ROLL NO. _____

Code: DE56/DE106 **Subject: ANALOG ELECTRONICS**

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **JUNE 2015 - SPECIAL** **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 OPTION 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. The ion implantation technique used to introduce impurities into a silicon wafer carried at _____.

(A) low temperature **(B)** high temperature
(C) moderate temperature **(D)** very high temperature

b. In a Common Emitter amplifier circuit with an unbypassed emitter resistor

(A) voltage gain decreases **(B)** current gain increases
(C) input resistance decreases **(D)** output resistance increases

c. Field Effect Transistor (FET) is _____ controlled device.

(A) current **(B)** voltage
(C) resistance **(D)** capacitor

d. Class AB power amplifier _____.

(A) increases efficiency **(B)** increases power output
(C) eliminates crossover distortion **(D)** consumes more DC power

e. The diode designed to be sensitive illumination is known as _____.

(A) Zener diode **(B)** Tunnel diode
(C) Gunn diode **(D)** Photo diode

f. The output impedance of an ideal Op – Amp is _____.

(A) Zero **(B)** Infinity
(C) Low **(D)** High

g. The offset current (I_{OS}) for BJT Op – Amp is _____.

(A) 20 nA **(B)** 200 nA
(C) 10 pA **(D)** 200 pA

h. The slew rate of 741C Op-Amp is

(A) 5V/µS **(B)** 0.5V/µS
(C) 10V/µS **(D)** 70V/µS

i. Which of the following is an application of a comparator using Op-Amp

(A) window detector **(B)** integrator
(C) differentiator **(D)** subtractor

j. The number of comparators required for a 3-bit parallel comparator type A to D converter is _____.

(A) 3 **(B)** 5
(C) 4 **(D)** 7

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

Q.2 a. With the help of neat diagrams, explain the fabrication of multi-emitter transistor and Schottky transistor. **(8)**

b. Explain the fabrication of MOSFET with neat diagrams. **(8)**

Q.3 a. Draw the h – parameter equivalent circuit of Common Emitter circuit with unbypassed emitter resistor. Derive the expressions for
(i) Input Impedance (ii) Output Impedance
(iii) Voltage Gain **(10)**

b. For the circuit shown in **Fig.1** with $h_{ie} = 2.1\,\text{k}\Omega, h_{fe} = 75$ and $h_{oe} = 1\mu s$. Calculate:
(i) Input Impedance (Z_i),
(ii) Output Impedance (Z_o)
(iii) Voltage Gain (A_v)

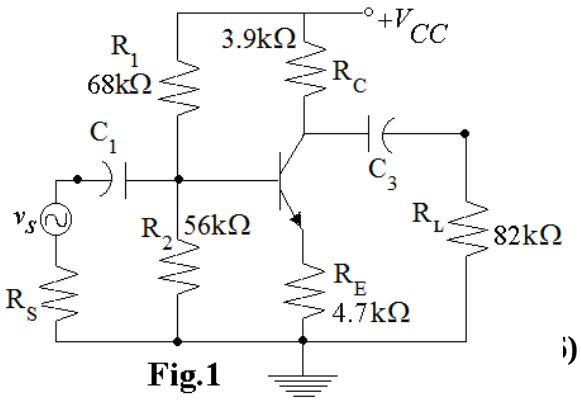

Fig.1

Q.4 a. Explain the construction, working and characteristics of Enhancement type MOSFET with the help of suitable diagrams. **(10)**

b. What are the special precautions necessary to protect MOSFETs from electrostatic discharge? **(6)**

Q.5 a. Draw the circuit of a transformer-coupled class A power amplifier and explain its operation. **(8)**

b. Explain the operation and characteristics of photo diode with neat sketches. **(8)**

Q.6 a. Explain the frequency response of an Operational Amplifier with suitable characteristics. **(10)**

b. Write the typical values of the following parameters with respect to 741C Op-Amp;

(i) Input Offset Voltage (ii) CMRR
(iii) SVRR (iv) Output Resistance
(v) Power Consumption (vi) Slew Rate **(6)**

Q.7 a. Draw the circuit of Op – Amp as subtractor and derive an expression for its output voltage. **(6)**

b. Write the important features of an Instrumentation Amplifier. **(4)**

c. Draw and explain Current to Voltage converter using OP-AMP. **(6)**

Q.8 a. Draw the circuit of Monostable Multivibrator using OP-AMP and derive an expression for the time period 'T". **(8)**

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

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

a. Write the characteristics of 3 – Terminal IC voltage regulator. **(8)**

b. With the help of diagram, explain the working of R-2R ladder digital to analog converter. **(8)**

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

a. Draw and explain the circuit of Differential amplifier. **(8)**

b. With the help of neat diagram, explain the working of weighted resistor type digital to analog converter. **(8)**