

Seat
No.

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मधुर - 033

Electronics Circuit Design (1090)

P. Pages : 4

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions carry equal marks.
5. Assume suitable data, if required.
6. Unless specified, assume material of device of silicon.
7. Use of non programmable calculator is allowed.

UNIT - I

1. Answer **any two**.

20

- a) Design a step down regulator using LM1575/2575 I.C. for $V_o=15V$, $I_L=800$ mA at $65^\circ C$, $V_{in}=20 \pm 2$ volt and $V_r(p-p)$ for filter capacitor of 2.0V. Draw circuit diagram. Design must include calculation of external components around I.C., heat sink if needed and unregulated power supply for Lm 1575/Lm 2575, $V_{sat}=0.8v$, $I_q=12$ mA $T_j=150^\circ C$, $Q_{jA}=65^\circ C/w$, $Q_{jC}=3^\circ C/w$, $Q_{cs}=2^\circ C/w$, Dropout voltage = 2 v.
- b) Design a discrete series regulator for the following condition of regulator output voltage $V_L=12$ Volt, load current = 150 mA (mili amp)
Input voltage = $20 \pm 2V$.
Draw the designed circuit diagram alongwith all ratings of component used.
- c) Design a regulated power supply using [LM 340-6] for following requirement
 - i) Output voltage $V_L = 6 V$
 - ii) Load current $I_L = 500$ mA
 - iii) $T_A = 30^\circ C$
 - iv) Dropout voltage = 2 v
 - v) $Q_{jA} = 50^\circ C$, $Q_{sA} = 7.9^\circ C/w$Design should include selection of transformer, calculation of rating of filter capacitor, rectifier diode, heat sink if required.

UNIT - II

2. Answer **any two**. 20

a) Design a single stage inverting amplifier using BJT for output voltage of 5 volt peak at $5\text{ k}\Omega$ having operating point = (7V, 2.2 mA). Bandwidth 20 Hz to 100 KHz, use $h_{fe} = 100$.

b) Design common source amplifier using JFET with

$V_{DD} = 16\text{V}$, Q point (2.4 mA, 6.6V)

$g_{mo} = 4\text{ mili siemen}$

$V_{gs} = -1.8\text{ V}$, $R_i = 240\text{ k}\Omega$, $V_P = -4\text{ V}$

$A_V = -2$, $R_{LW} = 10\text{ k}\Omega$

c) Design a two stage feedback amplifier to provide the following specifications $A_{vf} = 100$

$V_{CC} = 15\text{ V}$, $R_L = 3\text{ k}\Omega$, $R_S = 600\Omega$,

$V_o = 9\text{ V (p-p)}$, $f_L = 50\text{ Hz}$, $S = 10$

Q point (6V, 2.5 mA) use $h_{fe} = 80$, $h_{ie} = 842\Omega$.

Draw the designed diagram. Design must include bias component calculation and feedback network component calculation [No need of external coupling and bypass capacitor calculation]. Use identical stage each having same bias network ?

UNIT - III

3. Answer **any two**. 20

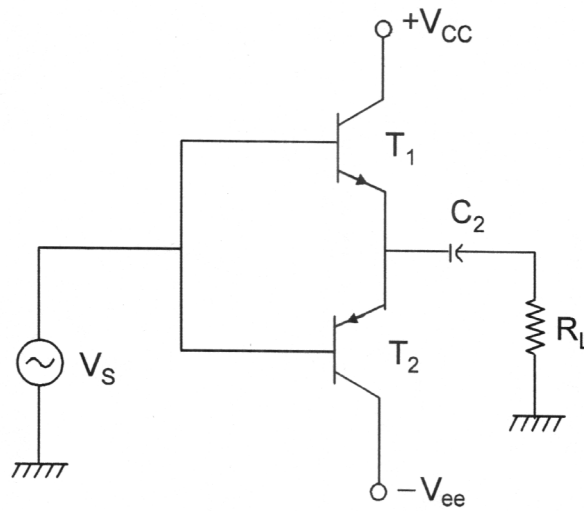
a) Design class A transformer coupled amplifier to deliver 45 mw of a.c. power to the load resistance of 4Ω use $V_{CC} = 9\text{ V}$ and efficiency of transformer as 70%.

b) Design a class B transformer coupled audio power amplifier to give output of 10W to a resistive load of 4Ω . Efficiency of output transformer is 80%, stability of bias network is 8 and $V_{CC} = 18\text{ V}$.

Design must include calculation of transistor rating, bias component and transformer selection use $h_{fe} = 50$.

- c) Design an audio complementary symmetry class - B pushpull amplifier as shown in fig. for the following condition.
- To produce maximum ac output power of 15 watt
 - Load resistance = 8 ohm
 - Operating frequency of 20 Hz.

Design must include calculation of supply voltage rating, output capacitor, transistor ratings ?



UNIT - IV

4. Answer any two.

20

- Design an Astable multivibrator (using BJT) to generate a square wave of 5 kHz and amplitude of 10V with collector current of 2mA. Use transistor with $h_{fe}(\min) = 100$. Draw the designed circuit alongwith component rating calculations.
- Design transistorised (BJT) monostable multivibrator circuit for
 - To generate pulse width of 300 μsec
 - Output voltage = 5 V
 - Use transistor having $I_c = 1\text{ mA}$ & $h_{fe} = 50$.
- Design a colpitt oscillator for JFET for following requirement.
 - Output frequency is 50 MHz.
 - Output voltage = 4 V (Peak)
 - Input resistance = 2 Mega ohm.
 - Voltage gain ≥ 25 .
 - JFET parameter $I_{DSS} = 2\text{ mA}$, $V_p = -6\text{ V}$, $g_{mo} = 3\text{ mS}$, $r_d = 50\text{ k}\Omega$

UNIT - V

5. Answer any two.

20

a) Design a non inverting amplifier with single supply of +15V using op-Amp IC 741 C for following requirement

i) Voltage gain $AV = 50$

ii) $f_L = 50 \text{ Hz}$

iii) load current $I_L = 5 \text{ mA}$

Specification of IC 741 C are

i) Open loop gain $A_o = 2 \times 10^5$

ii) break frequency $f_o = 5 \text{ Hz}$

iii) Slew rate = $0.5 \text{ v} / \mu\text{s}$

iv) $R_i = 2 \text{ M}\Omega$

v) $R_o = 75 \Omega$

Draw designed circuit diagram.

b) Design a sallen key unity gain low pass filter to meet following specifications.

a) Roll of rate 40 db / decade.

b) Pass band flat as possible.

c) Critical frequency of 2 kHz.

d) Gain of 5 at dc.

c) Design band pass active filter with single op Amp to meet the following specification $f_L = 3 \text{ kHz}$, $f_H = 3.5 \text{ kHz}$, $A_o = -5$.
