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a) n

b) n-1

c) 2'

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
- R_i decreases, R_o decreases.

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

 $\frac{1}{2\pi\sqrt{6RC}}$

b) $\frac{1}{2RC}$

c) $\frac{1}{\sqrt{6RC}}$

d) $\frac{1}{\pi\sqrt{RC}}$

Flip-Flop is also regarded as a multibibrator.

a) Astable

b) Monostable

c) Bistable

d) None of these.

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- 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) $\frac{1}{2R}\sqrt{L/C}$.

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:

$$10 \times 1 = 10$$

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- - a) Astable
 - b) Astable and Monostable
 - c) Monostable and Bistable
 - d) Astable, Monostable and Bistable.

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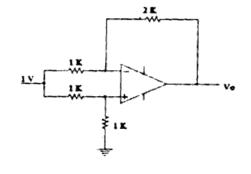
GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. What is ripple factor?
 - Explain how the ripple can be removed from the output of a rectifier. 1 + 4
- 3. Explain the need of biasing of a transistor.
 - Define the terms "Thermal Runaway" and "Early Effect".
- 4. State the characteristics of an ideal OP-AMP.
 - Explain the integrator circuit of an OP-AMP.
- The variation of open loop gain of an amplifier having internal gain 1000 is 10%, but for a specific use, only 1% gain variation is allowed. Find the feedback fraction and overall gain.
- Find out the output voltage Vo of the circuit shown below:



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- NE/SE 555 Timer IC consists of a
 - SR Flip-Flop
- JK Flip-Flop
- D Flip-Flop
- T Flip-Flop.
- viii) For an ideal Op-Amp
 - $Z_i = infinite, Z_o = zero$
 - $Z_1 = zero, Z_0 = zero$
 - Z_i = infinite, Z_0 = infinite
 - $Z_i = zero, Z_o = infinite.$
- In the astable multivibrator the capacitor charges up to
 - 1/3 Vcc al

2/3 Vcc

c) Vcc

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- none of these.
- SMPS stands for
 - Switched Max. Power Source a)
 - Small Min. Power Source bì
 - Switched Mode Power Supply c)
 - Simple Motor Power Supply. d)
- The Power amplifier with the highest efficiency is Xi)
 - Class A amplifier a)
- Class B amplifier
- Class C amplifier
- Class D amplifier.

- PLL stands for
 - Potential Low Level
 - Phase Logic Loop bì
 - Phase Locked Loop c)
 - Proportional Logic Level.

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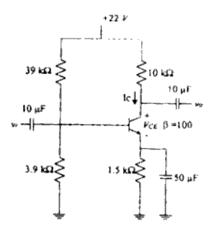
GROUP - C

(Long Answer Type Questions)

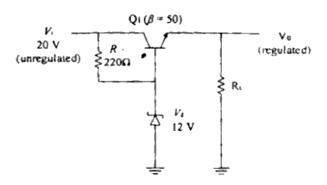
Answer any three of the following

 $3 \times 15 = 45$

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



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



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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 $h_{te} = 1 \text{k}\Omega$, $h_{re} = 2 \times 10^{-4} \text{ } \mu\text{A/V}$, $h_{fe} = 50 \text{ } \mu\text{A/V}$ and h_{oe} = 25 µA/V. Calculate the current gain A, and voltage gain A_{n}

8. What is the difference between Series and Shunt regulators?

- Explain the operation of Series Voltage Regulator with neat diagram.
- What is percentage regulation?

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- Describe the working principle of π -filter with neat diagram. 3 + 5 + 2 + 5
- Define the three Stability factors of transistor.
 - Draw & explain the Self-bias circuit of a NPN transistor b) in CE configuration.
 - Prove that $I_C = \beta I_B + (1 + \beta) I_{CO}$ of a transistor.
 - 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.
 - Prove that the maximum efficiency of class B amplifier is 78.5%.
 - What is the function of the tuned amplifier?

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- 11. a) What is VCO? What is the main difference between VCO and fixed frequency oscillator?
 - 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

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- e) Monostable multivibrator
- f) Instrumentation amplifier.

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