



Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH (ECE-N)/SEM-3/EC-304/2011-12

2011

ANALOG ELECTRONIC CIRCUITS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

- i) In active region of a BJT the emitter junction is in bias and collector junction is bias.
- a) forward, reverse b) forward, forward
- c) reverse, forward d) reverse, reverse.
- ii) The maximum theoretical efficiency of a class B push-pull transistor amplifier is approximately
- a) 25% b) 50%
- c) 70.7% d) 78.5%.

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- vii) Which one of the following oscillator is used for the generation of high frequencies ?
- a) R-C phase-shift b) Blocking oscillator
c) wien bridge d) L-C oscillator.
- viii) Operational amplifiers are used to amplify
- a) ac signals only b) dc signals only
c) both ac and dc signals d) none of these.
- ix) An ideal regulated power supply should have regulation which
- a) maximum b) 50%
c) zero d) 75%.
- x) A Class B push-pull amplifier has an ac output of 10 watts. The dc power drawn from the power supply under ideal condition is
- a) 10 watts b) 12.5 watts
c) 15 watts d) 20 watts.
- xi) The output voltage of IC7915 is
- a) 15V b) - 15V
c) 5V d) - 5V.
- xii) The Schmitt trigger is also known as
- a) squaring circuit b) blocking oscillator
c) sweep circuit d) astable multivibrator.

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**GROUP – B****(Short Answer Type Questions)**Answer any *three* of the following.

$$3 \times 5 = 15$$

2. With a neat diagram, explain the principle of operation of an antilog amplifier.
3. Explain the operation of transformer coupled class-A power amplifier.
4. Sketch the circuit of Wien-bridge oscillator. Explain the principle of operation & find an expression for the frequency of oscillation.
5. A phase-shift oscillator using a transistor has the following parameter values :

 $R_L = 3.3 \text{ k}\Omega$; $C = 0.01 \text{ }\mu\text{F}$. Calculate the frequency of oscillators & h_{fe} required for operation of an amplifier.
6. What are the differences between Series and Shunt regulator ? Draw a circuit diagram of a shunt regulator and explain its operation.

$$2 + 3$$

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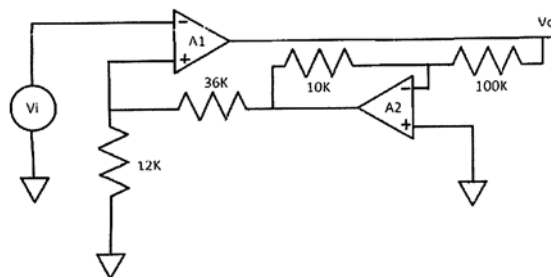
**GROUP – C****(Long Answer Type Questions)**Answer any *three* of the following. $3 \times 15 = 45$

7. Explain the need for biasing of a transistor. Mention different schemes for biasing a transistor. Compare their merits and demerits. Define stability factors. Explain the self biasing arrangement of the transistor. $(3 + 2 + 2) + 3 + 5$
8.
 - a) Draw the functional block diagram of 555 timer.
 - b) Explain the operation of astable multivibrator using 555 timer. Derive the expressions for frequency in case of the output waveform.
 - c) How can you modify the above circuit for 50% duty cycle ? $4 + (5 + 5) + 1$
9.
 - a) Derive the maximum efficiency of a class B push-pull amplifier. What is the major drawback of class B operation and how it can be avoided ?
 - b) Explain the importance of $P_{C,max}$ in designing the power amplifier.
 - c) What is the function of tuned amplifier ?
 - d) A transformer coupled class A power amplifier has maximum and minimum values of collector-emitter voltage of 25V and 2.5V respectively. Determine its collector efficiency. $(4 + 2) + 3 + 3 + 3$

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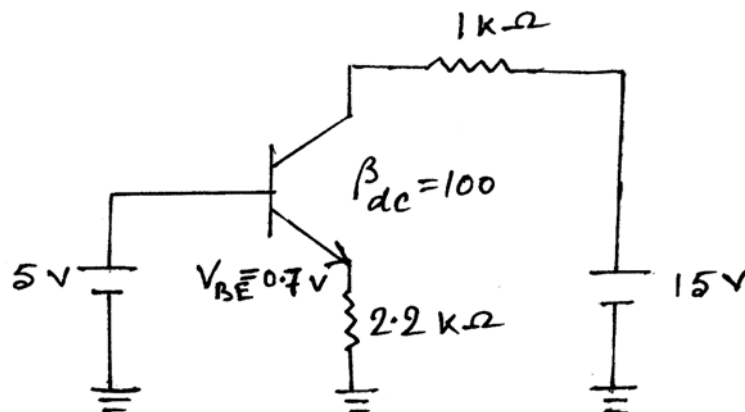
10. a) What are the characteristics of an ideal op-amp?
 b) Describe the functions of an op-amp as
 i) adder ii) integrator.
 c) Determine the value of the voltage gain $\frac{V_o}{V_i}$ for the following circuit.



- d) Explain logarithmic amplifier with circuit diagram.

2 + 4 + 4 + 5

11. a) Explain quiescent point and load line of a transistor amplifier. Find the Q point of the given emitter bias circuit.



- b) Define hybrid parameters for a basic transistor circuit in common emitter configuration and give its hybrid model.

(5 + 5) + 5

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12. Write short notes on any *three* of the following : 3×5

- a) Switched Mode Power Supply
 - b) RC phase shift oscillator.
 - c) Voltage Controlled Oscillator.
 - d) PLL
 - e) Wave shaper
 - f) Colpitts oscillators.
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