May 09 HP 12

Con. 2663-09.   (REVISED COURSE)   VR-3315

                              (3 Hours)   **[Total Marks 100**

N.B. :— (1) Question No. **1** is **compulsory**.
       (2) Attempt any **four** questions out of the remaining **six** questions.
       (3) Assume suitable data if **necessary**.

1.   Attempt any **five** :—   20

    (a) What are the various regions that a transistor can operate ? In which region should be a transistor operated if it is to be used as switch ?

    (b) Explain why CE configuration is popular in amplifier circuits.

    (c) Draw and explain the block-diagram of operational amplifier.

    (d) Derive the equation for On-time of the output in monostable multivibrator.

    (e) Write short note on series voltage regulator.

    (f) Derive the equation for transconductance in terms of pinch-off voltage and saturation drain current.

    (g) With the circuit diagram explain voltage-follower and draw input-output waveforms.

2. (a) Draw small-signal h-parameter model of the BJT and define the terms h_{ie}, h_{re}, h_{fe} 5 and h_{oe} for the same.

    (b) With approximate analysis, for the amplifier shown in **figure 1**, calculate the 15 R_i, A_{IS} and A_{VS}. The h-parameters of the transistor are : $h_{ie} = 1\ k\Omega$, $h_{fe} = 50$, $h_{re} = 2 \cdot 4 \times 10^{-4}$ and $h_{oe} = 25 \times 10^{-6}$.
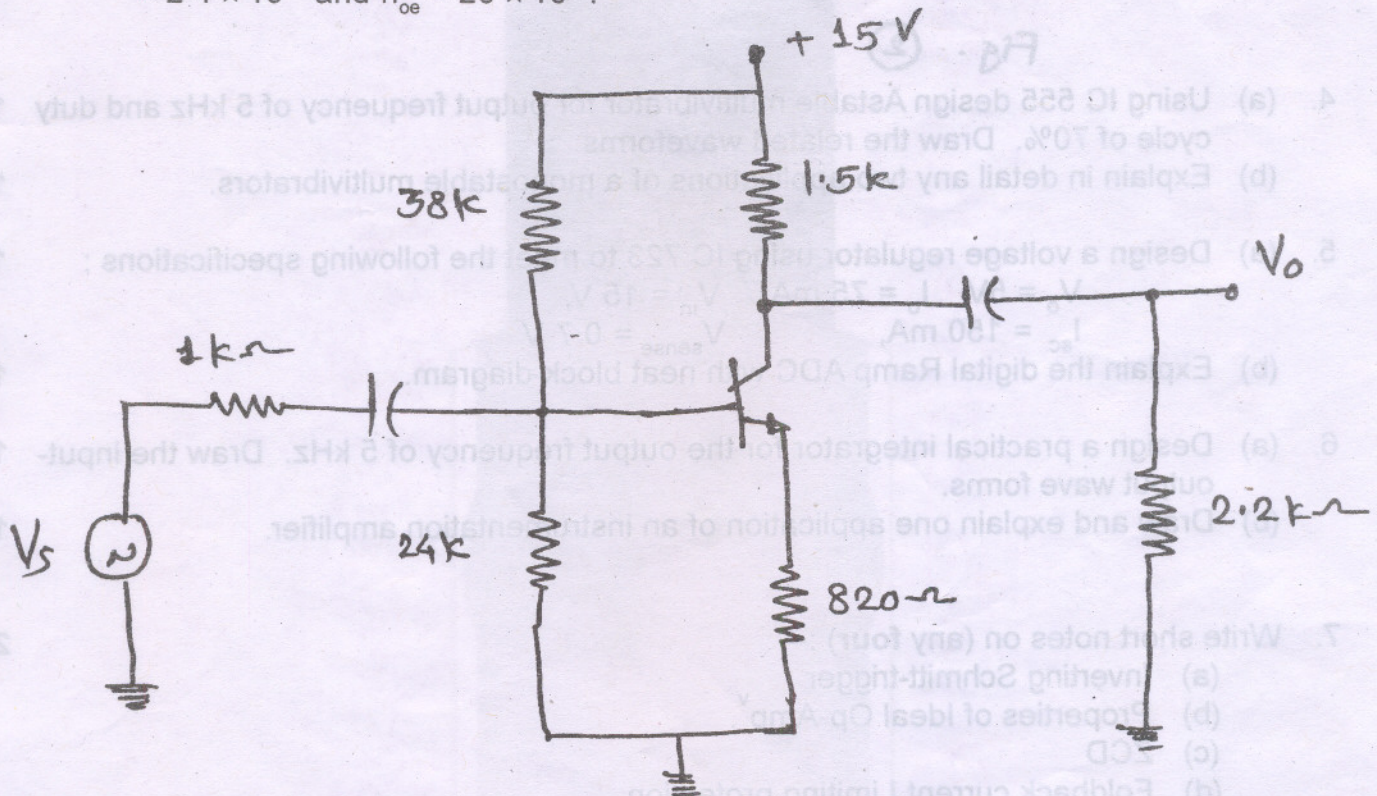

