M 077

MODEL PAPER

B.E. DEGREE EXAMINATION.

Fourth Semester

Electrical and Electronics Engineering

EC 254 — ELECTRONIC CIRCUITS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. With the small signal equivalent circuit, define the parameters of a JFET.

2. Draw the circuit diagram of a Darlington Emitter follower. What are the advantages of this amplifier?

3. What are the advantages of using FET input stages?

4. Draw a single tuned amplifier circuit diagram and its frequency response characteristics.

5. With a block diagram, obtain the closed loop transfer gain of a feedback system.

6. Draw the circuit of a Wien Bridge Oscillator.

7. Sketch the output waveform of a Schmitt Trigger with UTP = 5 V and LTP = 3 V for a 12 V peak to peak 1 kHz sinewave input.

8. Why the RC circuit given in fig. 1 is called a High Pass filter?

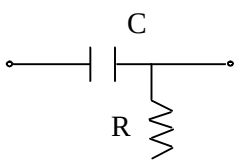


Fig. 1

9. Draw the circuit schematic of a simple 3 phase Half Wave Rectifier.

10. Give a functional block diagram of a switched Mode Voltage Regulators.

PART B — ($5 \times 16 = 80$ marks)

11. With differential mode and common mode small signal equivalent circuits, calculate CMRR for the differential amplifier with double ended output having the following specifications :

$R_C = 1\ k\Omega$, $R_{EE} = 10\ k\Omega$, $h_{ie} = 1\ k\Omega$, $h_{fe} = 200$, $h_{re} = h_{oe} = 0$.

12. (a) Using Miller's theorem, calculate A_V, A_{VS}, R_{in} and R_o of the Common Emitter amplifier shown in fig. 2.

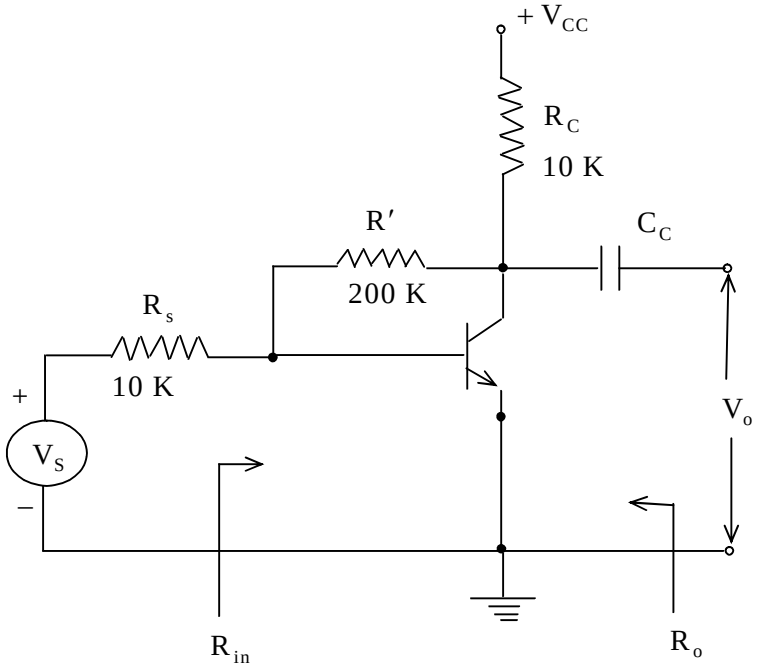


Fig. 2

The BJT has the following parameters :

$h_{ie} = 1.1\ k\Omega$

$h_{fe} = 50$

$\frac{1}{h_{oe}} = 40\ k\Omega$

$h_{re} = 0$.

Or

(b) (i) With a suitable circuit diagram and waveforms, explain the operation of a class B power amplifier using complementary symmetry transistors. (12)

(ii) Draw the circuit diagram of a class C power amplifier. Indicate the base and collector voltage waveforms. (4)

13. (a) (i) Derive R_{if} and R_{of} of a voltage series feedback amplifier. (8)

(ii) Compare the frequency response characteristics of an amplifier with and without feedback. (4)

(iii) Draw the circuits of single stage voltage series and current series feedback amplifiers. (4)

Or

(b) (i) Draw the circuit of a transistor Hartley Oscillator. Obtain the frequency of oscillation. (12)

(ii) What are the advantages of crystal oscillators? Draw a crystal oscillator circuit. (4)

14. (a) Design and draw a Monostable Multivibrator for the following specifications :

V_{CC} = 12 V; V_{BB} = 6 V; $I_{C(on)}$ = 1 mA;

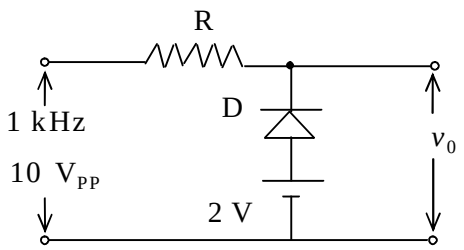
duration of output pulse 10 m seconds;

h_{FEmin} = 100; $I_{CBO} \approx 0$, $V_{BE(off)} = -0.5$ V.

Or

(b) (i) With circuit diagram and output voltage waveform, derive an expression for the period of oscillation of a UJT relaxation oscillator. (10)

(ii) Sketch the output waveforms of the following non linear RC wave shaping circuits given in fig. 3 and fig. 4. (6)



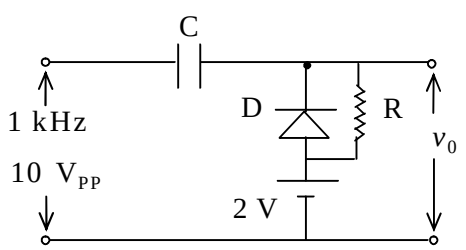


Fig. 3 Fig. 4

15. (a) With circuit diagram explain the operation of a transistor series voltage regulator with short circuit overload protection and current preregulation.

Or

(b) (i) Obtain an expression for the ripple factor of a capacitor input (RC) filter that follows a full wave rectifier, using the voltage waveforms. (10)

(ii) Show that the maximum rectification efficiency η_R of a full wave rectifier is 81%. (6)

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