**Motilal Nehru National Institute of Technology Allahabad**
**Department of Electronics & Communication Engineering**
**End-Semester (odd) Examination (November-2016)**
**Programme: B. Tech (EE), III-Semester**
**Subject: Principles of Electronics (EC-1304)**

Time: 3:00 Hours

Maximum Marks: 60

NOTE: Attempt all the questions and assume the necessary data if required.

Q1 Draw and explain the (a) Logarithmic amplifier (for two input signals only) and (b) Integrator circuits using operational amplifier. (8)

Q2 With the help of neat diagram explain the operation of n-channel MOSFET and its input and output characteristics. (7)

Q3 Draw and explain the hybrid parameter model of a BJT transistor with suitable diagrams. Also, derive the expression for current gain, voltage gain, power gain and input impedance. (8)

Q4 Analyze the given circuit to determine all node voltages ($V_C$, $V_E$) and branch currents ($I_B$, $I_C$, $I_E$). Assume $\beta = 100$. (7)
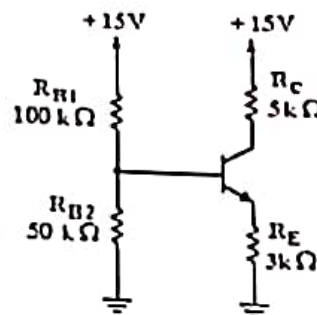


Q5 Consider a pn junction in equilibrium at room temperature (T=300 K) for which the doping concentrations are $N_A=10^{18}/cm^3$ and $N_D=10^{16}/cm^3$ and the cross sectional area $A=10^{-4} cm^2$. Calculate $p_p$, $n_{p0}$, $n_n$, $p_{n0}$, $V_0$, $W$, $x_n$ and $x_p$. Use $n_i=1.5 \times 10^{10}/cm^3$. (8)

Q6 For a given function $F(a, b, c, d) = \Sigma m(0, 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 15)$ find the followings: (7),

(a) Minimized expression

(b) Implement the minimized function using two input NOR gates.

Q7 Convert the following numbers from the given bases to the bases indicated:

(a) Decimal 225.225 to binary, octal and hexadecimal. (8),

(b) Binary 11010111.110 to decimal, octal and hexadecimal.

(c) Octal 623.77 to decimal, binary and hexadecimal.

(d) Hexadecimal 2AC5.D to decimal, octal and binary.

Q8 Explain the operation and characteristics of Tunnel and Varactor diode. (7)

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