ROLL NO. _____

Code: AE54/AC54/AT54/AE104
Subject: LINEAR ICs & DIGITAL ELECTRONICS

AMIETE – ET/CS/IT (Current & New Scheme)

Time: 3 Hours **DECEMBER 2018** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

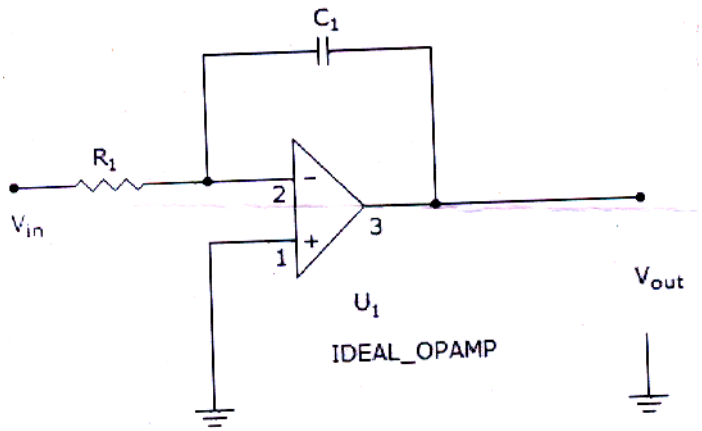
- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions, selecting at least TWO questions from each part, each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The most popular form of IC package is
(A) TO-5 **(B)** DIL
(C) Flatpack **(D)** None of these

b. A 22 kΩ resistor and a 0.02 F capacitor are connected in series to a 5 V source. How long will it take the capacitor to charge to 3.4V?
(A) 0.44 ms **(B)** 0.501 ms
(C) 0.66 ms **(D)** 0.70 ms

c. What is output waveform in below circuit.



(A) sine wave **(B)** square wave
(C) saw tooth wave **(D)** triangle wave

d. A differential amplifier
(A) is a part of an Op-amp **(B)** has one input and one output
(C) has two outputs **(D)** Both **(A)** and **(B)**

e. In order for an output to swing above and below a zero reference, the op-amp circuit requires
(A) a resistive feedback network **(B)** zero offset
(C) a wide bandwidth **(D)** a negative and positive supply

f. What is the maximum possible range of bit-count specifically in n-bit binary counter consisting of 'n' number of flip flops?
(A) 0 to 2^{n-1} **(B)** 0 to 2^{n}
(C) 0 to 2^{n+1} **(D)** 1 to 2^{n+1}

g. The bit sequence 0010 is serially entered (right-most bit first) into a 4-bit parallel out shift register that is initially clear. What are the Q outputs after two clock pulses?
(A) 1000 **(B)** 1111
(C) 0000 **(D)** 0110

h. The simplest equation which implements the K-map shown below is:

	$\overline{C}$	C
$\overline{A}\,\overline{B}$	0	0
$\overline{A}\,B$	1	1
$A\,B$	1	1
$A\,\overline{B}$	0	1

(A) $AB\overline{C} + ABC + A\overline{B}C$ **(B)** X = AC + B
(C) $AB + \overline{A}B$ **(D)** A

i. Convert the binary number 1001.0010 to decimal
(A) 90.125 **(B)** 12.5
(C) 9.125 **(D)** 125

j. A 16-input multiplexer is to be used to perform parallel-to-serial data conversion. Which of the following counters would be required to provide the data select inputs?
(A) MOD 8 **(B)** MOD 16
(C) MOD 4 **(D)** MOD 2

PART - A
Answer at least TWO questions. Each question carries 16 marks.

Q.2 a. (i) What are monolithic integrated Circuits?
(ii) Draw and explain Block Diagram of an Op Amp. **(10)**

b. Describe internal Circuit of Operational Amplifier. **(6)**

Q.3 a. (i) Explain in details about the Effect of Slew Rate on Sinusoidal Signals and Power Bandwidth.
(ii) Explain with necessary sketches V to I converter. **(10)**

b. Explain block diagram Instrumentation amplifier. **(6)**

Q.4 a. (i) Explain with neat sketches OP-AMP using diodes.
(ii) Draw only circuit and waveforms of comparator. **(8)**

b. Describe operation of Differentiator with necessary equations. **(8)**

Q.5 a. Explain 555 Timer as astable Multivibrator. **(8)**

b. Give details about R-2R Ladder Digital to Analog Convertor (DAC). **(8)**

PART - B
Answer at least TWO questions. Each question carries 16 marks.

Q.6 a. Write short notes on:-
(i) NOR gate latch
(ii) D Latch **(10)**

b. Explain about Propagation Delay in Ripple Counters. **(6)**

Q.7 a. What is Priority encoder? Draw and explain the truth table of decimal to BCD priority encoder. **(8)**

b. Explain with neat sketches Magnitude comparator circuit. **(8)**

Q.8 a. Why NAND and NOR gates are called universal gates? **(10)**

b. (i) Draw the logic circuit for the identity Y = ABC + ABC + B
(ii) Simplify the expression and draw a logic circuit for the same. **(6)**

Q.9 a. (i) What do you understand by complement, compare 1's complement and 2's complement in tabular form?
(ii) Explain the following codes:-
Excess 3 code, Grey code **(8)**

b. Perform the following conversions: **(8)**

(i) $(110011011001)_2 = (\_\_\_\_\_)_{10}$ (ii) $(268)_{10} = (\_\_\_)_{16}$
(iii) $(39.12)_{10} = (\_\_\_\_)_2$ (iv) $(1054)_8 = (\_\_\_\_)_{10}$
(v) $(2040.125)_{10} = (\_\_\_\_\_)_{16}$ (vi) $(1001101.1011)_2 = (\_\_\_\_)_8$
(vii) $(153)_{10} = (\_\_\_\_)_8$ (viii) $(0.513)_{10} = (\_\_\_\_)_8$