

Time: 3 Hours

DECEMBER 2013

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)

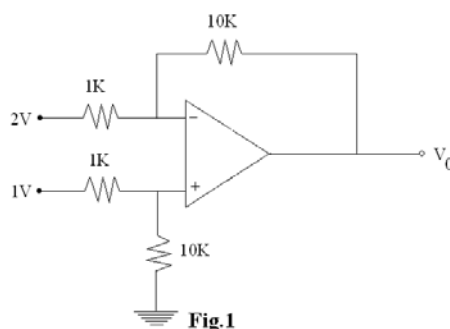
- a. Thin Film Resistor technology has advantage of
- (A) lesser and smaller parasitic component
 - (B) that the value of resistors cannot be easily changed
 - (C) high temp coefficient
 - (D) none of these
- b. In common collector configuration, there is
- (A) high voltage gain
 - (B) high current gain
 - (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 an OPAMP 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

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Subject: ANALOG ELECTRONICS

- f. LM380 is
- (A) hybrid power amplifier
(B) audio power amplifier
(C) operational transconductance amplifier
(D) none of these
- g. For integrating circuit to be effective, the RC product should be ____ the time period of the input wave
- (A) 5 times greater than
(B) 5 times smaller than
(C) equal to
(D) at least 10 times greater than
- h. 555 timer in monostable operation can be used as
- (A) AM Modulator
(B) Square wave generator
(C) Missing pulse detector
(D) Schmitt trigger

i.



In the above circuit, the o/p voltage V_0 is

- (A) 10V
(B) -10V
(C) 8V
(D) -8V
- j. Typical value of line regulation from data sheet of 7805 is
- (A) 15 mV
(B) 10 mV
(C) 5 mV
(D) 3 mV

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

- Q.2** a. How integrated resistors are fabricated? Explain diffused resistor method in detail? (8)
- b. Why aluminium is usually used for metallization of most ICs? (4)
- c. Explain the self aligning property of a polysilicon gate MOSFET (4)

- Q.3** a. Explain the need for coupling and bypass capacitors in transistor circuits, and draw AC Equivalent circuit of CE amplifier. (8)
- b. Use the simplified h-parameter model to derive equations for the current gain A_i , the input impedance R_{in} , the gain A_v and the output impedance R_{out} for the emitter follower circuit shown in Fig.2. Calculate the value of these parameters, assuming $h_{ie} = 1100\Omega$, $R_e = 10\text{ K}\Omega$, $h_{fe} = 50$ and $R_s = 1\text{ k}\Omega$ (8)

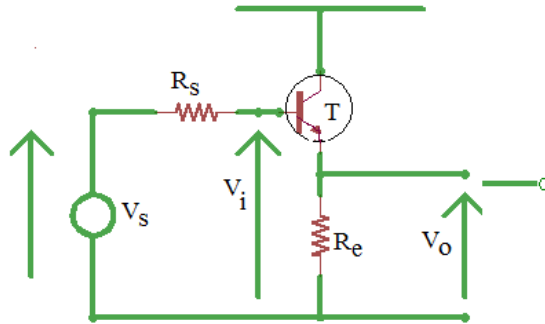


Fig.2

- Q.4** a. Draw and explain the transfer characteristics of JFET. List the advantages of JFET. (8)
- b. The constant current circuit shown in Fig.3 uses a JFET whose operation is described by the equation (8)
- $$I_D = I_{DSS}(1 - V_{GS}/V_P)^2, I_{DSS} = 8\text{ mA} \text{ and } V_P = 4\text{ V}$$
- (i) Draw the equivalent circuit as an amplifier
- (ii) Calculate the required value of R to give a current of 0.5 mA
- (iii) If the FET drain-source resistance r_{ds} is equal to $50\text{ K}\Omega$ at $I_D = 0.5\text{ mA}$, determine the incremental resistance of the circuit for the value of R calculated in (ii)

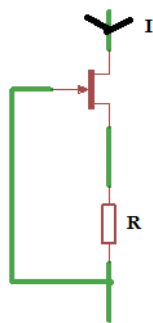


Fig.3

- Q.5** a. Draw and explain the circuit of complementary emitter follower. (5)
- b. Draw the circuits of opto-coupler with SCR and Triac and briefly explain these circuits. (5)
- c. Show that maximum collector efficiency of class A transformer coupled power amplifier is 50%. (6)
- Q.6** a. What is the need of negative feedback in OPAMP? (4)

- b. Define the following parameter and give their values for IC 723 (4)
- | | |
|-------------------------|---------------------------|
| (i) Input bias current | (ii) CMMR |
| (iii) Output resistance | (iv) Input offset voltage |
- c. For the differentiator circuit shown in Fig.4, find: (8)
- the expression for the output voltage
 - the output voltage for the given input.

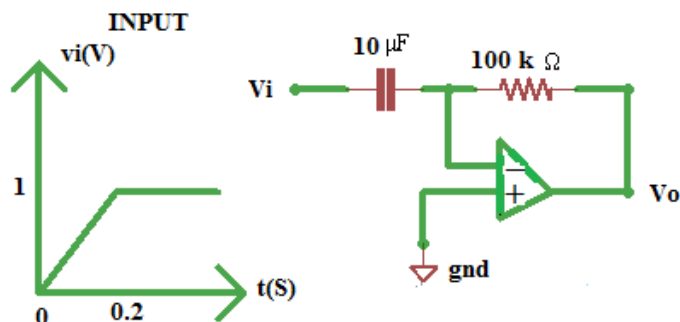


Fig.4

- Q.7 a. Draw and explain Sample and Hold circuit using OPAMP. Draw input and output waveform of the circuit. (8)
- b. For the circuit shown in the Fig.5 assuming that the input current is negligible, show that $v_o/v_i = f(R_2, R_1, A)$ and that it may be approximately to $v_o/v_i = -(R_2/R_1)$. Explain the purpose of R_3 (8)

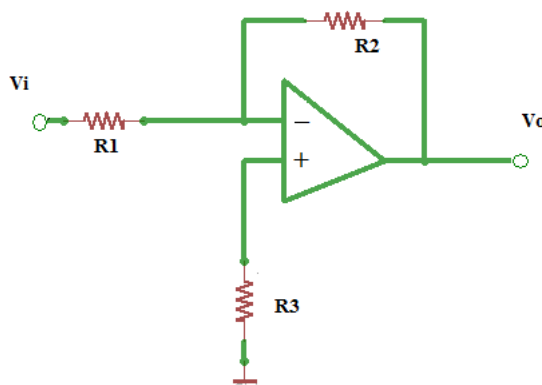


Fig.5

- Q.8 a. What are the applications of comparators? Explain the operation of zero crossing detector. (8)
- b. Draw the circuit of a Astable Multivibrator using 555 timer and explain its operation. (8)
- Q.9 Write Short notes on any **TWO** of the following: (2×8)
- 723 general purpose voltage regulator
 - Flash type A/D convertor
 - IC voltage regulator