CODE: A14302 | **R23** | **SET-2**

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

B. Tech II Year I Semester Regular & Supplementary Exams Nov – 2025

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	Define a random variable	2M	CO1	L1
	b	For the continuous probability function $f(x) = Kx^2e^{-x}$ when $x > 0$. Find K	2M	CO1	L1
	c	Define Variance of a random variable	2M	CO2	L2
	d	Write the properties of characteristic function.	2M	CO2	L3
	e	Define first order central moments for X and Y	2M	CO3	L2
	f	Define joint probability distribution function.	2M	CO3	L4
	g	State Cauchy Riemann equations in Cartesian form.	2M	CO4	L3
	h	Define harmonic function	2M	CO4	L1
	i	State Cauchy's residue 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	Suppose three companies X, Y, Z produce T.V.'s. X produces twice as many as Y while Y and Z produce the same number. It is known that 2% of X, 2% of Y and 4% of Z are defective. All the T.V.'s produced are put into one shop and then one T.V. is chosen at random. Suppose a T.V. chosen is defective, what is the probability that this T.V. is produced by company Z?	10M	CO1	L1,L5
		OR			
3	a	Calculate the first four moments of the following distribution about the mean: x: 1 2 3 4 5 6 7 8 9 frequency: 2 6 13 25 30 22 9 5 2	10M	CO1	L5
		UNIT-II			
4	a	Find first 4 central moments for the following data X: 1 2 3 4 5 f: 2 3 5 4 1	5M	CO2	L1
	b	The joint density of X and Y is given by $f(x,y) = \begin{cases} e^{-(x+y)}, 0 < x, y < \infty \\ 0, Otherwise \end{cases}$ Find the density function of the random variable X/Y .	5M	CO2	L1
		OR			
5	a	State and explain the properties of mean and variance?	5M	CO2	L2
	b	If $g(x,y)=be^{-x}\cos y$ $0<x\leq 2$, $0<y\leq \pi/2$ $=0$ elsewhere is a valid density function Evaluate b.	5M	CO2	L2
		UNIT-III			
6	a	Define characteristic function and its properties.	5M	CO3	L3, L5

	b	The joint characteristic function of two random variables is given by $\emptyset_{xy}(w_1, w_2) = \exp(-w_{12}, -4w_{22})$. Check whether X and Y uncorrelated or not.	5M	CO3	L2
		OR			
7	a	Define Joint Gaussian distribution for Bivariate case	5M	CO3	L1
	b	Define Gaussian Random Variables and it's the properties.	5M	CO3	L3&L5
		UNIT-IV			
8	a	Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial x^2}\right)\|Re\, f(z)\|^2 = 2\|f'(z)\|^2$, where $f(z)$ is a analytic function	5M	CO4	L3
	b	If $w(x,y) - \phi(x,y) + \psi(x,y)$ represents the complex potential for an electric field and $\phi = x^3 - 3xy^2$, determine the function ψ.	5M	CO4	L3
		OR			
9	a	Show that $u = 2\log(x^2 + y^2)$ is harmonic and find its harmonic conjugate	5M	CO4	L1
	b	Find the analytic function $f(z) = u + iv$ given $3u + 2v = y^2 - x^2 + 16x$.	5M	CO4	L1
		UNIT-V			
10	a	Evaluate $\int_{A(1,1)}^{B(2,8)} f(z)dz$ where f(z)=x^2+ixy along i)the straight line AB ii) the curve c:x=t , y= t^2	10M	CO5	L4
		OR			
11	a	Find the Laurent series expansion of $f(z) = \frac{1}{z^2-5z+5}$ for $(i)1 < z < 3 (ii)1 < z (iii) z < 3$	5M	CO5	L1
	b	Using the residue theorem, evaluate $\int_c \frac{(\sin \pi z^2 + \cos \pi z^2)dz}{(z-1)^2(z-2)}$. $C: \|z\| = 3$.	5M	CO5	L1

