Reg. No.															

Question Paper Code	13313

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Third Semester

Computer Science and Engineering (IoT)

20ESCI301 - BASIC ELECTRONICS AND COMMUNICATION ENGINEERING

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	A 2 kW, 220 V water heater is used to heat a water tank for 45 minutes. What will be the number of units of energy consumed? (a) 1.5 (b) 1 (c) 2 (d) 2.5	*1*	*K1*	*CO1*
2.	An electric iron draws 2A at 120V. find its resistance (a) 30 Ω (b) 60 Ω (c) 120 Ω (d) 180 Ω	*1*	*K1*	*CO1*
3.	Given a circuit with a 15Ω source resistance, what should the load resistance be for maximum power transfer? (a) 7.5Ω (b) 15Ω (c) 30Ω (d) 10Ω	*1*	*K1*	*CO1*
4.	The ripple factor of a full-wave rectifier compared to a half-wave rectifier is: (a) The same (b) Half (c) Double (d) Four times less	*1*	*K1*	*CO2*
5.	The _____ configuration of a transistor has a current gain approximately equal to 1. (a) collector (b) base (c) emitter (d) PN juction	*1*	*K1*	*CO2*
6.	The _____ of an op-amp is the ratio of output voltage change to time (a) Voltage bias (b) current bias (c) slew rate (d) off set null	*1*	*K1*	*CO2*
7.	The following is not a unit of information (a) Bit (b) decit (c) nat (d) Hz	*1*	*K1*	*CO3*
8.	Channel capacity of a noise free channel having M symbols is given by (a) Log_2M (b) M (c) 2^M (d) none	*1*	*K1*	*CO3*
9.	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*
10.	In an AM signal, when the modulation index m>1**,** the signal is said to be: (a) Under-modulated (b) Critically modulated (c) Over-modulated (d) Modulated without distortion	*1*	*K1*	*CO4*
11.	Which of the following devices is commonly used to demodulate an FM signal? (a) Phase-locked loop (b) Mixer (c) Envelope detector (d) Balanced modulator	*1*	*K1*	*CO4*
12.	The Carson's rule for FM bandwidth approximation is given by: (a) 2×(fm) (b) 2×(Δf+fm) (c) 2×(fc) (d) 2×(Δf−fm)	*1*	*K1*	*CO4*
13.	Which of the following is a key process in Pulse Code Modulation (PCM)? (a) Modulation (b) Quantization (c) Detection (d) Demodulation	*1*	*K1*	*CO5*
14.	Aliasing can be avoided in a pulse modulation system by**:** (a) Using a higher carrier frequency (b) Sampling at twice the highest frequency of the signal (c) Reducing the sampling frequency (d) Increasing the pulse width	*1*	*K1*	*CO5*
15.	The Nyquist rate for a signal with a maximum frequency of 5 kHz is**:** (a) 2.5 kHz (b) 5 kHz (c) 10 kHz (d) 15 kHz	*1*	*K1*	*CO5*
16.	If a PCM system has a bit depth of 4 bits, what is the maximum number of quantization levels? (a) 4 (b) 8 (c) 16 (d) 32	*1*	*K1*	*CO5*

17. In BFSK (Binary Frequency Shift Keying), the frequency of the carrier is shifted between how many values? *1 K1 CO6*
(a) 1 (b) 2 (c) 4 (d) 8

18. 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: *1 K1 CO6*
(a) Roaming (b) Handoff (c) Synchronization (d) Multiplexing

19. Which of the following is an essential element of a cellular network architecture that manages handoff and routing between cells? *1 K1 CO6*
(a) Mobile Station (b) Base Station Controller (BSC)
(c) Base Transceiver Station (BTS) (d) Antenna

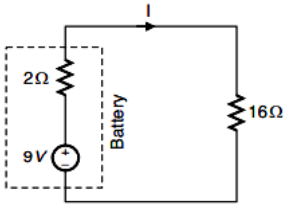
20. What is the main difference between soft and hard handoff in cellular networks? *1 K1 CO6*
(a) Soft handoff happens in different frequency bands, while hard handoff happens in the same band
(b) Soft handoff allows simultaneous connection to multiple base stations, while hard handoff does not
(c) Hard handoff is seamless, while soft handoff is not
(d) Soft handoff requires less power

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. Seven bulbs, each rated at 75 W, 120 V, are connected in parallel. Calculate the power and current consumed by them. *2 K2 CO1*

22. 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*



23. What is "Thermal runaway" in transistors and mention how it can be avoided? *2 K1 CO2*

24. Define CMRR. *2 K1 CO2*

25. Differentiate between joint probability and conditional probability. *2 K2 CO3*

26. List the property of entropy. *2 K1 CO3*

27. What is the pre-emphasis and de-emphasis? *2 K1 CO4*

28. Define heterodyning. *2 K1 CO4*

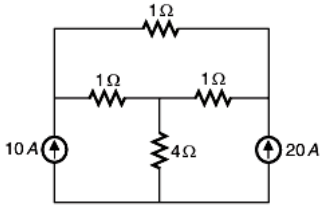
29. How many bits are required to represent a sample in a PCM system with 32 quantization levels? *2 K1 CO5*

30. What is meant by the term handoff? *2 K1 CO6*

PART - C (6 × 10 = 60 Marks)

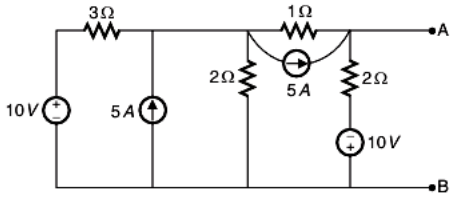
Answer ALL Questions

31. a) Find the power in the 4 Ω resistor of the circuit shown in Fig., using the node method. *10 K2 CO1*



OR

b) Find Thevenin's equivalent of the circuit shown in Fig. concerning terminals A and B. *10 K2 CO1*

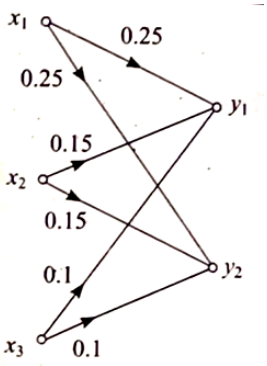


32. a) Explain how the Zener diode works as a regulator. *10 K2 CO2*

OR

b) Explain the inverting and non-inverting amplifier using op-amp and also write the gain expression. *10 K2 CO2*

33. a) Find the mutual information for the channel. *10 K2 CO3*



OR

b) 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. *10 K2 CO3*

34. a) Illustrate with a suitable block diagram and equation show how you will generate AM using a balanced modulator. *10 K2 CO4*

OR

b) Relate how SSB-SC can be generated using weaver's method with neat block. *10 K2 CO4*

35. a) Summarize the generation and demodulation of the PAM signal with necessary waveforms. *10 K2 CO5*

OR

b) Describe about surface wave propagation. *10 K2 CO5*

36. a) Outline the block diagram of the QPSK modulator and demodulator. Explain how it works. *10 K2 CO6*

OR

b) Elucidate in detail about Bluetooth and its advantages. *10 K2 CO6*