B.E. 1st Semester CE/ME/MET/MN Final Semester Examination, 2013
Subject: Basic Electronics (ET-1201)

Time: 3 hours Full marks: 70

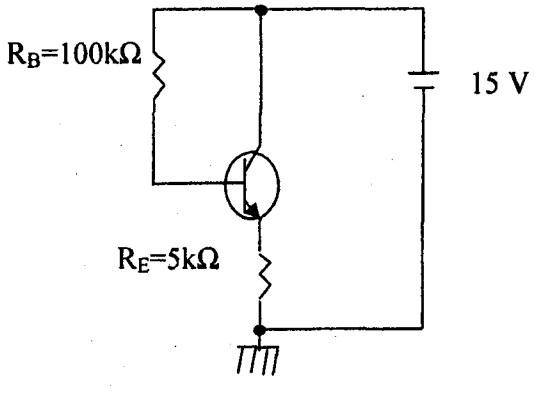
Answer any **Five questions:**

1. a) Explain the difference between metals, insulators and semiconductors with the help of band structure model
   (b) Draw and explain the V-I characteristics of a PN junction diode.
   (c) Explain why the increase in temperature increases the conductivity in a semiconductor, but increases resistivity in metallic conductors. (4+6+6=14)

2. (a) Explain the phenomena of a bridge rectifier with the help of a circuit diagram and mention its advantages and disadvantages when compared with a centre-tapped transformer rectifier circuit.
   (b)A bridge full wave rectifier circuit has V_i=100 sin (ωt) Volts. R_L=1000 Ω and R_f =100Ω. Find
   (i) The d.c load current
   (ii) The total input power
   (iii) PIV rating of the diodes
   (iv) The conversion efficiency.

   (c) Differentiate between Avalanche and Zener breakdown. (6+4+4=14)

3. (a) What is thermal runaway of a transistor? How biasing can be used to protect a transistor from thermal runaway?
   (b) Find the values of I_B, I_E and V_{CE} for the following circuit. β=100



   (c) Discuss 'Early effect' in BJT.

(4+6+4=14)

4. (a) Explain the operation of n-channel JEET with suitable diagram.
   (b)Why FET is called unipolar? Discuss the advantages of FET over BJT.
   (c)What is load line and operating point? Describe a graphical method for working of a transistor amplifier in CE mode. (5+4+5=14)

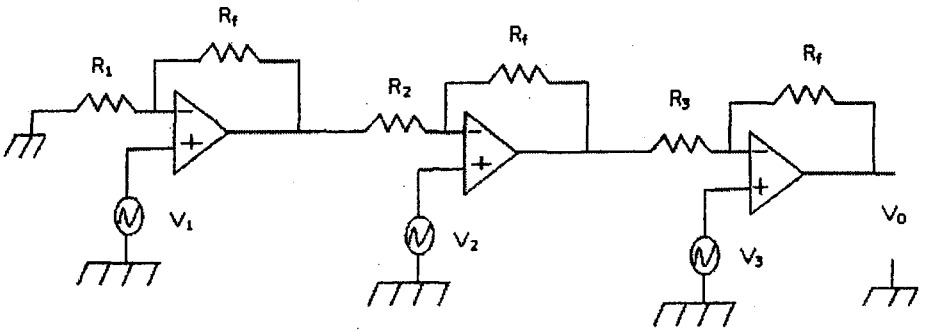
5. (a) What do you understand by 'negative feedback'? Derive the relation for feedback amplification gain and amplification gain without feedback.

(b) State the Barkhausen criterion for sustained oscillation.
(c) Design an RC phase-shift oscillator that will oscillate at 1.5 KHz.

(6+2+6=14)

6. (a) Explain the operation of Zener diode in voltage regulator circuit with suitable circuit diagram.
(b) "Negative feedback decreases gain but increases bandwidth in case of feedback amplifier"—discuss.
(c) What should be the characteristics of an ideal OPAMP. (4+3+4+3)

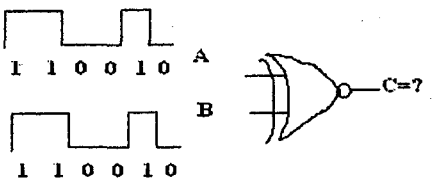
7. (a) What do you mean virtual ground in OPAMP circuit?
(b) Draw and explain the operation of an OPAMP integrator. Draw the output waveform if the input to an integrator is a square wave.
(c) Calculate the output (V_o) of the following circuit.



Where R_f=470kΩ, R_1=4.3kΩ, R_2=33kΩ, R_3=33kΩ, v_1=10μV, v_2=20μV, and v_3=40μV.

(2+6+6=14)

8. (a) If the two inputs of a XNOR gate are like below, then draw the output waveform.



(b)Realize the following expression using minimum number of NAND gates

$Y = A.B + \bar{A}C + \overline{BC}$

(c) Draw the truth table for the following logical expression:

$Y = A \oplus B \oplus C$ (4+6+4=14)

9. Write short notes on any **four** of the followings (3.5 ×4=14)
(a) Universal gates
(b) Short description of optoelectronic devices such as LED & LCD and their use
(c) Summing amplifier
(d) Varacter diode
(e) CRO.
(f) Full wave voltage doubler circuit: Its working and use
(g) Astable Multivibrator circuit and its operation