Total No. of Questions: 21

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Engineering

End Semester Examination May 2025

EC3CO17 Linear Integrated Circuits & Applications

Programme	:	B.Tech.	**Branch/Specialisation**	:	EC
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

Marks CO BL

Q1. Which of the following is an advantage of integrated circuits? **1 1 1**

- ○ High cost
- ○ Large size
- ◉ Low power consumption
- ○ Poor reliability

Q2. The Common-Mode Rejection Ratio of an ideal differential amplifier is- **1 1 1**

- ○ 0
- ○ 1
- ◉ Infinity
- ○ 100

Q3. The output of an ideal integrator is proportional to- **1 2 2**

- ○ The input voltage
- ○ The derivative of the input voltage
- ◉ The integral of the input voltage
- ○ The square of the input voltage

Q4. A zero-crossing detector is used to- **1 2 2**

- ○ Detect noise in signals
- ◉ Detect zero crossing of an input signal
- ○ Increase the amplitude of a signal
- ○ Convert analog to digital signals

Q5. A Butterworth filter is known for- **1 3 2**

- ◉ Maximum flat response
- ○ High selectivity
- ○ Ripple in the passband
- ○ Nonlinear phase response

Q6. A notch filter is used to- **1 3 2**

- ○ Pass all frequencies
- ◉ Reject a specific frequency
- ○ Amplify a certain band of frequencies
- ○ Reduce circuit noise

Q7. The 555 Timer IC in astable mode generates- **1 4 2**

- ○ A single pulse
- ○ A stable DC output
- ◉ A continuous square wave
- ○ No output

Q8. A Schmitt Trigger is used to- **1 4 2**

- ◉ Reduce noise in digital signals
- ○ Integrate signals
- ○ Convert signals to sinusoidal waves
- ○ None of these

Q9. The main function of a voltage regulator is to- **1 5 2**

- ○ Amplify the voltage
- ◉ Maintain a constant output voltage
- ○ Convert AC to DC
- ○ Filter out high-frequency noise

Q10. The LM317 is an example of- **1 5 1**

- ○ A fixed voltage regulator
- ◉ A variable voltage regulator
- ○ A transistor
- ○ A switching regulator

Section 2 (Answer all question(s))

Marks CO BL

Q11. Explain the advantages of integrated circuits. **2 1 2**

Rubric	Marks
As per explanation	2

Q12. (a) Draw and explain the block diagram of an operational amplifier. **8 1 2**

Rubric	Marks
Block Diagram	4
Explanation of Block Diagram	4

(OR)

(b) Discuss the characteristics of an ideal operational amplifier and its power supply configurations.

Rubric	Marks
Name of characteristics	2
Explanation of characteristics	4
power supply configurations	2

Section 3 (Answer all question(s))

Marks CO BL

Q13. Define an instrumentation amplifier. Why is it important in practical applications? **3 1 2**

Rubric	Marks
Define an instrumentation amplifier	2
importance in practical applications	1

Q14. (a) Explain the working of a voltage-series feedback amplifier with a neat diagram. Derive the expression for its voltage gain. **7 3 3**

Rubric	Marks
Explain the working of a voltage-series feedback amplifier with a neat diagram	4
Derive the expression for its voltage gain.	3

(OR)

(b) Explain the difference between inverting and non-inverting amplifier configurations with circuit diagrams and equations.

Rubric	Marks
Explain the difference between inverting and non-inverting amplifier	2
circuit diagrams	3
equations derivation	2

Section 4 (Answer all question(s))

Marks CO BL

Q15. Explain the classification of filters on basis of their frequency response. **3 3 2**

Rubric	Marks
classification of filters	3

Q16. (a) Design a second-order high-pass Butterworth filter using an operational amplifier. Explain the working with necessary equations. **7 3 3**

Rubric	Marks
Design a second-order high-pass Butterworth filter using an operational amplifier	4
Explain the working with necessary equations	3

(OR)

(b) What is the difference between a first-order and a second-order low-pass filter? Explain with diagrams and equations.

Rubric	Marks
What is the difference between a first-order and a second-order low-pass filter	2
diagrams	2
equations.	3

Section 5 (Answer all question(s))

Marks CO BL

Q17. Draw the PIN diagram of 555 timer. **2 4 1**

Rubric	Marks
PIN Diagram	2

Q18. (a) Explain the working of a Schmitt Trigger circuit using an IC-555 timer. Derive the expressions for its threshold and trigger voltage levels. **8 4 3**

Rubric	Marks
Explain the working of a Schmitt Trigger circuit using an IC-555 timer.	4
Derive the expressions for its threshold and trigger voltage levels	4

(OR)

(b) What is a peak detector circuit? Explain its working with diagram.

Rubric	Marks
What is a peak detector circuit?	2
Explain its working	2
diagram.	4

Section 6 (Answer any 2 question(s))

Marks CO BL

Q19. Differentiate between series and shunt voltage regulators. **5 5 2**

Rubric	Marks
Differentiate between series and shunt voltage regulators.	5

Q20. Explain the working of a Switch Mode Power Supply (SMPS) with a block diagram. **5 5 2**

Rubric	Marks
Explain the working of a Switch Mode Power Supply (SMPS) with a block diagram.	5

Q21. Explain the differences between a regulated and an unregulated power supply. **5 5 2**

Rubric	Marks
Explain the differences between a regulated and an unregulated power supply.	5

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