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CODE: A12301 | R23 | SET-1

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations November 2025

Subject Name: **Universal Human Values**

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 is happiness considered more important than prosperity?	2M	CO1	L1
	b	Define value education and its importance in understanding a fulfilling life.	2M	CO1	L1
	c	What are the primary differences between the needs of the self and the body?	2M	CO2	L2
	d	Define the term "Enjoyer" in the context of the Self.	2M	CO2	L2
	e	Explain the term "natural acceptance."	2M	CO3	L3
	f	Explain what is meant by “affection” in a family setting.	2M	CO3	L3
	g	Why is harmony in nature important for sustaining life on Earth?	2M	CO4	L1
	h	How do animals contribute to the Plant/Bio Order?	2M	CO4	L2
	i	What does a holistic understanding of ethics mean in a professional context?	2M	CO5	L2
	j	Give an example of ethical conduct in everyday life.	2M	CO6	L4
PART-B					
UNIT-I					
2	a	Why is value education important for the development of individuals and society?	5M	CO1	L1
	b	How does human consciousness influence thoughts, actions, and behaviors?	5M	CO1	L2
OR					
3	a	Self-exploration involves a dialogue between ‘what you are’ and ‘what you really want to be’. Explain this process with examples.	5M	CO1	L3
	b	Discuss the relationship between human consciousness and self-awareness in personal development.	5M	CO1	L6
UNIT-II					
4	A	Describe the interplay of imagination and natural acceptance in forming desires and expectations.	5M	CO2	L2
	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	Discuss how imagination can be used as a tool for problem-solving and personal growth.	5M	CO2	L6
	b	Explain the relationship between preconditioning and continuity of happiness in human life.	5M	CO2	L2
UNIT-III					
6	a	Explain how the concept of justice contributes to harmony in the family.	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	Discuss how natural acceptance promotes harmony in society.	5M	CO3	L4
	b	Discuss the importance of communication in maintaining harmony within families and communities.	5M	CO3	L6
UNIT-IV					
8	a	Explain the significance of "Conformance" (Anu-sangita) in the context of each of the four orders.	5M	CO4	L4
	b	Describe the holistic perception of harmony in existence and why is it essential for the well-being of both humans and the environment?	5M	CO4	L3
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	Explain the concept of "growth" in the plant/pranic order compared to the material order.	5M	CO4	L2
UNIT-V					
10	a	How does the concept of Right Understanding contribute to ethical human conduct?	5M	CO5	L2
	b	How does ethical conduct affect personal integrity and social trust?	5M	CO5	L4
OR					
11	a	Discuss the importance of mutual fulfillment in relationships at the family level according to the holistic understanding.	5M	CO6	L2
	b	Discuss the importance of ethics, empathy, and shared values in creating a Universal Human Order.	5M	CO6	L6

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CODE: A14301T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations November 2025

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 correlation of two signals.	2M	CO1	BTL1
	b	Write Dirichlet conditions for Fourier series	2M	CO1	BTL1
	c	Describe the bilateral and unilateral Laplace transforms.	2M	CO2	BTL2
	d	Write the modulation property of Fourier Transform.	2M	CO2	BTL2
	e	Give the relationship between Bandwidth and Rise time.	2M	CO3	BTL2
	f	Define system bandwidth.	2M	CO3	BTL1
	g	Define wide sense stationary (WSS) random process?	2M	CO4	BTL2
	h	Define Time average and Ergodicity?	2M	CO4	BTL1
	i	Write the relation between input and output PSD of LTI system	2M	CO5	BTL1
	j	Find $S_{yy}(\omega)$ given $S_{xx}(\omega) = \frac{16}{\omega^2+4}$ and $H(\omega) = \frac{1}{2+j\omega}$	2M	CO5	BTL2
PART-B					
UNIT-I					
2	a	Define mean square error and derive the expression for evaluating mean square error.	5M	CO1	BTL3
	b	Obtain the trigonometric Fourier series for full wave rectified sine wave?	5M	CO1	BTL3
OR					
3	a	Explain the various operations on signals?	5M	CO1	BTL4
	b	Determine whether the following function is periodic or not. If so, find the period. x(t)=6sin100□t + 5cos150t.	5M	CO1	BTL3
UNIT-II					
4	a	Find the F.T of the following signals i. $e^{5t}\,u(t)$ ii. $e^{-3t}\sin 4t\;u(t)$.	5M	CO2	BTL3
	b	Explain the importance of Sampling theorem in Communication	5M	CO2	BTL3
OR					
5	a	Find Inverse Laplace Transform of $X(s) = \frac{5s+3}{s(s^2+4s+13)}$ Re(s) > 0.	5M	CO2	BTL4
	b	State and prove Convolution and Differentiation Properties of L.T?	5M	CO2	BTL3
UNIT-III					
6	a	Derive the Magnitude and Phase conditions of a System for Distortion-less transmission	5M	CO3	BTL3

