Total No. of Questions—8]　　　　　[Total No. of Printed Pages—3

| Seat No. | |
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[5252]-532

**S.E. (Electronics/E&TC) (First Semester)**
**EXAMINATION, 2017**
**ELECTRONIC DEVICES AND CIRCUITS**
**(2015 PATTERN)**

Time : Two Hours　　　　　　　　　　Maximum Marks : 50

**N.B.** :— (i) Solve Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**, Q. No. **5** or Q. No. **6** and Q. No. **7** or Q. No. **8**.

(ii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.

(iii) Assume suitable data, if necessary.

(iv) Neat diagrams must be drawn wherever necessary.

(v) Figures to the right indicate full marks.

1. (a) Define the following terms w.r.t. JFET :　　　　　[6]
   (i) Pinch-off voltage $(V_P)$
   (ii) Cut-off voltage $(V_{GS(OFF)})$
   (iii) Forward Transconductance (9 m)

   (b) Calculate $I_D$ and $V_{DS}$ for the circuit shown in Fig. 1. MOSFET parameters are $V_T = 1$ V, K = 0.1 mA/V$^2$.　　　[6]
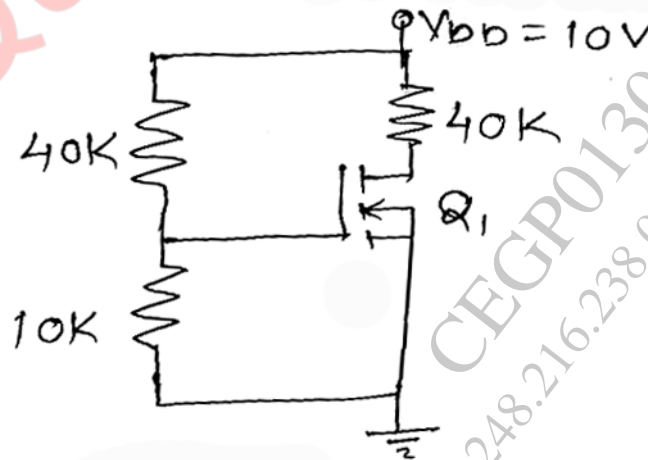


Fig. 1

P.T.O.

2. (*a*) Draw and explain frequency response of JFET CS amplifier. [6]

   (*b*) Explain the following non-ideal I-V characteristics of MOSFET : [6]

   (*i*) Body effect

   (*ii*) Sub-threshold conduction

   (*iii*) Breakdown effects.

3. (*a*) Draw and explain high frequency equivalent circuit of MOSFET. [6]

   (*b*) Explain working of MOSFET as a diode. [6]

*Or*

4. (*a*) Explain working of MOSFET as a switch in VLSI circuits. [6]

   (*b*) Determine the small signal voltage gain, input and output resistance of a CS amplifier shown in Fig. 2. MOSFET parameters are $V_T = 1.5$ V, $K_n = 0.8$ mA/V$^2$, $\lambda = 0.01$ V$^{-1}$. [6]
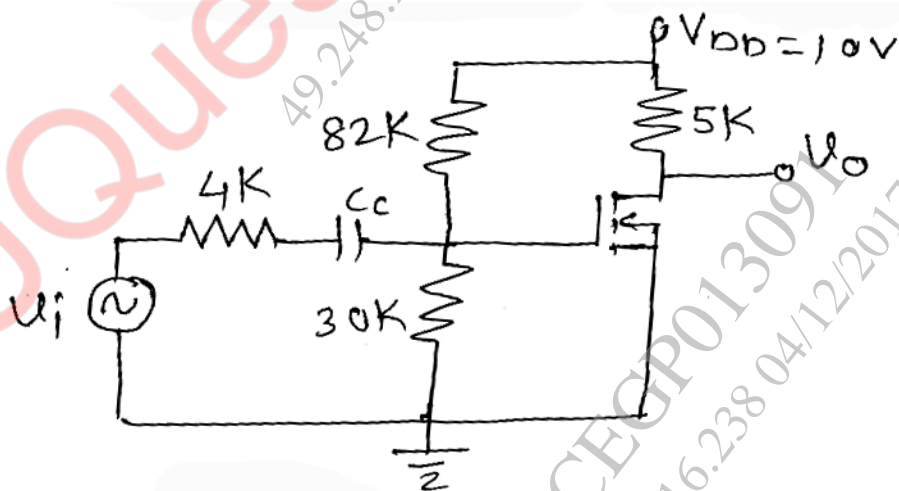


Fig. 2

**5.** (*a*) Draw and explain RC phase shift oscillator using FET. State its advantages. [7]

(*b*) An amplifier has a midband gain of 125 and bandwidth of 250 kHz. [6]

    (*i*) If 4% negative feedback is introduced, find the new bandwidth and gain

    (*ii*) If the bandwidth is to restricted to 1 MHz, find the feedback ratio.

*Or*

**6.** (*a*) Explain the effect of negative feedback on : [8]

    (*i*) Gain stability

    (*ii*) Amplitude distrotion

    (*iii*) Frequency distortion

    (*iv*) Noise.

(*b*) In a Colpitt's oscillator using FET, $C_1$ = 100 pF, $C_2$ = 7500 pF. If the frequency of oscillations is to vary between 950 kHz and 2050 kHz, determine the range of inductor values. [5]

**7.** (*a*) Draw and explain principle of current boosting in 3-terminal adjustable voltage regulator. [7]

(*b*) Determine the range over which the output voltage can be varied in LM 317 voltage regulator if value of $R_1$ = 240 Ω and $R_2$ is taken as 4.7 Ω potentiometer. Assume $I_{adj}$ = 100 μA. [6]

*Or*

**8.** (*a*) Compare between linear power supply and switch made power supply. [6]

(*b*) Write short note on 'Low Dropout Voltage Regulator'. [7]