

Total number of printed pages – 7

B. Tech
CPES 5202

Third Semester Examination – 2007

ANALOGUE ELECTRONICS CIRCUIT

Full Marks – 70

Time : 3 Hours



Answer Question No. 1 which is compulsory
and any **five** from the rest.

The figures in the right-hand margin
indicate marks.

1. Answer the following in brief. Provide suitable illustrations wherever necessary : 2×10

- (a) What is 'small' in a small signal modeling ?
How does a fixed bias resistor affect the input impedance of a CE amplifier ?

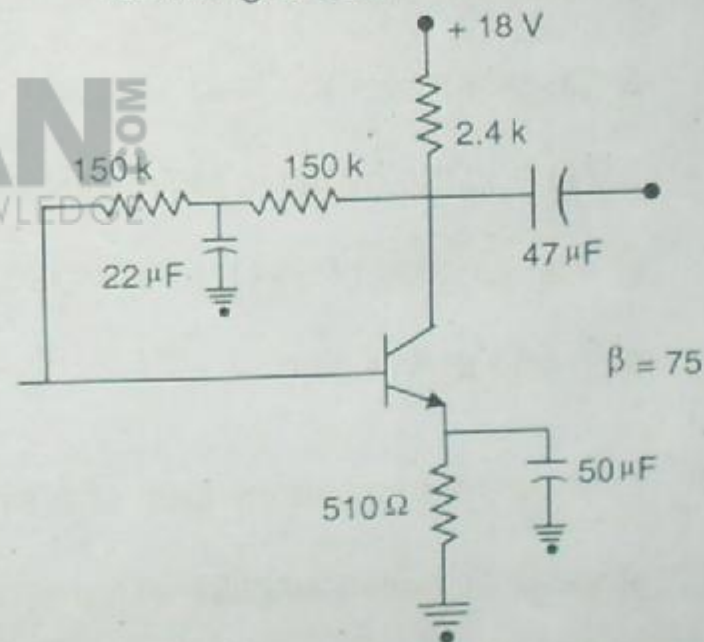
P.T.O.

- (b) How does the emitter resistor affect the stability of a CE configuration ? What is the need for biasing in an amplifier ?
- (c) How does a BJT behave at low frequencies ? Justify.
- (d) Why a square wave is fed to an amplifier for testing purpose ?
- (e) Design an RC phase shifter that introduces a phase shift of $\frac{\pi}{4}$ radians ?
- (f) What is a better input buffer, a BJT or an FET ? Justify.
- (g) Draw to scale, the output of an integrator when a sine wave is given as input.

Justify.

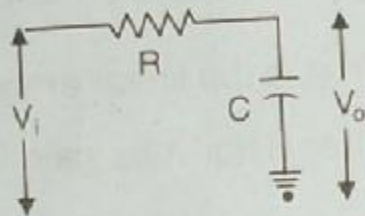
- (h) What are the advantages of a push-pull power amplifier ? Justify.
- (i) Give the load line of BJT amplifier if $V_{CC} = +9V$ and $R_C = 1.8K$?
- (j) What is the linear amplification factor of a transistor if its gain is 100 ?
2. (a) Compute the values of I_B , I_C , V_C for the following circuit.

6



Derive the necessary formula used.

- (b) Compute the time domain output of this circuit if a pulse of 1v is given as its input. 4



3. (a) A transistor has a value of $\alpha = 0.99$ in a CB amplifier. Its load resistance is 4.5Ω and the dynamic resistance of the emitter junction of 50Ω . Find its voltage gain and power gain. 5

- (b) Find the mid frequency gain of a single stage RC coupled amplifier in terms of its h-parameters. 5

4. (a) Find the input resistance, output resistance of an amplifier that employs voltage series feed back. 6

- (b) Derive the conditions of oscillation in a Wein-bridge oscillator. 4

5. (a) Establish the odd order harmonic cancellation property of a push-pull amplifier mathematically. 7

- (b) If $V_{cc} = 9v$, $I_c = 4mA$, what is the DC power consumption of a power amplifier? 3

6. (a) Do the mid frequency response of the CS amplifier? 4

- (b) An n-channel FET has $V_P = -2.0\text{V}$ and $I_{DSS} = 1.65\text{mA}$. It is desired to bias the circuit at $I_D = 0.8\text{mA}$ at $V_{DD} = 24\text{V}$. Find V_{GS} , g_m , R_S and R_d . 6

7. (a) Draw and explain the op-amp based differentiator. Draw its output in response to a periodic square wave. 5

- (b) What is the need of a differential amplifier? Draw and derive the differential gain of a CE based differential amplifier. 5

8. (a) Compare the cascade and the cascode amplifiers. What are their applications? 5

- (b) Draw a current source and establish how it can establish a constant current? What is its application? 5