

B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Fifth and Seventh Semester

18ECO102J - ELECTRONIC CIRCUITS AND SYSTEMS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

- i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours

Max. Marks: 100

PART - A (20 × 1 = 20 Marks)

Answer all Questions

	Marks	BL	CO
1. What is the cut-in voltage for the silicon semiconductor? (A) 0.3 (B) 0.7 (C) 0.4 (D) 0.1	1	1	1
2. which material has poor electrical conductivity? (A) Metal (B) Insulator (C) Semiconductor (D) Conductor	1	1	1
3. An reverse biased PN junction will act as a/an (A) amplifier (B) open switch (C) attenuator (D) closed switch	1	1	1
4. Identify the device that can be used to regulate voltage in an electrical system. (A) p-n junction diode (B) zener diode (C) snubber circuit (D) JFET	1	1	1
5. The extremely high input impedance of a MOSFET is primarily due to the (A) absence of its channel (B) negative gate-source voltage (C) depletion of current carriers (D) extremely small leakage current of its gate capacitor	1	1	2
6. FET have similar properties to (A) PNP transistors (B) Power transistors (C) NPN transistors (D) Unijunction transistors	1	1	2
7. For small values of drain-to-source voltage, JFET behaves like a (A) constant-current source (B) constant-voltage source (C) negative resistance (D) resistor	1	1	2
8. The voltage gain of a given common-source JFET amplifier depends on its (A) amplification factor (B) dynamic drain resistance (C) drain load resistance (D) Input impedance	1	1	2
9. An OP-AMP can be classified as _____ amplifier (A) low input resistance (B) positive feedback (C) RC-Coupled (D) linear	1	1	3
10. An ideal OP-AMP has (A) finite voltage gain (B) Infinite input resistance (C) low bandwidth (D) zero total gain	1	1	3
11. The two input terminals of an OP-AMP are known as (A) positive and negative voltage (B) differential and non-differential amplifier (C) inverting and non-inverting voltage (D) high and low voltage	1	1	3

12. Which of the following op-amp configurations is commonly used as a voltage follower?	1	1	3
(A) Inverting amplifier			
(B) Non-Inverting amplifier			
(C) Integrator			
(D) Differentiator			
13. Which type of waveform is typically generated by an IC741-based Wien Bridge oscillator?	1	1	4
(A) Square wave			
(B) Sine wave			
(C) Triangle wave			
(D) Sawtooth wave			
14. Which parameter of an IC741 operational amplifier is critical for designing stable oscillators?	1	1	4
(A) Input bias current			
(B) Open-loop voltage gain			
(C) Slew rate			
(D) Output voltage swing			
15. Which of the following is not a type of multivibrator?	1	1	4
(A) Astable			
(B) Monostable			
(C) Bistable			
(D) Bipolar			
16. In an astable mode configuration, what is the output of the 555 timer?	1	1	4
(A) Constant high voltage			
(B) Constant low voltage			
(C) Alternating between high and low			
(D) Pulsating voltage			
17. In AM modulation, which part of the carrier signal varies with the amplitude of the modulating signal?	1	1	5
(A) Frequency			
(B) Phase			
(C) Wavelength			
(D) Amplitude			
18. Which of the following statements is true about FM modulation compared to AM modulation?	1	1	5
(A) FM is less immune to noise.			
(B) FM has a narrower bandwidth.			
(C) FM is less affected by atmospheric conditions.			
(D) FM requires less transmitter power.			
19. In Pulse Amplitude Modulation (PAM), what does the amplitude of each pulse represent?	1	1	5
(A) Phase information			
(B) Frequency information			
(C) Digital data			
(D) Analog data			
20. What is the primary purpose of an antenna in a wireless communication system?	1	1	5
(A) To amplify the received signal			
(B) To filter out noise from the signal			
(C) To convert electrical signals into electromagnetic waves and vice versa			
(D) To increase the data rate of the transmission			

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

	Marks	BL	CO
21. The following current values are obtained in Common base BJT configuration, the values are $I_E = 2\text{mA}$, $I_B = 10\mu\text{A}$. Compute the values of current gain (α) and collector current I_C .	4	1	1
22. Classify solids based on energy band diagram.	4	1	1
23. Define Transconductance and Amplification factor of FET.	4	1	2
24. List out the difference between FET and BJT	4	1	2
25. Draw circuit diagram of op-amp in Non-inverting amplifier and give the expression for its output voltage & gain.	4	1	3
26. Mention some applications of IC555 timer.	4	1	4

27. Illustrate the purpose of modulation in communication.

4 1 5

Marks BL CO

PART - C (5 × 12 = 60 Marks)

Answer all Questions

28. (a) Describe the circuit operation of Half wave and Full-wave rectifier using pn-junction diode with suitable circuit diagram and its waveform

12 1 1

(OR)

(b) Explain the input and output characteristics of common Emitter-BJT amplifier with neat diagram.

29. (a) Explain the Voltage-Divider Biasing of JFET using D.C analysis with the circuit diagram

12 1 2

(OR)

(b) Sketch the circuit diagram for a depletion type common source MOSFET amplifier operated in voltage divider bias configuration and determine the expressions for its input impedance, output impedance and voltage gain.

30. (a) Describe the basic operation of a comparator using the IC741 with suitable circuit diagram.

12 1 3

(OR)

(b) Describe the functioning of an OPAMP log amplifier circuit, derive the output voltage formula and illustrate the circuit diagram of an OPAMP inverting amplifier, also find its voltage gain.

31. (a) Explain the operation of an RC phase shift oscillator, detailing the key components and the principles behind its oscillation mechanism.

12 1 4

(OR)

(b) Explain the operation of Hartley oscillator circuit using IC741 with a neat diagram.

32. (a) With suitable diagram, explain the fundamental building block of communication, and how does it play a crucial role in the transmission of information?

12 1 5

(OR)

(b) (i) Define the term amplitude modulation with its waveform. (4 Marks)

(ii) Describe the types of amplitude modulation with its waveform. (8 Marks)

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