| Seat No. | |
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**[5459]-132**

## S.E. (Electronics/E&TC) (I Sem.) EXAMINATION, 2018

## ELECTRONIC DEVICES AND CIRCUITS

### (2015 PATTERN)

**Time : Two Hours**                                   **Maximum Marks : 50**

*N.B.* :— (*i*)   Neat diagrams must be drawn wherever necessary.

   (*ii*)   Figures to the right indicate full marks.

   (*iii*)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

   (*iv*)   Assume suitable data, if necessary.

1.   (*a*)   Draw and explain the V-I characteristics of N-channel JFET.                                                                 [6]

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

   (1)   Finite output resistance

   (2)   Body effect

   (3)   Breakdown effects.

P.T.O.

*Or*

**2.** (*a*) For the circuit diagram shown in Fig. 1. Calculate $I_D$, $V_{DS}$, $R_S$. Assume : [6]

$I_{DSS} = 8$ mA

$V_P = -4$ V

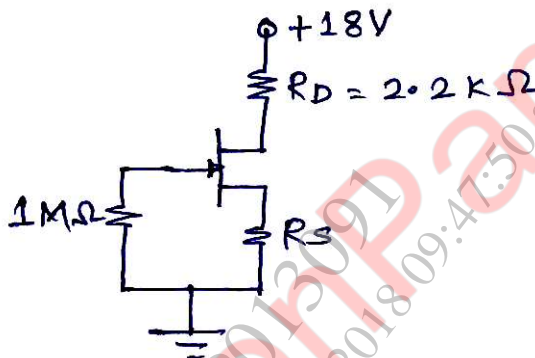$V_{GS} = -2$ V.



+18V

$R_D = 2.2 K\Omega$

1MΩ

$R_S$

Fig. 1

(*b*) Write a short note on constant source Biasing circuit using MOSFET. [6]

**3.** (*a*) Write a short note on MOSFET scaling. [6]

(*b*) Explain the MOSFET as switch In VLSI. [6]

*Or*

**4.** (*a*) For the circuit diagram shown in Fig. 2, calculate AV, Ri, Ro. The MOSFET parameters are $V_T = 1.5$ V, $K_n = 0.8$ mA/V$^2$, $\lambda = 0.01$ V$^{-1}$. [6]
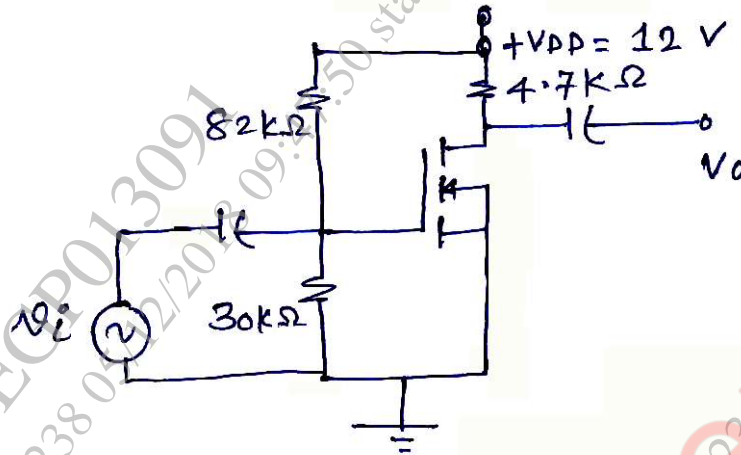
Fig. 2

(b) Explain the MOSFET as current sink and source circuit in VLSI. [6]

**5.** (a) Draw and explain four basic types of Amplifier. [8]

(b) An Amplifier has a midband gain of 100 and a bandwidth of 200 kHz : [5]

(i) If 5% negative feedback is introduced, find the new bandwidth and gain.

(ii) If the bandwidth is to be restricted to 1 MHz, find the feedback ratio. [5]

*Or*

**6.** (a) Draw and explain Hartley oscillator using FET. [7]

(b) In a Colpitt's oscillator using FET $C_1$ = 100 PF, $C_2$ = 10,000 PF. If the frequency of oscillator is vary between 950 kHz and 2000 kHz. Determine the range of inductor values. [6]

**7.** (*a*) Explain the working of Buck type switching regulator with a neat diagram and necessary waveform. State its advantages. [8]

(*b*) Determine the range over which the output voltage can be varied in LM317 voltage regulator if values of $R_1 = 240 \ \Omega$ and $R_2$ is taken as 5 kΩ potentiometer. Assume $I_{adj} = 100$ µA. Draw the typical connection diagram. [5]

*Or*

**8.** (*a*) Draw and explain block diagram of adjustable positive three-terminal voltage regulator. [8]

(*b*) Design an adjustable voltage regulator using LM317 for output voltage 1.25 V to 15 V and draw necessary connection diagram. (Assume $R_1 = 240 \ \Omega$, $I_{adjustable} = 100$ µA). [5]