ROLL NO. _____

Code: DE56 / DE106 Subject: ANALOG ELECTRONICS

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **JUNE 2015** **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.**
- **Q2 TO Q8 CAN BE ATTEMPTED BY BOTH CURRENT AND NEW SCHEME STUDENTS.**
- **Q9 HAS BEEN GIVEN INTERNAL OPTIONS FOR CURRENT SCHEME (CODE DE56) AND NEW SCHEME (CODE DE106) STUDENTS.**
- **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. SiO_2 is an extremely hard protective coating and is unaffected by almost all reagents except _____

(A) Hydrofluoric acid **(B)** Hydrochloric acid
(C) Sulphuric acid **(D)** Cupric acid

b. The voltage gain in a common emitter configuration with bypass capacitor is given by _____

(A) $-R_C/R_E$ **(B)** R_C/R_E
(C) $-R_C/r_e$ **(D)** R_C/r_e+R_E

c. The amplification factor of JFET is equal to _____

(A) Sum of g_m and r_d **(B)** Difference of g_m and r_d
(C) Product of g_m and r_d **(D)** Division of g_m and r_d

d. The maximum collector efficiency of transformer coupled power amplifier is _____

(A) 25% **(B)** 78.5%
(C) 50% **(D)** 90%

e. The intensity of light produced by LED is _____

(A) Directly proportional to the current
(B) Inversely proportional to the current
(C) Doesn't depend on current
(D) Proportional to the square of current

f. In an op-amp, which of the following adjusts dc voltages so that output voltage is zero for zero inputs?

(A) Differential amplifier **(B)** Level shifter
(C) Output stage **(D)** Input stage

g. Ideal Op-amps are rarely used in open loop because of its _____

(A) Infinite Input resistance **(B)** Zero output resistance
(C) Infinite Voltage gain **(D)** None of these

h. Which of the following is known as time delay circuit as it generates a fast transition at a predetermined time T after the application of trigger input?

(A) Monostable multivibrator **(B)** Astable multivibrator
(C) Bistable multivibrator **(D)** Schmitt trigger

i. Which of the following is the application of 555 timer as monostable multivibrator

(A) FSK Generator **(B)** Pulse position Modulator
(C) Schmitt trigger **(D)** Missing pulse detector

j. The output voltage produced by a D to A converter whose output range is 0 to 10 V and whose input binary number is 0110 (for a four bit DAC) _____

(A) 5V **(B)** 3.75V
(C) 6V **(D)** 4.25V

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

Q.2 a. Explain with diagrams, the fabrication process of a typical circuit. **(12)**

b. Write the advantages of ICs over discrete circuits. **(4)**

Q.3 a. Draw the circuit of transistor common emitter amplifier with coupling and bypass capacitors and draw its h-parameter equivalent circuit and derive the expression for:
(i) Input Impedance (ii) Output Impedance
(iii) Voltage gain (iv) Current gain **(12)**

b. Define h-parameters. **(4)**

Q.4 a. Explain the process of amplification using FET. **(8)**

b. Explain constructional features and working of Enhancement type MOSFET. **(8)**

Q.5 a. Explain the working of class B amplifier and show that its maximum collector efficiency is 78.5%. **(10)**

b. Explain the working of phototransistor? **(6)**

Q.6 a. What is slew rate of an op-amp and derive an expression for f_{max} (maximum input frequency at which undistorted output is obtained) **(8)**

b. Draw the voltage follower circuit and write its use. **(4)**

c. Design an amplifier with a gain of +5V using one op-amp**.** **(4)**

Q.7 a. Draw the circuit of Non-inverting summing amplifier for 2 inputs using an op-amp and derive the expression for its output voltage. **(8)**

b. Draw the circuit of Practical Differentiator and derive the expression for its output voltage. **(8)**

Q.8 a. Explain the working of Square Wave Generator using op-amp and derive the expression for its time period (T). **(8)**

b. Draw the functional block diagram of 555 IC and explain. **(8)**

Q.9 (For Current Scheme students i.e. DE56)

a. What is meant by a voltage regulator? Draw the block diagram of a regulated power supply and explain the function of its various components. **(8)**

b. Explain the parallel comparator A to D converter with the help of suitable diagram and give its applications. **(8)**

Q.9 (For New Scheme students i.e. DE106)

a. Explain how a solar cell differs from a photodiode. Sketch the typical solar cell characteristics and explain. **(8)**

b. Draw the functional diagram of the successive approximation A to D converter and explain its operation. **(8)**