Code: DE56 **Subject: ANALOG ELECTRONIC**

DipIETE – ET

Time: 3 Hours **DECEMBER 2012** **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. The process used to produce a metal thin film layer that will serve to make interconnections of the various components on the chip is

   (A) Metallization **(B)** Dielectric Isolation
   (C) Ion Implantation **(D)** Diffusion

b. Which of the following circuit is known as the emitter follower

   (A) CB amplifier **(B)** CC amplifier
   (C) CE amplifier **(D)** CS amplifier

c. Which of the following amplifier suffer from the cross over distortion?

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

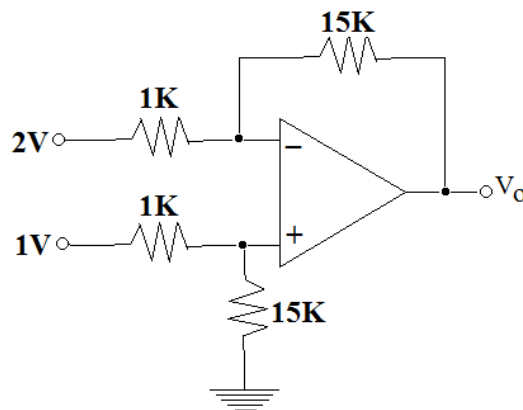d. The typical value of forward voltage drop for an LED is

   (A) 0.7 Volts **(B)** 0.3 Volts
   (C) 2.6 Volts **(D)** 1.2 Volts

e. The ideal value of slew rate for an op-amp is

   (A) Zero **(B)** Infinite
   (C) Low **(D)** Medium

f. The output voltage in the circuit shown below is

   (A) 15 V **(B)** 10 V
   (C) - 15 V **(D)** -10 V

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g. The frequency of oscillation of a Wien Bridge Oscillator using op-amp with R=10 K Ohm and C= 0.01 μF is

(A) 1674.46 Hz   (B) 1592.35 Hz
(C) 1289.4 Hz   (D) 1952 Hz

h. The output frequency of an astable multivibrator using 555 timer IC is available at

(A) Pin 3   (B) Pin 2
(C) Pin 4   (D) Pin 6

i. For a FET $I_{DSS} = 16$ mA, $V_p = -8V$. The value of transconductance (g_m) for $V_{GS} = -4V$ is

(A) 3500 μS   (B) 2500 μS
(C) 2000 μS   (D) 1500 μS

j. The number of op-amps required for a 3 bit output simultaneous converter type ADC is

(A) 7   (B) 5
(C) 3   (D) 15

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

Q.2 a. Explain any one of Basic Planar process used in IC fabrication.   **(8)**

   b. Explain Enhancement type MOSFET fabrication process.   **(8)**

Q.3 a. Draw the h-parameter equivalent circuit of Common Collector Amplifier circuit and derive the expressions for input impedance, output impedance, voltage gain and current gain.   **(10)**

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b. Calculate the input impedance, output impedance and voltage gain for the circuit shown below; R_1=39 KΩ, R_2=47 KΩ, R_C= 1.8 KΩ, R_L= 68 KΩ and h_{fe} = 80, h_{oe} = 1.5 µS, h_{ie}= 1.2 KΩ. **(6)**
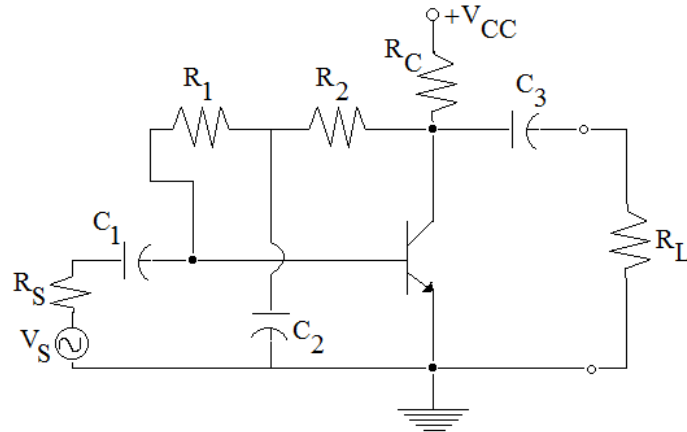
Q.4 a. Explain with a neat diagram, the working of n-channel JFET. **(8)**

b. For given IRF520

V_{DS} (max)	I_D (max)	P_D (max)	r_d (on)
100V	8A	40W	0.3 Ω

g_{FS}	V_{GS}(Th)
1.5S(min)	2V(min)
2.9 S(typ)	4V(max)

Calculate the gate – source voltage required to produce a 7A drain current in an IRF520. Determine the drain source ON voltage and the device power dissipation at $I_D = 7$A. **(8)**

Q.5 a. Explain with a diagram, the working of a Class B push pull power amplifier. **(8)**

b. Explain the complementary Emitter Follower Circuit. **(8)**

Q.6 a. Write the characteristics of an ideal op-amp. **(4)**

b. Derive an expression for the gain of an Inverting Amplifier using op-amp. **(5)**

c. Explain the term Slew Rate and obtain an expression for maximum frequency in terms of slew rate. **(7)**

Q.7 a. Explain the working of a differentiator using an op-amp. **(8)**

b. Explain the working of the following circuits using op-amp. **(8)**
   (i) Voltage to Current Converter
   (ii) Current to Voltage Converter

Q.8 a. Explain the working of monostable multivibrator using an op-amp.   **(8)**

b. Explain the working of an astable multivibrator using an op-amp and derive the expression for frequency of output wave.   **(8)**

Q.9 a. Explain the working of a Series Op-Amp Regulator.   **(7)**

b. Explain the working of Successive Approximation Type ADC.   **(9)**