Printed Pages : 4

Roll No.

328353(28)

BE (3rd Semester)
Examination, Nov.-Dec., 2018

(New Scheme)

Electronic Devices and Circuits

Time Allowed : 3 hours | *Maximum Marks :* 80
Minimum Pass Marks : 28

Note : (*i*) Attempt **all** questions. Part (*a*) of each question is compulsory. Attempt any **two** parts from (*b*), (*c*) and (*d*) of each question.

(*ii*) The figures in the right-hand margin indicate marks.

1. (*a*) State Mass-action Law as an equation and in words. [2]

(*b*) Explain formation of *P-N* junction diode and its characteristics. [7]

(*c*) Prove that for a step-graded *p-n* junction diode the contact potential is

$$V_0 = V_T \ ln \frac{N_D N_A}{n_i^2}$$ [7]

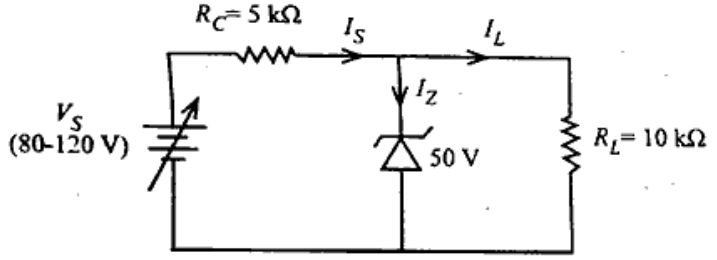
(*d*) A sample of germanium (Ge) is doped to the extent of 10^{14} donor atoms/cm^3 and 7×10^3 acceptor atoms/cm^3. At the temperature of the sample the resistivity of intrinsic germanium is 60 Ω-cm. If applied electric field is 2 V/cm, find the total conduction current density. [7]

2. (*a*) Write the equation of diode current. [2]

(*b*) Compare half-wave rectifier, full-wave rectifier and bridge rectifier. [7]

(*c*) Explain Zener diode as voltage regulator. [7]

(*d*) For the circuit shown, find the maximum and minimum values of Zener diode current. Given that [7]
$V_Z = 50$ V, $R_L = 10$ kΩ, $R_S = 5$ kΩ, $V_S = (80$ to 120 V).



3. (*a*) Define biasing of a transistor. [2]

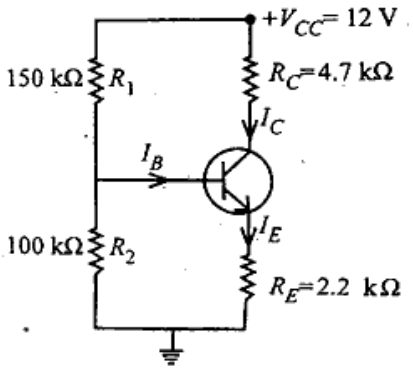
(*b*) Draw the input and output characteristics of common emitter configuration. Explain active, saturation and cut-off region. [7]

(*c*) Explain voltage divider bias circuit and derive the expression for stability factor. [7]

(*d*) For the circuit shown, find the operating point. What is the stability factor of the circuit? [7]

Given that

$\beta = 50$, $V_{BE} = 0.7$ V, $V_{CC} = 12$ V, $R_1 = 150$ kΩ, $R_C = 4.7$ kΩ, $R_2 = 100$ kΩ, $R_E = 2.2$ kΩ.



4. (*a*) Define pinch-off voltage. [2]

(*b*) Explain construction and working of *n*-channel JFET. [7]

(*c*) Starting with the definition of g_m and r_d, verify the relation $\mu = g_m \times r_d$. Also show that if two identical FET's are connected in parallel. g_m is doubled and r_d is halved. Since $\mu = g_m \times r_d$, then μ remains unchanged. [7]

(*d*) Explain FET as voltage variable resistor. [7]

5. (*a*) Draw symbol of *n*-channel E-MOSFET and *n*-channel D-MOSFET. [2]

(*b*) Explain working of Depletion MOSFET with transfer characteristics. [7]

(*c*) Explain C-MOS inverter in detail. [7]

(*d*) Compare E-MOSFET and D-MOSFET. [7]

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