

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2019

FIRST YEAR [BATCH 2018-21]

ELECTRONICS (General)

Paper : II

Date : 29/05/2019

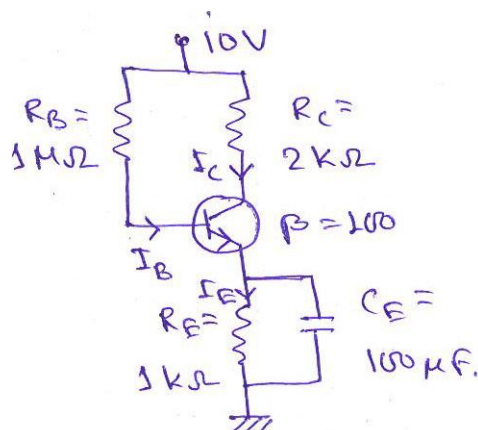
Time : 11 am – 1 pm

Full Marks : 50

Answer any five of the following questions :

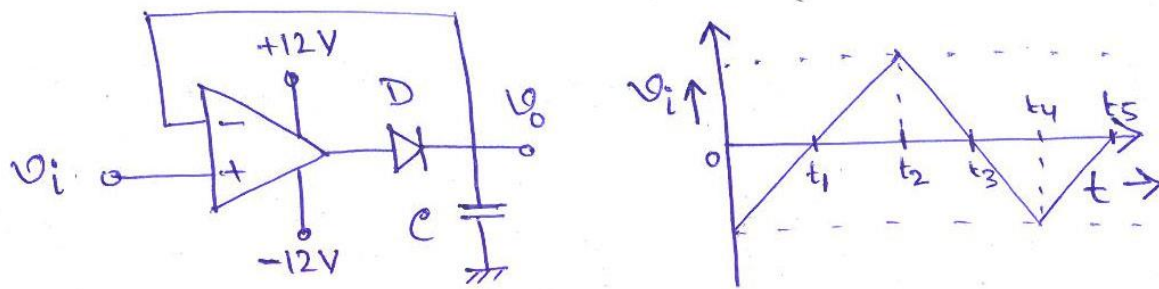
[5×10]

1. a) What do you mean by DC biasing of transistor? Define load line and Q-point. [2+2]
b) What is thermal runaway? [2]
c) Obtain the stability factors for collector-to-base bias transistor amplifier. [4]
2. a) Obtain expression for input and output impedance of a CE amplifier. [4]
b) If a full sinusoidal signal is applied at the input terminal of a class A, B, AB and C amplifier respectively, then draw the corresponding output waveform for each of the amplifier classes. [4]
c) Calculate the values of I_C , I_B and I_E for the given transistor circuit: [2]



3. a) Explain the concept of feedback in amplifiers. What do you mean by positive and negative feedback? [2+2]
b) Differentiate between oscillator and amplifier. [3]
c) The voltage gain of a transistor amplifier is 60. The input and output resistances of the amplifier are $1k\Omega$ and $50k\Omega$ respectively. If the amplifier is provided with 15% negative voltage feedback in series with the input, calculate the voltage gain and the input and output resistances. [3]
4. a) What is the Barkhausen criteria? [2]
b) State the working principle of a Wien-bridge oscillator. Obtain the condition for oscillation and expression for frequency of oscillation. [3+3]
c) Compare Hartley and Colpitts oscillators. [2]
5. a) What is fan-in and propagation delay of an integrated circuit. [2]
b) State and explain the working principle of TTL NAND gate. [4]
c) Design and explain the working of a NOR gate based on NMOS and CMOS technology. [2+2]

6. a) Define and explain CMRR. State how CMRR can be improved for an OPAMP. [3+1]
 b) For the given circuit, with the given input signal (v_i), determine the output waveform (v_o). [3]



- c) State the working of a zero-crossing voltage comparator designed with OPAMP. What should be the output, if a pure sinusoidal input voltage is applied at its input terminal? [2+1]
7. a) Describe the internal structure of timer chip 555 with the help of a schematic diagram. [3]
 b) Compare oscillator and multivibrator. [1]
 c) Design and explain the working of a mono-stable multivibrator based on IC 555. [6]
2. Write short notes on **any four** of the following : [4×2.5]
- | | |
|--------------------------|---------------------------|
| a) Stability factors | b) Fixed bias BJT circuit |
| c) Feedback topologies | d) CMOS logic family |
| e) OPAMP characteristics | f) OPAMP differentiator. |

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