ROLL NO. _____

Code: AE104 **Subject: LINEAR ICs & DIGITAL ELECTRONICS**

AMIETE – ET *{NEW SCHEME}*

Time: 3 Hours **DECEMBER 2014** **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 bandwidth of an ideal Op-Amp is

(A) Zero **(B)** Infinity
(C) Small **(D)** Large

b. The typical value of CMRR for 741C Op-Amp is

(A) 20 dB **(B)** 40 dB
(C) 60 dB **(D)** 90 dB

c. Operational Transconductance Amplifiers (OTAs) are used in

(A) Integrators **(B)** Differentiators
(C) Current switches **(D)** Logarithmic Amplifiers

d. The time period "T" for which the output of Monostable Multivibrator using op-amp goes low is given by

(A) 0.69RC **(B)** 2.01RC
(C) 1.69RC **(D)** 1.09RC

e. The fastest and most expensive Analog to Digital Conversion Technique is

(A) Counter Type **(B)** Parallel Comparator type
(C) Successive Approximation Type **(D)** Dual Slope Type

f. The code that is used for transfer of alphanumeric information between a computer and external device is

(A) ASCII Code **(B)** BCD Code
(C) Gray Code **(D)** Excess – 3 Code

g. The output expression for Y in the circuit shown below in Fig.1 is

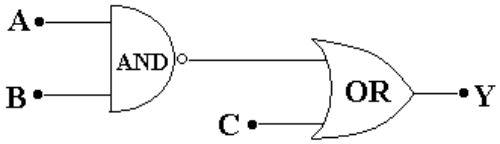

Fig.1

(A) $A \bullet B + C$ **(B)** $\overline{A} + \overline{B} + C$
(C) $\overline{A} + B + \overline{C}$ **(D)** $\overline{A} + \overline{B} + \overline{C}$

h. The simplified expression for $x = (\overline{A} + B)(A + B + D)\overline{D}$ is

(A) $x = \overline{B}D$ **(B)** $x = B\overline{D}$
(C) $x = (\overline{A} + \overline{D})$ **(D)** $x = (A + D)$

i. $(592)_{16} - (3A5)_{16} = (\quad)_{16}$

(A) 1ED **(B)** 1A7
(C) 1B7 **(D)** 1C3

j. The output frequency of a decade counter which is clocked from a 50 KHz signal is

(A) 25 KHz **(B)** 12.5 KHz
(C) 6.25 KHz **(D)** 5 KHz

PART (A)

Answer at least TWO Questions. Each question carries 16 marks.

Q.2 a. Briefly define monolithic, thin film, thick film and hybrid integrated circuits. **(8)**

b. Draw the equivalent circuit, block schematic of an Op-Amp, and list the characteristics of an ideal Op-Amp. **(8)**

Q.3 a. Explain Op-Amp circuit bandwidth and slew rate. **(8)**

b. Draw the circuit of inverting summing amplifier using Op-Amp and derive the expression for its output. **(8)**

Q.4 a. Explain the working of Sample and Hold circuit using Op-Amp with the help of waveforms. **(8)**

b. Explain the working of Schmitt Trigger circuit using Op-Amp. **(8)**

Q.5 a. Explain the working of Astable Multivibrator using Op-Amp. **(8)**

b. Explain the working of Parallel comparator type A/D Converter. **(8)**

PART (B)
Answer at least TWO Questions. Each question carries 16 marks.

Q.6 a. Describe the relative advantages of parallel and serial transmission of binary data. **(6)**

b. Perform the following conversions;
(i) $(100101)_2$ = ( )$_{10}$ (ii) $(372)_8$ = ( )$_{10}$
(iii) $(5431)_8$ = ( )$_2$ (iv) $(2AF)_{16}$ = ( )$_{10}$
(v) $(3A6)_{16}$ = ( )$_2$ **(10)**

Q.7 a. Determine the output expression for the circuit shown in Fig.2 and find the output, if A=0, B=1, C=1 and D=1. **(8)**

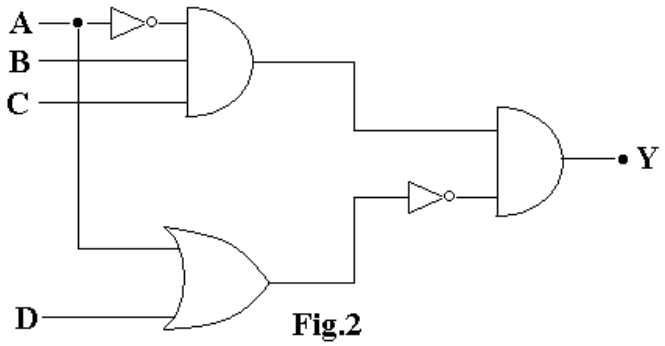

Fig.2

b. Simplify the expression $x = \bar{A}\bar{B}\bar{C} + \bar{A}BC + ABC + A\bar{B}\bar{C} + A\bar{B}C$ using Karnaugh map. **(8)**

Q.8 a. Draw the block diagram of a 5-bit parallel Adder circuit using full-adders and explain. **(8)**

b. What is a Multiplexer? Explain with a diagram the working of a 4-input multiplexer. **(8)**

Q.9 a. Explain the working of a clocked JK flip flop with neat diagram and waveforms. **(8)**

b. Draw the diagram of a 4-bit Ring-Counter and explain its working with waveforms. **(8)**