ES201
[ET]

Enrol. No. ....

END SEMESTER EXAMINATION : NOV. – DEC., 2017

BASIC ELECTRONICS ENGINEERING

Time : 3 Hrs.   Maximum Marks : 70

Note: *Attempt questions from all sections as directed.*
Use of simple calculator is allowed.

SECTION – A   (30 Marks)

Attempt any **five** questions out of **six**.
Each question carries **06** marks.

1. What is the main difference between Zener and avalanche breakdown? A silicon diode has reverse saturation current of 2.2 µA at 300 K. Find forward voltage for a forward current of 9 mA.

2. (a) Draw the output of given clipper circuit. Assume both D1, D2 diodes as Si diodes.   (3)
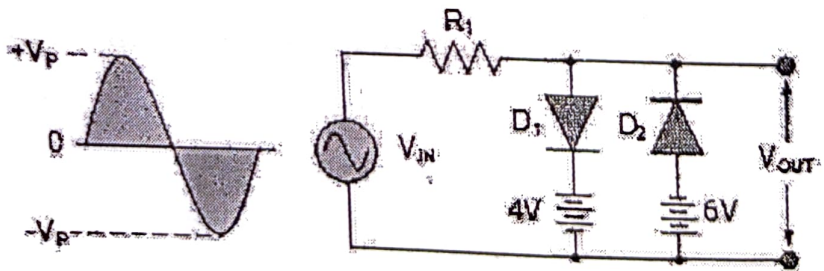
(b) Draw the output of given clamper circuit with Ge diode. (3)
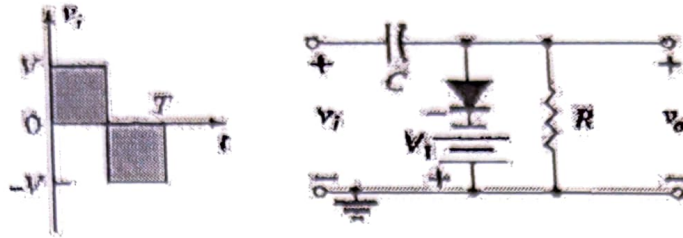
3. State and prove De Morgan's theorem. Design a combinational circuit with mode control that can perform 2-bit addition and subtraction. When mode control = 0 it is an adder and when mode control = 1 it is an subtracter.

4. Draw the circuit diagram of closed loop non-inverting operational amplifier (OP-AMP) and drive the expression for its voltage gain. Locate the virtual ground point in the circuit and explain its significance.

5. Reduce the following function in SOP form using K–Map.

$$F = \Sigma(0,1,2,3,7,8,10) + \Sigma d(5,6,11,15)$$

Implement the simplified function using only NAND gate.

6. What is thermal runaway in transistor amplifier circuits? Draw the circuit diagram to obtain the

characteristics of BJT in CE configuration. Draw output characteristics curves and explain the behavior of transistor in active, cut-off and saturation mode.

SECTION – B   (20 Marks)

*Attempt any* **two** *questions out of* **three**.
Each question carries **10** *marks.*

7. What is the significance of stability factor in transistor operation? Determine V_{CE} and I_C in the voltage-divider biased transistor circuit. Assume $\beta_{DC} = 100$ and $I_E \approx I_C$.
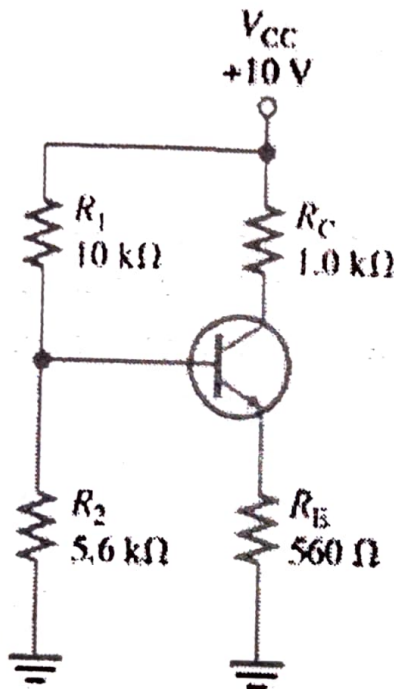
8. Calculate the voltage gain in the amplifier shown in figure below The transconductance of the JFET is 4000 μs. If the 400Ω source resistance is by passed by a capacitor, how much is voltage gain?

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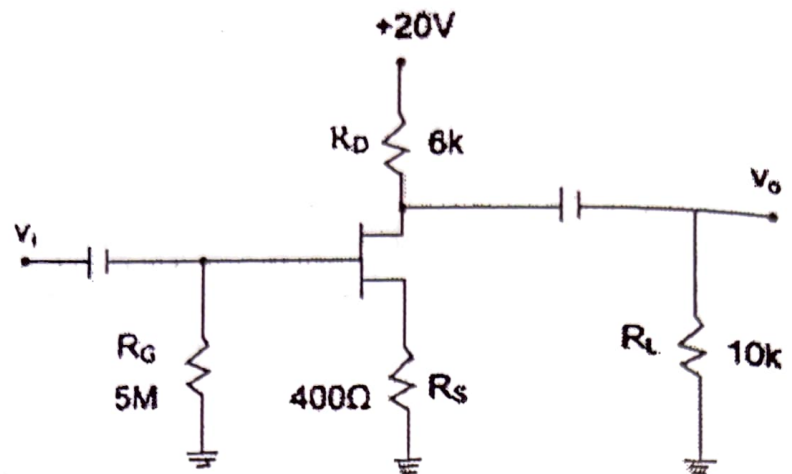
9. An inverting amplifier has $R_f = 400\ K\Omega$ and $R1 = 4\ K\Omega$. Determine the amplifier circuit voltage gain, input resistance, output resistance, output voltage and input current if the input voltage is 0.2 V. Assume OP-AMP to be ideal one.

SECTION – C   (20 Marks)
(Compulsory)

10. (a) Show how Zener diode can be used as a voltage regulator. Design a voltage regulator that will maintain an output voltage at 30 V across 1.2 KΩ load with input voltage that will vary between 40 V and 60 V. Determine proper value of R_s, I_L and maximum current I_{ZM}.   (10)

(b) How MOSFET can be used as voltage controlled resistor? Draw the structure of n-channel depletion type MOSFET and explain its working with the help of output and transfer characteristics.   (10)