

CS/B.Tech (ECE-NEW)/SEM-3/EC-304/2013-14

2013

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 × 1 = 10

- i) 555 timer IC can be used to design multivibrator (s).
 - a) Astable
 - b) Astable and Monostable
 - c) Monostable and Bistable
 - d) Astable, Monostable and Bistable.

ii) For a Flash type *n*-bit ADC the number of comparators required is

- a) n
- b) $n - 1$
- c) 2^n
- d) $2^n - 1$.

iii) For a shunt derived series fed voltage feedback network

- a) R_i increases, R_o decreases
- b) R_i decreases, R_o increases
- c) R_i increases, R_o increases
- d) R_i decreases, R_o decreases.

iv) The frequency of oscillation of an RC phase shift oscillator is given as

- a) $\frac{1}{2\pi\sqrt{6RC}}$
- b) $\frac{1}{2RC}$
- c) $\frac{1}{\sqrt{6RC}}$
- d) $\frac{1}{\pi\sqrt{RC}}$.

v) Flip-Flop is also regarded as a multivibrator.

- a) Astable
- b) Monostable
- c) Bistable
- d) None of these.

vi) Quality Factor of a crystal oscillator is given by

- a) $\frac{1}{R} \sqrt{L/C}$
- b) $\frac{1}{R} \sqrt{LC}$
- c) $\frac{\pi}{R} \sqrt{L/C}$
- d) $\frac{1}{2R} \sqrt{L/C}$.

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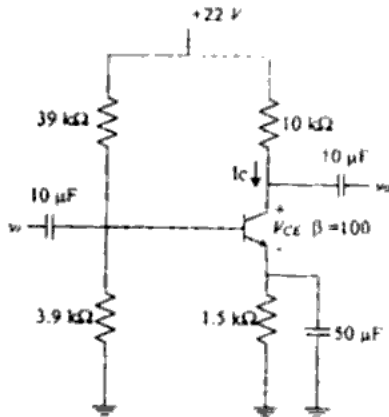
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GROUP - C

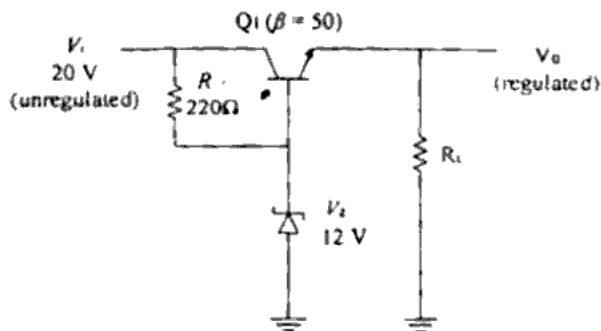
(Long Answer Type Questions)

Answer any *three* of the following 3 × 15 = 45

7. a) Determine the dc bias voltage V_{CE} and the current I_C for the voltage divider configuration of the figure given below : 3 + 3



- b) Calculate the output voltage and Zener current in the regulator circuit of the figure below for $R_L = 1\text{ k}\Omega$. 4



- c) A common emitter amplifier uses a voltage source having internal resistance $R_s = 800\ \Omega$ and the load resistance $R_L = 1000\ \Omega$. The h -parameters are $h_{ie} = 1\text{ k}\Omega$, $h_{re} = 2 \times 10^{-4}$ $\mu\text{A/V}$, $h_{fe} = 50$ $\mu\text{A/V}$ and $h_{oe} = 25\ \mu\text{A/V}$. Calculate the current gain A_i and voltage gain A_v . 5
8. a) What is the difference between Series and Shunt regulators ?
- b) Explain the operation of Series Voltage Regulator with neat diagram.
- c) What is percentage regulation ?
- d) Describe the working principle of π -filter with neat diagram. 3 + 5 + 2 + 5
9. a) Define the three Stability factors of transistor.
- b) Draw & explain the Self-bias circuit of a NPN transistor in CE configuration.
- c) Prove that $I_C = \beta I_B + (1 + \beta) I_{CO}$ of a transistor.
- d) Draw the circuit diagram & input-output characteristics of a PNP transistor with different regions in CB mode. 2 + 5 + 3 + 5
10. a) Explain the operation of Class B push-pull amplifier.
- b) Prove that the maximum efficiency of class B amplifier is 78.5%.
- c) What is the function of the tuned amplifier ? 5 + 7 + 3

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11. a) **What is VCO ? What is the main difference between VCO and fixed frequency oscillator ?**
- b) **Describe the operation of the PLL with block diagram. Define capture range and lock range. 2 + 2 + 7 + 4**
12. **Write short notes on any three of the following : 3 × 5**
- a) Diode Compensation
 - b) DC Load Line & Q Point
 - c) Crystal Oscillator
 - d) SMPS
 - e) Monostable multivibrator
 - f) Instrumentation amplifier.
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