	b	Explain the ideal characteristics of LPF, HPF, BPF and BSF using their Magnitude and Phase responses.	5M	CO3	BTL3
OR					
7	a	Explain the Characteristics of an ideal LPF and Explain why it cannot be realized.	5M	CO3	BTL3
	b	What is Causality and Paley-Wiener criterion for physical realization? What is the significance of these? Explain.	5M	CO3	BTL2
UNIT-IV					
8	a	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 (0,2π).	5M	CO4	BTL3
	b	Briefly explain the concept of random process and categorize its classifications with examples.	5M	CO4	BTL4
OR					
9	a	Discuss in detail about: (i) First order stationary random process. (ii) Second order & Wide - Sense Stationary Random Process	5M	CO4	BTL3
	b	List and explain the properties of Autocorrelation.	5M	CO4	BTL3
UNIT-V					
10	a	State properties of cross-power density spectrum of a random process.	5M	CO5	BTL3
	b	Find cross correlation function corresponding to the cross-power spectrum $S_{xy}(\omega) = \frac{6}{(9+\omega^2)(3+j\omega)^2}$	5M	CO5	BTL3
OR					
11	a	State and prove the expression relating power and auto correlation function of random process.	5M	CO5	BTL3
	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(ω) = $\frac{1}{2+j\omega}$ Determine PSD of the response?	5M	CO5	BTL4

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CODE: A14302T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations November 2025

SUBJECT NAME**: ELECTRONIC DEVICES AND CIRCUITS**

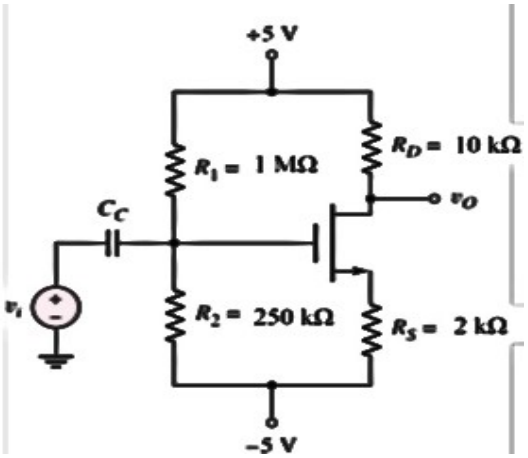
Branch: ECE

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	Explain the differences between transition and diffusion capacitances of a PN junction diode.	2M	CO1	BTL1
	b	What are clipping and clamping circuits.	2M	CO1	BTL1
	c	What is the early effect?	2M	CO2	BTL2
	d	What is thermal runaway? How it can be avoided?	2M	CO2	BTL1
	e	Define threshold voltage.	2M	CO3	BTL1
	f	What is meant by body effect?	2M	CO3	BTL1
	g	Draw the small signal model of BJT.	2M	CO4	BTL1
	h	Define pinch-off voltage in JFET.	2M	CO4	BTL2
	i	Distinguish between T-model and hybrid-π model for MOSFET.	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 50 Hz transformer having 60 V_{rms} on each side of the centre tap supplies a full wave rectifier circuit. The circuit load is 210 Ω with a shunt capacitor filter of 1000 μF. Find the ripple factor.	5M	CO1	BTL3
OR					
3	a	Describe the operating principle of LED with a diagram and assess the advantages of photodiode over LED?	5M	CO1	BTL3
	b	Determine the concentration of holes and electrons in a p-type germanium at 3000K, if the conductivity is 150Ω-cm. Mobility of holes in germanium μp = 1800 cm^2/Vsec	5M	CO1	BTL2
UNIT-II					
4	a	Draw and explain the input and output characteristics of a transistor in CC configuration.	5M	CO2	BTL2
	b	Justify why self-bias (voltage divider bias) is widely used in amplifiers compared to fixed bias	5M	CO2	BTL2
OR					
5	a	Design a fixed-bias CE amplifier circuit for a given V_{CC} , β and desired I_C.	5M	CO2	BTL4
	b	Derive the stability for the self-bias circuit using BJT.	5M	CO2	BTL4
UNIT-III					
6	a	Derive the expression for transconductance (gm) starting from the exponential BJT I–V relation.	5M	CO3	BTL3

