**Code: DE56**          **Subject: ANALOG E**

## DipIETE – ET

**Time: 3 Hours**          **JUNE 2013**

*PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVID*
*IMMEDIATELY AFTER RECEIVING THE QUESTION PAPE*

**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.**

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**Q.1**   **Choose the correct or the best alternative in the following:**          **(2×10)**

a. The most commonly used transistor circuit configuration for power amplification is

   **(A)** CB                                      **(B)** CC
   **(C)** CE                                      **(D)** CE, CB and CC

b. In a CE amplifier, if the emitter bypass capacitor is removed

   **(A)** Input resistance decreases           **(B)** Output resistance increases
   **(C)** Voltage gain decreases               **(D)** Current gain increases

c. Which of the following amplifiers provides maximum efficiency

   **(A)** Class B amplifier                    **(B)** Class A amplifier
   **(C)** Class AB amplifier                   **(D)** Class C amplifier

d. Which of the following is used for isolation in circuits

   **(A)** LED                                   **(B)** Optocoupler
   **(C)** Photo diode                           **(D)** Photo transistor

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

   **(A)** 1 V/ $\mu$s                           **(B)** 0.5 V / $\mu$s
   **(C)** 10 V/ $\mu$s                          **(D)** 40 V/ $\mu$s

f. The circuit shown in the Fig.1 below is

   **(A)** Clipper                               **(B)** Half-wave rectifier
   **(C)** Peak detector                         **(D)** Sample & Hold circuit

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Fig.1

g. The circuit used to convert a slowly varying input voltage into a square wave is

**(A)** Schmitt trigger                    **(B)** Comparator
**(C)** Monostable Multivibrator          **(D)** Astable Multivibrator

h. The number of comparators required for a 4-bit parallel A to D converter

**(A)** 3                                  **(B)** 7
**(C)** 15                                 **(D)** 19

i. For an FET $I_{DSS}$ = 10 mA, $V_p$ = -4V, then the drain current $I_D$ for $V_{GS}$ =-2V is

**(A)** 2 mA                               **(B)** 2.5 mA
**(C)** 6 mA                               **(D)** 5 mA

j. In a 3-terminal fixed voltage regulators the unregulated input voltage should be more than the regulated output voltage by at least

**(A)** 0.1 V                              **(B)** 0.5 V
**(C)** 1 V                                **(D)** 2 V

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

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**Q.2**  a.  Explain
         (i)  Diffusion
         (ii) Ion implantation used in IC fabrication                                    **(8)**

         b.  Explain how a complementary MOSFET (CMOS) is fabricated on an IC.    **(8)**

**Q.3**  a.  The transistor in the CC circuit in Fig.2 has the following parameter $h_{ie} = 2.1K\Omega$ and $h_{fe} = 75$.
         (i)  Calculate the $Z_{in}, Z_{out}$ with $R_L$ not connected.
         (ii) $Z_{in}$ and $A_V$ with $R_L$ connected.                                    **(8)**
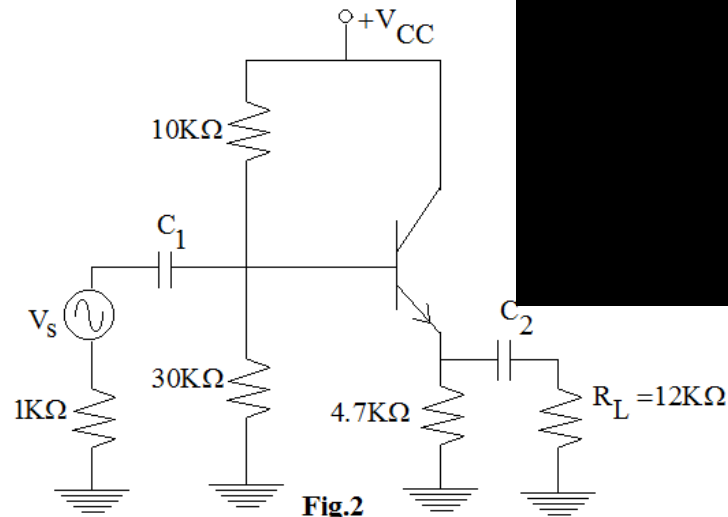
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**Fig.2**

b. Compare the performance of CE, CC, and CB circuits. **(8)**

**Q.4** a. Explain the drain characteristics of n-channel JFET with $V_{GS} = 0$ V. **(8)**

b. Explain the terms
 (i) Transconductance
 (ii) Drain Resistance
 (iii) Breakdown Voltage with respect to JFET **(8)**

**Q.5** a. Explain, with a neat diagram, the working of a Class A transformer coupled power amplifier. **(8)**

b. Write a short note on LED and optocoupler. **(8)**

**Q.6** a. Derive an expression for the gain of Non-Inverting Amplifier using op-amp. **(8)**

b. For the circuit shown in Fig.3 below, calculate
 (i) $V_0$                   (ii) $A_{CL}$
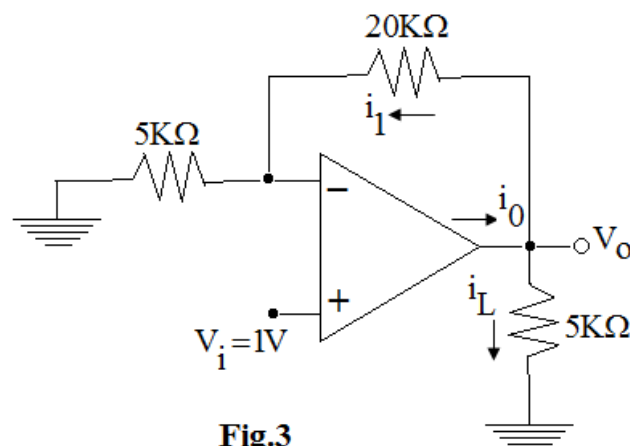 (iii) the load current $i_L$         (iv) total current $i_o$ **(8)**



**Fig.3**

**Q.7**    a.   Draw the circuit of Inverting summing amplifier usin
the expression for its output voltage.

       b.   Explain the working of the following circuits using op–
          (i)   Peak Detector                 (ii)   Clipper

**Q.8**    a.   Explain the working of a Schmitt Trigger using an op-amp, with waveforms.
                                                             **(8)**

       b.   Explain the working of 555 timer as monostable multivibrator. Also derive the
expression of frequency of oscillation.             **(8)**

**Q.9**    a.   Explain how a fixed voltage regulator can be used as a
          (i)   Current Source                   (ii)   Adjustable Regulator       **(8)**

       b.   Explain the working of Counter type A/D Converter.         **(8)**