	L1
	c	What are the primary differences between the needs of the self and the body?	2M	CO2	L2
	d	Define "Sensation" and explain its role in forming desires.	2M	CO2	L2
	e	How does trust contribute to harmony within a family?	2M	CO3	L3
	f	Explain the concept of right evaluation in respect.	2M	CO3	L3
	g	What are the key activities of material units (jada units)?	2M	CO4	L1
	h	Define conscious (chaitanya) units.	2M	CO4	L2
	i	Define Utility Value (Upayogita Mulya).	2M	CO5	L2
	j	Give an example of ethical conduct in everyday life.	2M	CO6	L4
PART-B					
UNIT-I					
2	a	What is human consciousness, and why is it important to understand it?	5M	CO1	L2
	b	How does human consciousness influence thoughts, actions, and behaviors?	5M	CO1	L2
OR					
3	a	What is meant by natural acceptance, and how can it improve human relationships?	5M	CO1	L2
	b	Define Svatva, Swatantrata, and Swarajya. Explain their significance in the context of personal and societal values.	5M	CO1	L2
UNIT-II					
4	a	How does "Right Understanding" lead to definite human conduct and harmony?	5M	CO2	L3
	b	Why is it important to balance the needs of the body and the self for overall health and happiness?	5M	CO2	L4
OR					
5	a	How does the body recognize and fulfill its needs?	5M	CO2	L3
	b	How do the physical needs of the body differ from the emotional and mental needs of the self?	5M	CO2	L3
UNIT-III					
6	a	Discuss the importance of gratitude in strengthening family bonds.	5M	CO3	L2
	b	Why is self-respect important, and how does it impact one's relationships with others?	5M	CO3	L1
OR					
7	a	Explain how societal differentiation based on wealth impacts mutual respect.	5M	CO3	L4
	b	Discuss the importance of communication in maintaining harmony within families and communities.	5M	CO3	L6
UNIT-IV					
8	a	Discuss the relationship between material units and conscious units, highlighting their roles in human existence and the natural world.	10M	CO4	L4
OR					
9	a	Describe the mutual fulfillment among the four orders of nature. How do the needs of one order contribute to the well-being of another?	5M	CO4	L3

	b	How does the recognition of co-existence in nature lead to more ethical and responsible human behavior?	5M	CO4	L5
UNIT-V					
10	a	Discuss the significance of self-exploration in realizing human values.	5M	CO5	L2
	b	How does ethical conduct affect personal integrity and social trust?	5M	CO5	L4
OR					
11	a	Elaborate on the comprehensive human goal and its relevance to professional ethics. How can professionals align their activities with this goal?	10M	CO6	L2
