

DiplETE – ET (Current & New Scheme)

Time: 3 Hours

June 2019

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. Thin Film Resistor technology has advantage of
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| (A) Lesser and smaller parasitic component | (B) That the value of resistors cannot be easily changed |
| (C) High temp coefficient | (D) None of these |
- b. In common collector configuration, there is
- | | |
|--------------------------|----------------------------|
| (A) High voltage gain | (B) High current gain |
| (C) Low input resistance | (D) High output resistance |
- c. JFET has high input impedance, because
- | | |
|---|------------------------------|
| (A) It is made up of semiconductor material | (B) Input is reversed biased |
| (C) of impurity atoms | (D) None of these |
- d. Power amplifier generally use transformer coupling because transformer permits
- | | |
|----------------------------|-----------------------------|
| (A) Cooling of the circuit | (B) Impedance matching |
| (C) Distortion less output | (D) Good frequency response |
- e. With Zero volts on both inputs of an Op-Amp ideally should have an output
- | |
|--------------------------------------|
| (A) Equal to positive supply voltage |
| (B) Equal to negative supply voltage |
| (C) Equal to zero voltage |
| (D) Equal to infinite voltage |

- f. Which of the following circuits is known as Emitter Follower?
 (A) CB amplifier (B) CC amplifier
 (C) CE amplifier (D) CS amplifier
- g. Which of the following power amplifiers suffer from Cross Over Distortion?
 (A) Class B amplifier (B) Class A amplifier
 (C) Class AB amplifier (D) Class C amplifier
- h. The typical value of forward voltage drop for an LED is
 (A) 0.7 Volts (B) 0.3 Volts
 (C) 2.6 Volts (D) 1.2 Volts
- i. The ideal value of slew rate for an Op-Amp is
 (A) Zero (B) Infinite
 (C) Low (D) Medium
- j. Which of the following is not a Unipolar Device?
 (A) JFET (B) MOSFET
 (C) IGFET (D) BJT

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

- Q.2** a. Explain with neat diagrams any one of basic planar processer used in silicon planar technology for IC fabrication. (8)
- b. Explain Enhancement type MOSFET fabrication process, with neat sketches. (8)
- Q.3** a. Draw and analyze the circuit for Transistor Common Base amplifier with voltage and current waveforms. Also mention equations for Input Impedance, Output Impedance, and Voltage Gain. (12)
- b. Give the comparison among CE, CC & CB circuits in terms of Z_i , Z_o , A_v , Phase Shift. (4)
- Q.4** a. Draw and explain the operation of N-channel Enhancement mode MOSFET. Sketch Drain and Transfer characteristics for an N-channel E-MOSFET. (8)
- b. Define the following FET parameters: (4)
 (i) Transconductance (g_m) (ii) Output Admittance(Y_{os})
- c. Draw the symbols for (i) N & P - channel JFET, (ii) N & P - channel EMOSFET, (iii) N-channel DE-MOSFET and (iv) N-channel VMOSFETs. (4)

- Q.5** a. Explain with a neat diagram, the working of a Class B Push Pull Audio Power Amplifier. (8)
- b. Explain the Complementary Emitter Follower Circuit with neat diagram. (8)
- Q.6** a. Write the characteristics of an Ideal Op-Amp. (4)
- b. Derive an expression for the Voltage Gain of an Inverting Amplifier using Op-Amp. (5)
- c. Explain the term Slew Rate and obtain an expression for maximum frequency (f_{\max}) of a large amplitude sine wave in terms of slew rate. (7)
- Q.7** a. Explain Sample and Hold circuit using Op-Amp. With the help of circuit diagram and input, output waveforms. (8)
- b. Draw circuit diagram of a typical OP-Amp based Instrumentation Amplifier and briefly discuss its properties in respect of output and common mode rejection. (8)
- Q.8** a. Explain the working of Monostable Multivibrator using an Op-Amp, with the help of circuit diagram and output Voltage waveforms. (8)
- b. Explain the working of an Astable Multivibrator using an Op-Amp and derive an expression for the frequency of output waveform. (8)
- Q.9** a. Explain the working of a Series Op-Amp Regulator. With neat circuit diagram. (7)
- b. Explain the working of Successive Approximation Type ADC. With Suitable diagrams. (9)