

Total No. of Questions : 8]

SEAT No. :

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P1710

[5131]-102

M.Sc. - I

ELECTRONIC SCIENCE

EL1 UT 02 : Analogue Circuit Design

(2013 Pattern) (Credit System) (Semester - I)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

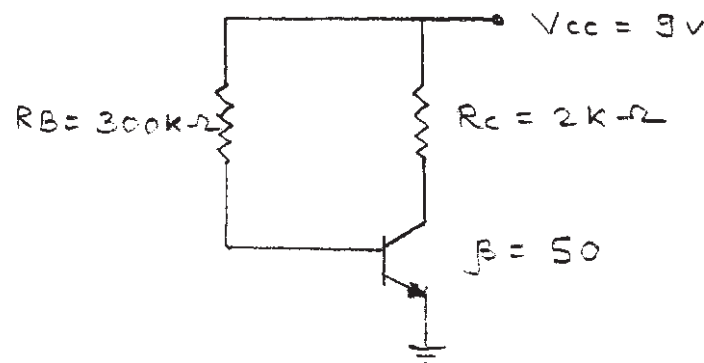
- 1) Attempt any five questions.
- 2) All questions carry equal marks.
- 3) Use of log table/non-programmable calculator is allowed.
- 4) Figures to the right indicate full marks.

Q1) Attempt the following:

- a) With neat sketches and characteristics curve, explain operation of junction FET. [4]
- b) What is filter? Design high pass filter with cut off frequency 1 kHz, and pass band gain of 2 using op-amp. [3]
- c) Draw the circuit diagram of Colpitt's oscillator and explain its working. Write down the expression for frequency of oscillation. [3]

Q2) Attempt the following:

- a) What is tuned amplifier? Explain stagger tuned amplifier with circuit diagram and characteristics. [4]
- b) Explain with the help of suitable circuit diagram, different coupling schemes used in amplifier. [3]
- c) Find the collector current and collector to emitter voltage for the given circuit [3]



P.T.O.

Q3) Attempt the following:

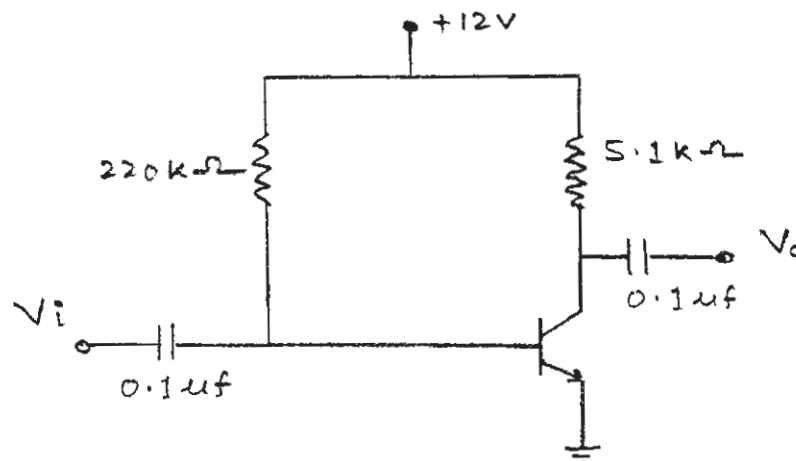
- State types of biasing. Explain voltage divider bias circuit and derive an expression for its stability factor. [4]
- Draw block diagram of PLL and explain function of each block. State applications of it. [3]
- Draw circuit diagram of single stage RC coupled BJT amplifier. State role of bypass capacitor. [3]

Q4) Attempt the following:

- Explain the effect of temperature on I-V characteristics of P-N Junction diode. Determine forward resistance of P-N junction diode when forward current is 5mA at $T = 300\text{ K}$. Assume silicon diode. [4]
- A crystal has following parameters:- $L = 0.5\text{ H}$, $C_s = 0.06\text{ pF}$, $C_p = 1\text{ pF}$ and $R = 500\Omega$. Find series and parallel resonant frequency. [3]
- Compare BJT and MOSFET. [3]

Q5) Attempt the following:

- What is clamper? Discuss with the help of circuit diagram and waveforms, the operation of a clamper circuit. [4]
- Determine input impedance, output impedance, voltage gain and current gain for CE amplifier of given circuit. The h - parameters of the transistor are $h_{fe} = 60$, $h_{ie} = 500\Omega$ at $I_c = 3\text{ mA}$. [3]



- Draw the circuit diagram of practical differentiator circuit using op-amp and give designing steps of it. [3]

Q6) Attempt the following:

- a) Compare C_E , C_B and C_C configurations. A transistor has $I_E = 10 \text{ mA}$ and $\alpha = 0.98$. Determine values of I_C and I_B . [4]
- b) Draw circuit diagram of Wien Bridge oscillator and explain its operation. Derive expression for frequency of oscillation of it. [3]
- c) In Hartley oscillator, value of capacitor in tuned circuit is 500 pf and two sections of coil have inductances $38\mu\text{H}$ and $12\mu\text{H}$. Find frequency of oscillation and feedback factor β . [3]

Q7) Attempt the following:

- a) Obtain expression for input impedance and output impedance with negative feedback for inverting amplifier. [5]
- b) Draw circuit diagram of RC phase shift oscillator using BJT and explain its working. Find value of C in RC phase shift oscillator designed for frequency of 1 kHz having value of R $10\text{k}\Omega$. [5]

Q8) Attempt the following:

- a) What is distortion? State different types of distortions in amplifier and explain them. [5]
- b) Explain the following terms in brief associated with op-amp. [5]
 - i) Input offset voltage
 - ii) Input offset current
 - iii) Input bias current
 - iv) CMRR
 - v) Slew rate

x

x

x