

**B.E. ELECTRONICS AND TELE-COMMUNICATION ENGINEERING
SECOND YEAR SECOND SEMESTER EXAM, 2019**

ANALOG CIRCUITS- II

Time: Three hours

Full Marks: 100

Module I Any one (20)

1. a) Determine the operating point of the transistors shown in Fig. 1. Assume $\beta_1 = \beta_2 = 100$. [8]
 b) Draw the small signal equivalent circuit and calculate voltage gain; input and output resistances the amplifier shown in Fig. 1. [3+6+3]
2. a) Explain the advantages of cascode amplifier over CE amplifier. [4]
 b) Determine the current through the transistors, small signal equivalent circuit, voltage gain, input and output resistances of the amplifier shown in Fig. 2. [8+3+2+3]

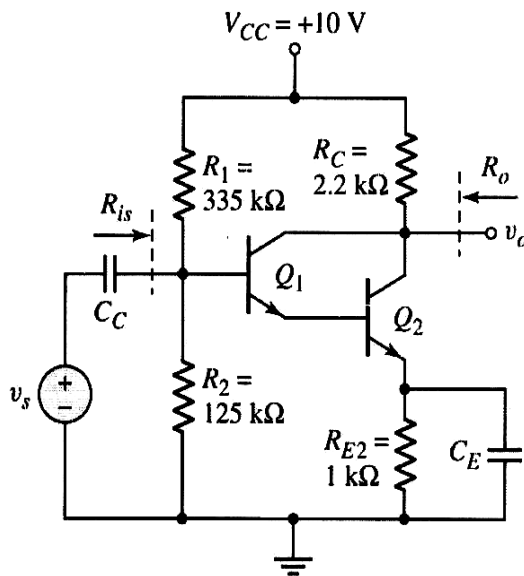


Figure 1

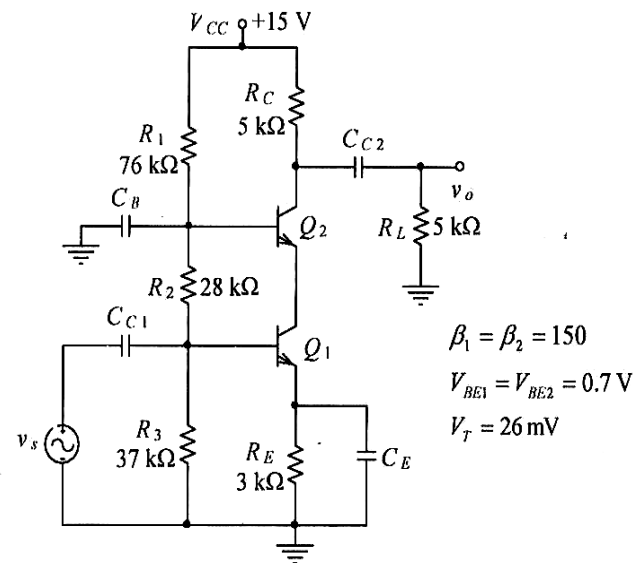


Figure 2

Module II Any three (3×20=60)

3. a) The class-A power amplifier is biased at $V_{CE} = 12 \text{ V}$. $V_{CC} = 24 \text{ V}$, $R_C = 50 \Omega$, $R_L = 50 \Omega$, [4+2]
 capacitively coupled. Calculate the power conversion efficiency of the amplifier. Explain why the efficiency is much less than its theoretical maximum value.
 b) A power transistor dissipates 4 W. If $T_{jmax} = 90^\circ \text{C}$, find the maximum ambient temperature [4]
 at which it can be operated. Given thermal resistance $\theta = 8^\circ \text{C/W}$.
 c) Draw transformer coupled class-B Push-pull amplifier and calculate its maximum [2+8]
 theoretical efficiency with the help of its load line.

[Turn over

4. a) Explain the operation of class-C power amplifier with the help of its circuit diagram and load line. [10]
b) What do you mean by nonlinear distortion in a transistor amplifier? Obtain the expression for output if the dynamic characteristic is given by a parabolic form ($A_0x+B_0x^2$), where A_0 and B_0 are constants and input is sinusoidal. Derive the form of 2nd order harmonic distortion and mention its importance. [2+4+4]
5. a) Explain the response of the high-pass RC circuit to pulse input. [10]
b) 1 kHz symmetrical square wave of peak-to-peak voltage 20 V is applied to a low-pass RC circuit with $R = 100 \Omega$ and $C = 1 \mu F$. Sketch the input and output waveforms to scale. [10]
6. a) With the help of block diagram explain the operation of PLL. Explain lock range and capture range. [6+4]
b) Construct VCO using 555 timer and the following components, $R_1 = 1k\Omega$, $R_2 = 2k\Omega$, pot (0-100k Ω) and a capacitor $C = 10\mu F$. Draw and level the capacitor voltage waveform and derive the frequency of oscillation of the 555 oscillator. [10]
7. a) What are the advantages of LC oscillators? Explain the operation and derive the frequency of oscillation of Hartley oscillator using Op-Amp. [2+8]
b) Derive and then calculate the frequency of oscillation of the Wien-Bridge oscillator with $R_1=R_2=1k\Omega$ and $R_3=2k\Omega$ [6+4]

Module III Any One (20)

8. Design a step down switching voltage regulator to obtain an output voltage of 15 V across a load of 1k Ω with ripple voltage less than 2% of the output voltage. Input voltage is 22 V. Forward diode drop=1V, saturation voltage of the transistor is 0.6V and assume $t_{off}=4\mu s$. Draw voltage and current waveforms at all nodes to scale. [12+8]
9. a) Design a function generator to generate sine, square and triangular wave. Choose proper components to obtain the frequency of the sine wave as 1kHz. [10]
b) Implement a monostable multivibrator circuit using 555 timer IC with the help of its internal circuit diagram. Find the value of external components so that the unstable state sustains for 10 msec. (Assume the SR flip-flop used in the IC is a positive edge trigger FF and the IC is using a 5V supply voltage). Draw the trigger waveform, capacitor voltage and corresponding output waveforms to scale. [4+2+4]

- i) Create the RESULT table with necessary foreign keys and indicated primary key. Assume data type as per your choice.
- ii) For each subject, show subject name and number of students passed.
- iii) For each student show name and his/her total marks in the descending order of total marks and list will have only those students with total marks more than 400.
- iv) Delete the rows from SUBJECT if no student appears in examination for the subject. 3x4

- 8) a) i) What is trigger? 3
ii) Assume the tables: DEPT(DCODE, DNAME, MAX_CNT) EMP(ECODE, ENAME)

Write a trigger to add tuple in EMP such that it will be allowed only if number of employees in the department does not exceed corresponding MAX_CNT. 5

OR

- b) i) What is the use of PL/SQL in oracle? 2
ii) Explain NO_DATA_FOUND and TOO_MANY_ROWS exceptions. 3
iii) Discuss the attributes of explicit cursor in PL/SQL. 3

Group E[CO5]: 15 Marks

- 9) a) i) Describe the steps for query processing. 4
ii) Show that incorrect summary problem does not happen in two phase locking protocol. 5
iii) Why steal-no force approach is preferred for transaction management? 3
iv) Compare primary and secondary indexing. 3

OR

- b) i) Describe transaction states and transition. 4
ii) Discuss the security feature of DBMS. 3
iii) When can one use merge join and hash join strategy? Also mention number of block accesses required for the two cases. 4
iv) What is the use of checkpoint in log based recovery? What happens at the time of checkpoint operation? 4