

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. 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. Ultraviolet radiation is used in IC fabrication process for \_\_\_\_\_
- |               |                  |
|---------------|------------------|
| (A) diffusion | (B) masking      |
| (C) isolation | (D) metalization |
- b. In a common emitter amplifier, the unbypassed emitter resistance provides \_\_\_\_\_
- |                               |                               |
|-------------------------------|-------------------------------|
| (A) voltage shunt feedback    | (B) current series feedback   |
| (C) negative voltage feedback | (D) positive current feedback |
- c. The drain-source voltage at which drain current becomes nearly constant is called \_\_\_\_\_
- |                       |                      |
|-----------------------|----------------------|
| (A) breakdown voltage | (B) barrier voltage  |
| (C) pinch-off voltage | (D) pick-off voltage |
- d. The maximum theoretical efficiency of a class B push-pull transistor amplifier is approximately \_\_\_\_\_
- |           |           |
|-----------|-----------|
| (A) 25%   | (B) 50%   |
| (C) 70.7% | (D) 78.5% |
- e. LEDs are fabricated from \_\_\_\_\_
- |              |                      |
|--------------|----------------------|
| (A) silicon  | (B) germanium        |
| (C) Si or Ge | (D) gallium arsenide |
- f. The ideal value of common mode rejection ratio for an op-amp is \_\_\_\_\_
- |              |         |
|--------------|---------|
| (A) 1        | (B) 0   |
| (C) infinite | (D) 100 |

Code: DE56

Subject: ANALOG ELECTRONICS

- g. If the maximum internal capacitor charging current is  $15 \mu A$  and capacitor is of the value of  $30 \text{ pF}$ , then the Slew Rate of OP-AMP is \_\_\_\_\_
- (A)  $0.5 \text{ V}/\mu s$  (B)  $2 \text{ V}/\mu s$   
 (C)  $0.5 \text{ mV}/\mu s$  (D)  $450 \text{ V}/\mu s$
- h. An ideal regulated power supply should have \_\_\_\_\_
- (A) 100% regulation (B) 50% regulation  
 (C) 0% regulation (D) 75% regulation
- i. The output time period of a transistorized monostable multivibrator using base resistor  $R_b$  and coupling capacitor  $C_b$  for the output transistor is given by \_\_\_\_\_
- (A)  $R_b C_b$  (B)  $0.69 R_b C_b$   
 (C)  $2 R_b C_b$  (D)  $1.38 R_b C_b$
- j. The number of comparators required to realize a 10 bit flash ADC is \_\_\_\_\_
- (A) 1023 (B) 10  
 (C) 9 (D) 1024

**Answer any FIVE Questions out of EIGHT Questions.**  
**Each question carries 16 marks.**

- Q.2** a. Describe the four methods available for fabricating Integrated Resistors and explain Thin Film Resistor with a neat sketch. (8)
- b. Explain Complementary MOSFET fabrication process with neat sketch. (8)
- Q.3** a. Draw the h-parameter equivalent circuit of Common Emitter Amplifier circuit and derive the expression for input impedance, output impedance, voltage gain and current gain. (10)
- b. Compare CE, CB and CC. Discuss typical application of each. (6)
- Q.4** a. Sketch a typical drain characteristic for  $V_{GS} = 0$  for an N-channel JFET. Explain the shape of the characteristic and identify the regions. (9)
- b. An N-channel JFET has drain-source saturation current ( $I_{DSS}$ ) = 8.7 mA, pinch-off voltage ( $V_P$ ) = - 3V and gate-source voltage ( $V_{GS}$ ) = -1 V. Determine:
- (i) Drain current ( $I_D$ )  
 (ii) Transconductance for  $V_{GS} = 0$  ( $g_{mo}$ )  
 (iii) Transconductance ( $g_m$ ) (7)
- Q.5** a. Explain with a diagram, the working of a transformer coupled class AB power amplifier. (8)

- b. What is an Opto-coupler? Explain its construction and operation with neat diagrams. (8)
- Q.6** a. Draw the block diagram of Op-Amp internal circuit and explain the function of each block briefly. (5)
- b. Derive an expression for the voltage gain of Non-Inverting Op-Amp. (5)
- c. What are the various DC characteristics of Op-Amp? Explain Input Offset Voltage. (6)
- Q.7** a. Draw the circuit diagram of Sample and Hold circuit using op-amp and explain its operation with the help of input and output waveforms. (9)
- b. Explain the working of integrator using Op-Amp (7)
- Q.8** a. Draw the circuit diagram of triangular waveform generator using op-amp and describe its operation with waveforms. (8)
- b. Draw the circuit of monostable multivibrator using 555 timer and explain its operation. (8)
- Q.9** a. Draw the functional block diagram of 723 general purpose voltage regulator IC and explain its operation. (7)
- b. Draw the block diagram of Counter Type A/D Converter and explain its operation with the help of waveform. (9)