Fig. ①

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3. (a) For n-channel FET $I_{Dss} = 5\cdot8$ mA, $V_p = -3$ V and $V_{GS} = -2$V find I_D, g_m, g_{mo}. **5**

(b) For the network shown in **figure** 2 determine I_D, V_{GS}, V_G, V_D, V_S and V_{Ds}. **15**
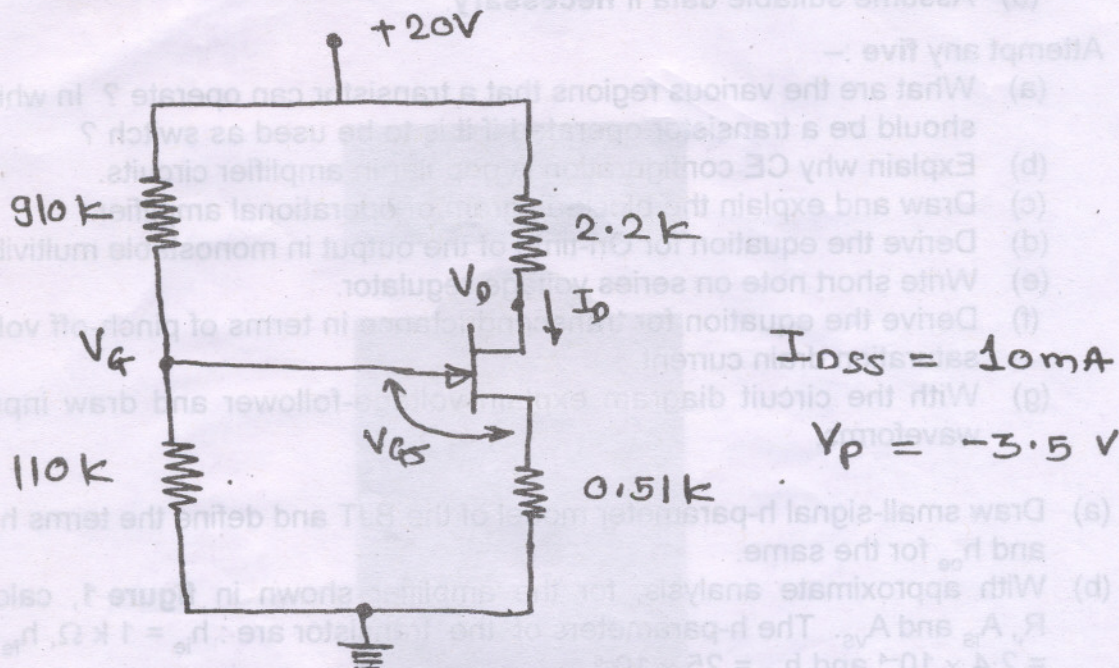

Fig. ②

4. (a) Using IC 555 design Astable multivibrator for output frequency of 5 kHz and duty cycle of 70%. Draw the related waveforms. **10**

(b) Explain in detail any two applications of a monostable multivibrators. **10**

5. (a) Design a voltage regulator using IC 723 to meet the following specifications : **10**
$V_o = 5$V, $I_o = 75$ mA, $V_{in} = 15$ V,
$I_{sc} = 150$ mA, $V_{sense} = 0\cdot7$ V

(b) Explain the digital Ramp ADC with neat block-diagram. **10**

6. (a) Design a practical integrator for the output frequency of 5 kHz. Draw the input-output wave forms. **10**

(b) Draw and explain one application of an instrumentation amplifier. **10**

7. Write short notes on (any **four**) :– **20**
   (a) Inverting Schmitt-trigger
   (b) Properties of Ideal Op-Amp.
   (c) ZCD
   (d) Foldback current Limiting protection.
   (e) Small signal amplifiers.