

AMIETE – ET {NEW SCHEME}

Time: 3 Hours

JUNE 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 Slew Rate of an ideal Op-Amp is

- | | |
|----------|--------------|
| (A) Zero | (B) Infinity |
| (C) Low | (D) High |

b. An instrumentation amplifier should have

- | | |
|---------------------------|--------------------|
| (A) High CMRR | (B) Low CMRR |
| (C) High output impedance | (D) High DC offset |

c. A Sample and Hold circuit is useful in

- | | |
|------------------------|--------------------------------|
| (A) Rectifier circuits | (B) Digital interface circuits |
| (C) Amplifier circuits | (D) Oscillator circuits |

d. The 555 Timer is compatible with

- | | |
|------------------------------|-----------------------------------|
| (A) Only TTL circuits | (B) Only CMOS circuits |
| (C) Both TTL & CMOS circuits | (D) Neither TTL nor CMOS circuits |

e. The number of comparators required for a 4-bit parallel comparator type A to D converter is

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|-------|--------|
| (A) 3 | (B) 5 |
| (C) 7 | (D) 15 |

f. $(423)_{10} = (\quad)_{16}$

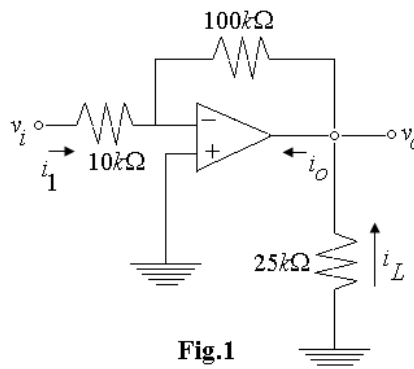
- | | |
|---------|---------|
| (A) 1A7 | (B) 2AF |
| (C) 1BF | (D) 1AE |

- g. $x + \bar{x}y =$
- (A) $\bar{x}y$ (B) $x + \bar{y}$
 (C) $x + y$ (D) $\bar{x} + y$
- h. Which of the following provides a high output whenever the two inputs are at the same level?
- (A) OR operation (B) XOR operation
 (C) NOR operation (D) XNOR operation
- i. The output frequency of decade counter that is clocked from 50 KHz signal is
- (A) 25 KHz (B) 12.5 KHz
 (C) 6.25 KHz (D) 5 KHz
- j. The number of Flip-Flops required for constructing a Mod – 10 counter is
- (A) 2 (B) 3
 (C) 4 (D) 5

PART (A)

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

- Q.2** a. Write about IC chip size and circuit complexity and explain power supply connections of an Op-Amp. (10)
- b. Calculate i_1, v_0, i_L and total current is into the output pin of the circuit shown below in Fig.1 (6)



- Q.3** a. Draw and explain the internal circuit of op-Amp. Explain the following terms:
- (i) Input Offset current (ii) Input Offset Voltage
 (iii) Slew rate (iv) Stability of Op-Amp (8)
- b. Draw the circuit of instrumentation amplifier and derive the expression for its output.
- (i) Using two Op-Amp (ii) Using three Op-Amp (8)

Code: AE104

Subject: LINEAR ICs & DIGITAL ELECTRONICS

- Q.4** a. Draw the circuit of Half-Wave rectifier using Op-Amp and explain. (8)
- b. Explain the operation of practical differentiator circuit using Op-Amp. (8)
- Q.5** a. Explain the working of monostable multivibrator and derive the expression for the time period "T". (8)
- b. Draw and explain the functional diagram of 555 Timer IC. Explain its application as pulse position modulator. (8)

PART (B)

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

- Q.6** a. Write the advantages of digital techniques and discuss serial and parallel transmission. (8)
- b. Explain the following codes:
- | | | |
|-----------------|------------------------|-----|
| (i) BCD Code | (ii) ASCII Code | |
| (iii) Gray Code | (iv) Alphanumeric Code | (8) |
- Q.7** a. Construct a logic circuit for the following Boolean expression
 $Y = AC + B\bar{C} + \bar{A}BC$ using NAND gates only. (6)
- b. Simplify the following logic expression using Karnaugh Map and explain in steps;
 $Y = \bar{C}(\bar{A}B\bar{D} + D) + A\bar{B}C + \bar{D}$ (6)
- c. State De-Morgans Theorems. Obtain $\overline{A(BC + \bar{D}E + \bar{F}G)}$ (4)
- Q.8** a. Explain BCD adder with a neat diagram. (4)
- b. Implement full adder using 3×8 decoder. (6)
- c. Obtain 16:1 MUX using 2:1 multiplexers only. (6)
- Q.9** a. Design a synchronous counter using JK Flip-Flop that has the following sequence: 000, 010, 101, 110 and repeat. The undesired states 001, 011, 100 and 111 must always go to 000 on the next clock pulse. (8)
- b. Explain, with a neat diagram and waveforms, the working of a Mod-6 Johnson counter. (8)