	b	Explain how the MOSFET acts as an amplifier and switch.	5M	CO3	BTL2
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=15μA and β=150.	5M	CO3	BTL2
UNIT-IV					
8	a	Evaluate the advantages of FET over BJT in terms of input resistance and thermal stability	5M	CO4	BTL3
	b	Derive the expression for AI, AV, Ri and Ro for CE amplifier using h-parameter model.	5M	CO4	BTL2
OR					
9	a	Explain the working of a depletion type MOSFET with its characteristics	5M	CO4	BTL2
	b	The transistor is connected as a C.E. amplifier with Rs = 1 KΩ, R1 = 50 KΩ, R2 = 2KΩ, R=1KΩ, R1=1.2KΩ, h_{ie}=1100Ω, h_{re}=2.5x10^{-4}, h_{fe}=50, h_{oe}=25 μA/V. Find the various gains and the input and output impedances using small signal analysis.	5M	CO4	BTL3
UNIT-V					
10	a	The parameters for the transistor in the circuit shown in Figure below are V_{TN} = 0.6 V, K_n = 0.5 mA/V^2 , and λ= 0. (a) Determine the quiescent values of I_{DQ} and V_{DSQ} ,(b) Find the small signal voltage gain. 	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

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CODE: A14303T	R23	H.T.No:									

RAVINDRA COLLEGE OF ENGINEERING FOR WOMEN

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations November 2025

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	Convert the signed decimal number -45 into its 8-bit 2's complement binary representation	2M	CO1	L1
	b	What is canonical form of Boolean functions?	2M	CO1	L1
	c	Compare PROM, PLA & PAL.	2M	CO2	L1
	d	What is a multiplexer?.	2M	CO2	L1
	e	Differentiate between structural and behavioral modeling in Verilog with one example for each	2M	CO3	L2
	f	Explain the difference between structural and behavioral modeling in Verilog.	2M	CO3	L1
	g	What is the modulus of a 4-bit ripple counter? Draw the state diagram	2M	CO4	L1
	h	Mention data types used in Verilog HDL.	2M	CO4	L1
	i	State two advantages of FPGAs over traditional logic circuits or other PLDs.	2M	CO5	L1
	j	What is the working principle of a sequence detector?	2M	CO5	L1
PART-B					
UNIT-I					
2	a	State Duality theorem. List Boolean laws and their Duals.	5M	CO1	L3
	b	Minimize the following function: F(A,B,C,D,E) = ∑(0,2,4,6,9,13,21,23,25,29,31) using K-map	5M	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	Realize XOR gate using minimum number of NAND gates	5M	CO1	L6
UNIT-II					
4	a	Define an encoder. Design octal to binary encoder	5M	CO2	L6
	b	With neat block diagram, explain BCD adder circuit.	5M	CO2	L6
OR					
5	a	Design a 32:1 Multiplexer using 4:1 Multiplexers.	5M	CO2	L6
	b	Construct and explain Full adder using Two Half adders and one OR gate	5M	CO2	L6
UNIT-III					
6	a	Explain the following "lexical conventions" with examples in Verilog. a) White space b) strengths c) Operators	5M	CO3	L5
	b	Develop a Verilog code for 2X1 Multiplexer using Behavioural modelling.	5M	CO3	L6
OR					
7	a	Draw and explain in detail about VHDL design flow.	5M	CO3	L2
	b	Develop a Verilog code for shift registers using structural modelling	5M	CO3	L5
UNIT-IV					
8	a	Design a Mod-10 counter using RS flip-flops.	5M	CO4	L6
	b	Design a 3-bit counter using T flip flops and explain its operation	5M	CO4	L2
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	A	Design and implement Mod-10 Synchronous Up counter using T-FFs	10M	CO5	L3
OR					
11	a	Implement f (A,B,C,D) = ∑m(0,1,3,5,6,8,9,11,12,13) using PAL.	5M	CO5	L6
	b	What is meant by finite state machine? What are the capabilities and limitations of finite state machine?	5M	CO5	L2