

DipIETE – 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. 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. Photo etching is used for
- | | |
|---------------------------------|----------------------|
| (A) Diffusion of impurities | (B) Ion impurities |
| (C) Removal of SiO ₂ | (D) Epitaxial growth |
- b. A transistor in a circuit has its current levels measured as $I_B = 20 \mu\text{A}$ and $I_C = 1\text{mA}$. The value of h_{ie} is
- | | |
|---------------------|---------------------|
| (A) 1.33 k Ω | (B) 1.00 k Ω |
| (C) 100 Ω | (D) 2.1 k Ω |
- c. The Drain–Source Voltage at which the drain current becomes zero is called
- | | |
|-----------------------|-----------------------|
| (A) Breakdown Voltage | (B) Pinch off Voltage |
| (C) Cut in Voltage | (D) Knee Voltage |
- d. The crossover distortion is produced in
- | | |
|------------------------|-----------------------|
| (A) Class A amplifier | (B) Class B amplifier |
| (C) Class AB amplifier | (D) Class C amplifier |
- e. The typical value of forward voltage drop across an LED is
- | | |
|-----------|-----------|
| (A) 0.7 V | (B) 1.0 V |
| (C) 1.6 V | (D) 0.3 V |
- f. The Slew Rate of an Op-Amp is specified in terms of
- | | |
|--------------------------------|--------------------------------|
| (A) Volts/ μs | (B) Volts/ μV |
| (C) $\mu\text{s}/ \text{Volt}$ | (D) $\mu\text{V}/ \text{Volt}$ |

- g. A comparator is basically an open loop Op-Amp with output at
 (A) $\pm V_{Ref}$ (B) $\pm V_{sat}$
 (C) $\pm V$ (D) 0 V
- h. In 78XX series voltage regulators, the last two numbers XX indicate
 (A) Output Current (B) Input Current
 (C) Output Voltage (D) Input Voltage
- i. In a monostable multivibrator using 555 IC, the output becomes high for a time period of
 (A) 1.1 RC seconds (B) RC seconds
 (C) 1.45 RC seconds (D) 0.45 RC seconds
- j. Which of the following A to D converter uses a very efficient code to complete n-bit conversion in just n-clock periods?
 (A) Parallel Comparator type ADC
 (B) Counter type ADC
 (C) Successive Approximation type ADC
 (D) Dual slope type ADC

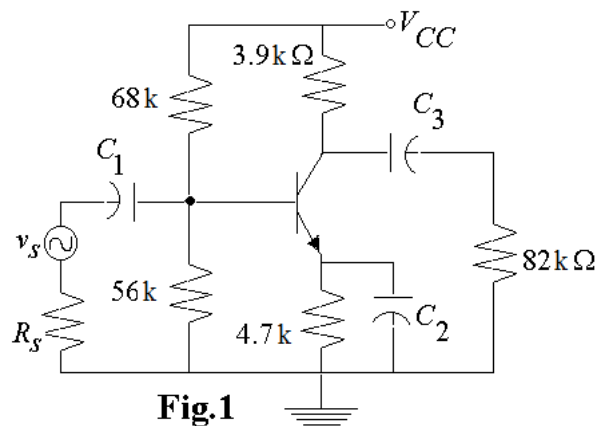
Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain the photolithography process used in IC fabrication. (8)

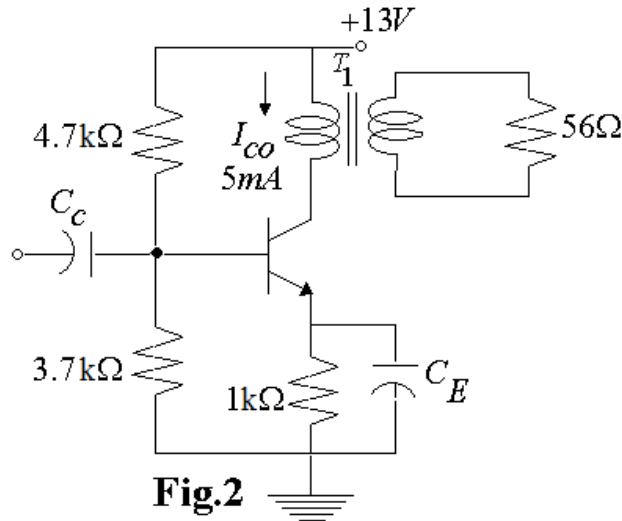
b. Explain various methods used for deposition of thin films. (8)

Q.3 a. Draw the Common Emitter circuit and draw its h-parameter equivalent circuit and derive the expressions for
 (i) Input Resistance (ii) Output Resistance
 (iii) Voltage Gain (iv) Current Gain (10)

b. Calculate R_i , R_o , A_v for the circuit shown in Fig.1 below with $h_{ie} = 2.0 \text{ k}\Omega$, $h_{fe} = 75$ and $h_{oe} = 1.0 \mu\text{s}$. (6)



- Q.4** a. Explain the operating principle of N-channel JFET. (8)
- b. Explain how an N-channel JFET can be used as an amplifier (8)
- Q.5** a. Calculate the maximum efficiency of Class A amplifier shown below in Fig.2. Assume that the transformer has an efficiency of 80%. (8)



- b. Explain the operation of Class B power amplifier with a neat circuit diagram. (8)
- Q.6** a. Explain the basic differential amplifier. (8)
- b. Define the term “Slew Rate” for an Op-Amp and derive the expression for maximum input frequency at which undistorted output voltage is obtained. (8)
- Q.7** a. Explain the V to I and I to V converter circuits using Op-Amp. (10)
- b. Draw the circuit of integrator using Op-Amp and derive the expression for its output. (6)
- Q.8** a. Explain, with a neat circuit diagram, the working of Schmitt Trigger using an OP-Amp. (8)
- b. Draw the circuit of monostable multivibrator using 555 IC and derive the expression for time period T. (8)
- Q.9** a. Explain the working of a Regulated Power Supply with a neat diagram. (8)
- b. Explain, with a neat diagram, the working of Successive Approximation Type Analog to Digital Converter. (8)