Total No. of printed pages = 6

ELECTRONIC CIRCUIT AND DEVICES – II

Full Marks – 100

Pass Marks – 30

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (i) Explain in steps how the load line and Q point can be determined in the output characteristics of a common emitter BJT configuration. Take the example of fixed bias common emitter configuration. 8

   (ii) In the given common emitter voltage divider bias configuration, determine the relations for the following : 6

   (a) Input impedance
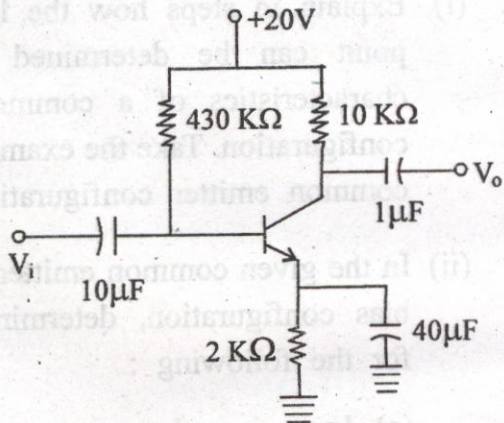
(b) Output impedance

(c) Voltage gain
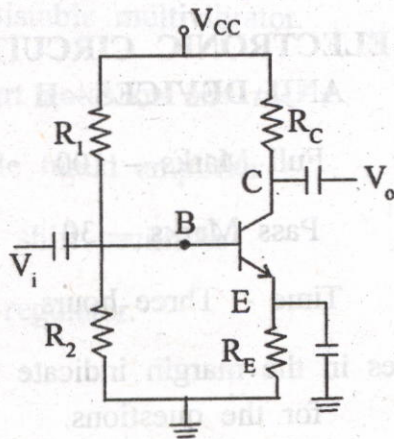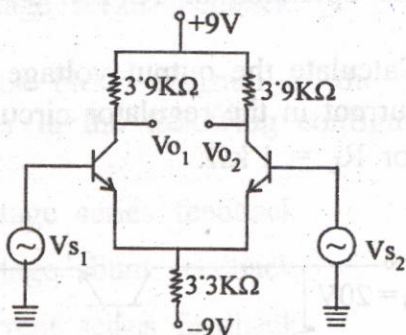

(iii) For the emitter bias network, determine : 6

(a) I_b

(b) I_c

(c) V_{CE}

2. (i) Calculate the d.c voltages and current in the circuit. 5

(ii) Perform a.c analysis over a single input differential amplifier configuration and determine the relation for voltage gain. 7

(iii) With the help of block diagram and relevant voltage waveforms, explain the operation of switching regulator or SMPS. 8

3. (i) What are the characteristics of an ideal operational amplifier ? Explain briefly. 5

(ii) Design a non-inverting amplifier using opamp having a voltage gain of 11. 5

(iii) How opamp can be used to design an active filter ? Explain with an example. 5

(iv) Draw the circuit diagram of Wein bridge oscillator and describe its working. 5

4. (i) Describe with the help of a circuit diagram the operation of IC LM 317.   5

(ii) Calculate the output voltage and the Zener current in the regulator circuit of the figure for $R_L = 1 \text{ k}\Omega$.   5
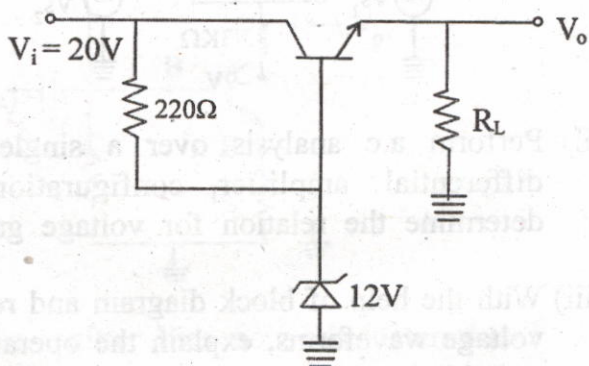
(iii) What is the difference between a regulated power supply and an unregulated power supply.   2

(iv) Draw a voltage supply using a full-wave bridge rectifier, capacitor filter and IC regulator to provide an output of +12V.   4

(v) What are the advantages of negative feedback ? Explain.   4

5. (i) Deduce the expression for input impedance for voltage series feedback. 5

(ii) Draw the block diagram of the feedback amplifier in the following configurations : 8

   (a) Voltage series feedback

   (b) Voltage shunt feedback

   (c) Current series feedback

   (d) Current shunt feedback [1i]

(iii) Determine the voltage gain and input impedance with feedback for voltage series feedback having $A = -20$, $R_i = 100$ kΩ and $R_o = 50$ kΩ while $\beta = -0.1$. 5

(iv) What are the Barkhausen criteria for oscillation ? 2

6. (i) With the help of a circuit diagram, explain the operation of a single tuned amplifier. Also, discuss the frequency response characteristics. 7

(ii) Mention the reasons of oscillation in a tuned amplifier. Briefly explain the methods used to stabilize the tuned amplifier generated oscillations. 3

(iii) With the help of circuit diagrams, describe how a 555 timer can be used as :

(a) Astable multivibrator

(b) Bistable multivibrator.   5+5=10

7. Write short notes on any *two* :   10×2=20

(i) Double tuned amplifier

(ii) Phase shift oscillator

(iii) Bulk regulator.