

DiplETE – ET (Current & New Scheme)

Time: 3 Hours

DECEMBER 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 HAVE 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. The maximum collector efficiency of transformer coupled class-A power amplifier is _____

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

b. The typical value of input impedance for JFET is _____

- (A) 10Ω (B) 100Ω
(C) 10 MΩ (D) 100 MΩ

c. Which of the following BJT configuration has highest input resistance?

- (A) CC (B) CE
(C) CB (D) CE-CC

d. Full scale output of an 8-bit DAC for the 0 to 10 V range is _____

- (A) 8.86 V (B) 9.86 V
(C) 8 V (D) 9.961 V

e. The duty cycle for 555 astable multivibrator output for $C = 0.01 \mu\text{F}$, $R_A = 2 \text{ K}\Omega$ & $R_B = 100 \text{ K}\Omega$ is _____

- (A) 56.5% (B) 54.5%
(C) 49.5% (D) 50.5%

- f. The resistivity of N-type epitaxial collector region is in the range of _____
- (A) 0.1 to 0.5 $K\Omega/cm^2$ (B) 0.4 to 0.9 $K\Omega/cm^2$
 (C) 0.7 to 0.12 $K\Omega/cm^2$ (D) 1 to 10 $K\Omega/cm^2$
- g. The categorization of series regulator is _____
- (A) Inverting (B) Switching
 (C) Linear (D) Non-inverting
- h. The typical values of forward voltage and forward current respectively for LED's display are _____.
- (A) 1.2 V, 20 mA (B) 1.6 V, 20 mA
 (C) 2.5 V, 20 mA (D) 2.5 V, 100 mA
- i. Power supply rejection ratio of an op-amp should be _____
- (A) ideally zero (B) as large as possible
 (C) as small as possible (D) none of these
- j. The ideal value of CMRR is _____
- (A) 1 (B) 0
 (C) ∞ (D) $-\infty$

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

- Q.2** a. With the help of neat diagrams, explain briefly the basic planar process used to fabricate ICs. (12)
- b. Write a short note on thick film technology. (4)
- Q.3** a. Draw the ac equivalent circuit for common-emitter transistor amplifier with coupling and bypass capacitors and explain the elements used in it. (8)
- b. Compare the characteristics for CC, CE & CB circuit with diagram. (8)
- Q.4** a. Draw typical drain and transfer characteristics for a P-channel JFET and explain. (8)
- b. Draw a neat sketch to illustrate the structure of a N-channel E-MOSFET and explain its operation. (8)
- Q.5** a. Explain the working of transformer coupled class-A power amplifier and derive an expression for its collector efficiency. (9)
- b. Explain the working of opto-coupler with the help of a diagram and give its applications. (7)

- Q.6** a. Explain the differential amplifier with the help of suitable diagram. (8)
b. Discuss the characteristics of an ideal operational amplifier. (8)
- Q.7** a. What is the input impedance of a non-inverting operational amplifier? (4)
b. Explain why CMRR approaches infinity for an emitter coupled differential amplifier when R_E approaches to infinity. (4)
c. Draw the circuit of Integrator using Op-Amp and derive an expression for its output voltage. (8)
- Q.8** a. Draw the circuit diagram of Triangular Wave Generator & derive an expression for frequency of oscillation. (8)
b. Explain how the timer IC 555 can be operated as an astable multivibrator, using timing diagrams. (8)
- Q.9 (For Current Scheme students i.e. DE56)**
- a. Write the limitations of three terminal voltage regulators & explain the 723 general purpose voltage regulators with diagram. (8)
b. Write a short note on complementary emitter follower circuit. (4)
c. Explain monolithic power amplifiers. (4)
- Q.9 (For New Scheme students i.e. DE106)**
- a. Explain the concept of FET switching. (4)
b. Write a short note on photo-diodes with applications. (4)
c. Draw the functional diagram of Counter Type ADC & explain its operation. (8)