B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025
Third Semester
Computer Science and Engineering (IoT)
24ESCI301 - BASIC ELECTRONICS AND COMMUNICATION ENGINEERING
Regulations - 2024

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K-Level	CO

1. In a node basis matrix equation, node voltages are solved by using _____.   1   K1   CO1
   (a)Cramer's rule   (b) Matrix Inversion
   (c) Gaussian Elimination   (d) Successive Over-Relaxation
2. When n number of identical resistances of value R are connected in parallel, the equivalent   1   K1   CO1
   value of the parallel combination is,
   (a) nR   (b) R/n   (c) 2R/n   (d) R/2n
3. Which transistor configuration provides the highest current gain?   1   K1   CO2
   (a) Common-base   (b) Common-emitter
   (c) Common-collector   (d) All provide equal gain
4. Biasing is required to keep the transistor in   1   K1   CO2
   (a) Active region   (b) Saturation   (c) Cutoff   (d) Breakdown
5. In an inverting amplifier using an op-amp, the concept of _____ _____ is applied   1   K1   CO3
   at the inverting input terminal.
   (a) Ground   (b) virtual ground   (c) +Vcc   (d) -Vcc
6. The _____ of an op-amp is the ratio of output voltage change to time   1   K1   CO3
   (a)Voltage bias   (b) current bias   (c) slew rate   (d) off set null
7. Entropy gives   1   K1   CO4
   (a) Amount of information   (b) Rate of information
   (c) Measure of uncertainty   (d) probability of message
8. Mutual information is given by: 1   K1   CO4
   (a) I(X;Y) = H(X) – H(X|Y)   (b) I(X;Y) = H(X) + H(Y)
   (c) I(X;Y) = H(X,Y) – H(X)   (d) I(X;Y) = H(X,Y) + H(Y)
9. FM modulation index is   1   K1   CO5
   (a) $\Delta f / fm$ (b) $fm / \Delta f$ (c) $\Delta f / fc$ (d) $fc / \Delta f$
10. Aliasing occurs when the sampling rate is   1   K1   CO6
    (a) Less than Nyquist rate   (b) Equal to Nyquist rate
    (c) More than Nyquist rate   (d) Infinite

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

11. Solve for the current flowing through 8Ω resistor.   2   K2   CO1
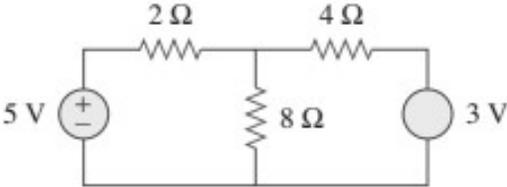
12. State maximum power transfer theorem.   2   K1   CO1
13. What is "Thermal runaway" in transistors and mention how it can be avoided?   2   K1   CO2
14. Differentiate between zener breakdown and avalanche breakdown.   2   K2   CO2
15. Assuming a slew rate for 741 IC is 0.5v/ μs. What is the maximum undistorted sine wave   2   K2   CO3
    that can be obtained for 12 V peak.
16. Define Shannon's Channel Capacity theorem.   2   K1   CO3

17. List the properties Entropy.	2 K1	CO4
18. What is the pre-emphasis and de-emphasis?	2 K1	CO4
19. Write the formulae for calculating modulation index for AM and FM signal.	2 K1	CO5
20. Recall the steps in pulse code modulation.	2 K1	CO5
21. Draw the BPSK signal for the given input bit stream 101010.	2 K1	CO6
22. Compare TDM with FDM.	2 K2	CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23. a) Determine the currents in various elements of the bridge circuit shown in Fig. using mesh analysis.   *11 K3 CO1*
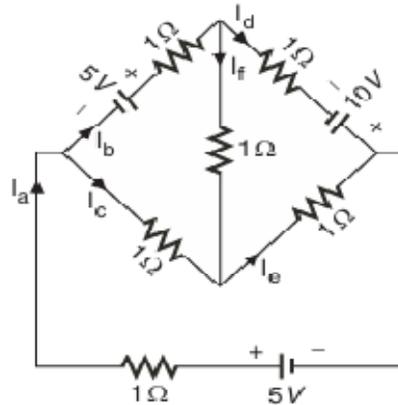
OR

b) A source has Vth = 30 V and Rth = 10 Ω. It supplies a variable load R_L.   *11 K3 CO1*
(i) Find the value of R_L for maximum power transfer.
(ii) Calculate the maximum power delivered to the load.
(iii) Plot the relationship between load power and load resistance.

24. a) Summarize the input and output characteristics of a transistor in CE configuration.   *11 K2 CO2*

OR

b) Explain the construction, working and characteristics of a PN junction diode with suitable diagrams and graph.   *11 K2 CO2*

25. a) Explain Instrumentation Amplifier using Op-Amps for amplifying a sensor signal and derive the gain equation.   *11 K2 CO3*

OR

b) Illustrate the working of differentiator and integrator using IC741.   *11 K2 CO3*

26. a) A source emits symbols A, B, C, D with probabilities 0.5, 0.25, 0.15, and 0.10. Compute the entropy of the source.   *11 K3 CO4*

OR

b) For a source X with probabilities (0.5, 0.3, 0.2) and a channel where H(Y|X)=0.4 bits. Calculate:(a) H(X), (b) H(Y), (c) I(X;Y).   *11 K3 CO4*

27. a) Explain the generation of SSB by Phase shift method and also derive the equation.   *11 K2 CO5*

OR

b) Interpret the working of Pulse Code Modulation system with a block diagram.   *11 K2 CO5*

28. a) Compare ASK, FSK and PSK in terms of bandwidth efficiency, power requirement and robustness against noise.   *11 K2 CO6*

OR

b) Illustrate in detail about ground wave and space wave propagation.   *11 K2 CO6*