

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Computer Science and Engineering (IoT)

20ESCI301 - BASIC ELECTRONICS AND COMMUNICATION ENGINEERING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

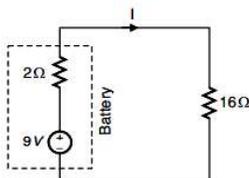
Answer ALL Questions

- | | Marks | K-Level | CO |
|---|-------|---------|-----|
| 1. If a circuit has 8 branches and 5 nodes, then the number of independent voltages are
(a) 7 (b) 6 (c) 5 (d) 4 | 1 | K1 | CO1 |
| 2. Consider a circuit with a 12V voltage source in series with a 4Ω resistor and an 8Ω resistor connected in series across two terminals (A and B). What is the Thevenin equivalent resistance seen from terminals A and B?
(a) 4Ω (b) 8Ω (c) 12Ω (d) 6Ω | 1 | K1 | CO1 |
| 3. The knee voltage in a diode's VI characteristic curve represents the point where the diode starts to conduct _____ current.
(a) Most (b) Significant (c) Least (d) Fast | 1 | K1 | CO2 |
| 4. In a full-wave center-tapped rectifier, the frequency of the output ripple compared to the input frequency is:
(a) Same (b) Twice (c) Half (d) Four times | 1 | K1 | CO2 |
| 5. If information rate is 2 bits per second, what is the efficiency of the channel?
(a) 25% (b) 40% (c) 50% (d) 100% | 1 | K1 | CO3 |
| 6. Which of the following increases when the noise in a channel increases?
(a) Channel capacity (b) Information rate
(c) Entropy of the source (d) Conditional entropy | 1 | K1 | CO3 |
| 7. In FM, the bandwidth is generally determined using:
(a) Nyquist criterion (b) Carson's rule (c) Shannon's theorem (d) Fourier analysis | 1 | K1 | CO4 |
| 8. Which type of signal modulation is used in TV transmission?
(a) AM (b) DSC-SC (c) VSB (d) SSB | 1 | K1 | CO4 |
| 9. The duty cycle is changed from 25% to 75% in a PWM system. How does this affect the average power delivered to the load?
(a) Increases (b) Decreases (c) Remains constant (d) Becomes zero | 1 | K1 | CO5 |
| 10. In a cellular network, the process of transferring an active call or data session from one cell to another as the user moves is called:
(a) Roaming (b) Handoff (c) Synchronization (d) Multiplexing | 1 | K1 | CO6 |

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

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| 11. Seven bulbs, each rated at 75 W, 120 V, are connected in parallel. Calculate the power and current consumed by them. | 2 | K2 | CO1 |
| 12. A 9 V Battery with an internal resistance of 2 Ω is connected to a 16 Ω resistive load. Calculate power delivered to load. | 2 | K2 | CO1 |



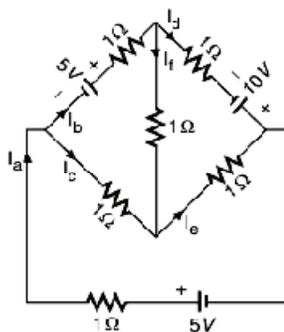
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| 13. Distinguish between intrinsic and extrinsic semiconductor. | 2 | K2 | CO2 |
| 14. What are the characteristics of an ideal OP-AMP? | 2 | K1 | CO2 |
| 15. State the Channel Coding theorem. | 2 | K1 | CO3 |

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| 16. List the properties of Mutual Information. | 2 | K1 | CO3 |
| 17. A carrier frequency is modulated with a sinusoidal signal of 2Khz resulting in a maximum frequency deviation of 5KHz. Find the bandwidth of the modulating signal. | 2 | K2 | CO4 |
| 18. List the need for modulation. | 2 | K1 | CO4 |
| 19. What is the purpose of sample and hold circuit? | 2 | K1 | CO5 |
| 20. Compare natural and flat-top sampling. | 2 | K2 | CO5 |
| 21. State the significance of the constellation diagram. | 2 | K1 | CO6 |
| 22. What is the purpose of a clock recovery circuit? When it is used? | 2 | K1 | CO6 |

PART - C (6 × 11 = 66 Marks)

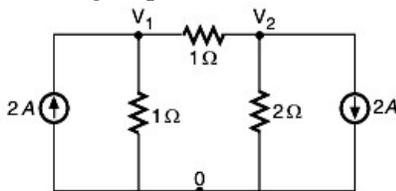
Answer ALL Questions

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| 23. a) | Determine the currents in various elements of the bridge circuit shown in Fig. using mesh analysis. | 11 | K3 | CO1 |
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| b) | Write and solve the nodal voltage equations for the circuit shown in Fig. | 11 | K3 | CO1 |
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| 24. a) | Explain BJT's input and output characteristics in common emitter configuration with neat sketches. | 11 | K2 | CO2 |
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| b) | Explain how the Zener diode works as a regulator. | 11 | K2 | CO2 |
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| 25. a) | A source transmits messages Q1 to Q5 having probabilities 1/2, 1/4, 1/8, 1/16, 1/16 respectively. Calculate the average information of the source. | 11 | K3 | CO3 |
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| b) | Calculate the minimum signal-to-noise ratio required to support information transmission through the telephone channel at the rate of 9600 bits/s with bandwidth of 9.6 KHz. | 11 | K3 | CO3 |
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| 26. a) | Interpret how FM signal is detected using the slope detector method. | 11 | K2 | CO4 |
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| b) | Outline the working of a super heterodyne receiver with a neat block diagram. | 11 | K2 | CO4 |
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| 27. a) | Infer about the sampling theorem and derive its equation. | 11 | K2 | CO5 |
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| b) | Explain the working of a PCM transmission and reception system. | 11 | K2 | CO5 |
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| 28. a) | Summarize the working of on-off keying. | 11 | K2 | CO6 |
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OR

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| b) | Explain the working of the CDMA encoder and decoder. | 11 | K2 | CO6 |
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