

3E1641

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3E1641**B.Tech .III Semester (Main/Back) Examination -2014
3EE1A-Electronics Devices & Circuits****Time : 3 Hours****Maximum Marks : 80
Min. Passing Marks : 24****Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

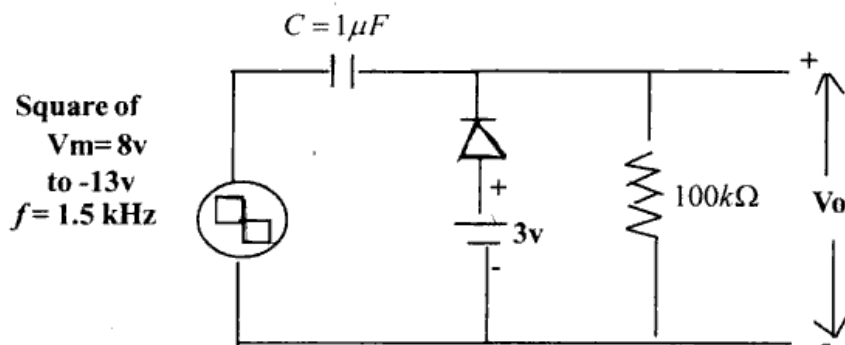
1. a) Explain Energy band theory of crystals. On its basis bring out the difference between Insulator, Semiconductor and metals. (8)
- b) Find the conductivity of Silicon
 - i) Under intrinsic condition at 300^ok
 - ii) With donor impurity of 1 part in 5×10^7 . Given that, intrinsic concentration $(\eta_i) = 1.5 \times 10^{10}/\text{cm}^3$, mobility of electron $(\mu_n) = 1300 \text{ cm}^2/\text{v-s}$, mobility of holes $(\mu_p) = 500 \text{ cm}^2/\text{v-s}$, $e = 1.6 \times 10^{-19} \text{ C}$ and no. of S_i atoms $= 5 \times 10^{22}/\text{cm}^3$ at a temperature of 27^oC. (8)

OR

1. a) What are the step graded and continuously graded semiconductor? Explain. (8)
- b) Explain hall-effect and derive mathematical expression for hall-Coefficient, also describe its application. (8)

Unit - II

2. a) Draw the output wave for of the following circuit (8)



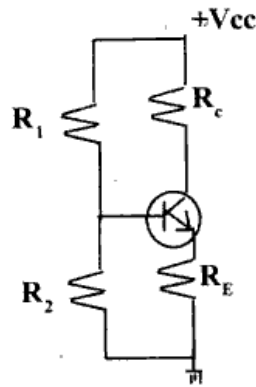
- b) Explain the working principle of UJT. Also explain why UJT has a negative resistance region? (8)

OR

2. a) A full wave rectifier uses diode with forward resistance of 6Ω . The transformer secondary is centre tap with output $10-0-10$ r.m.s and has resistance of 8Ω of each half section. Calculate (8)
- Percentage regulation at 0.1 A
 - Power conversion efficiency
 - Ripple voltage across load
 - PIV of each diode.
- b) Write short notes on:-
- Schottky diode
 - Voltage multiplier. (8)

Unit - III

3. a) Draw with circuit diagram of transistor common base configuration input and output characteristics. Also indicate the active, saturation and cut-off region. (8)
- b) Determine the value of R_1 and R_2 for the given circuit. Given that $V_{cc} = 24v$, $R_c = 330\Omega$, $R_E = 130\Omega$, $V_{BE} = 0.3 \text{ V}$, $I_C = 20mA$, $\alpha = 0.99$ and stability factor $S = 10$. (8)



OR

3. a) Deduce expression for A_i, A_v, R_i, R_o and A in a common collector BJT transistor amplifier in term of h -parameters. (8)
- b) Explain the significance of current gain α and β in a transistor using various current component. (8)

Unit - IV

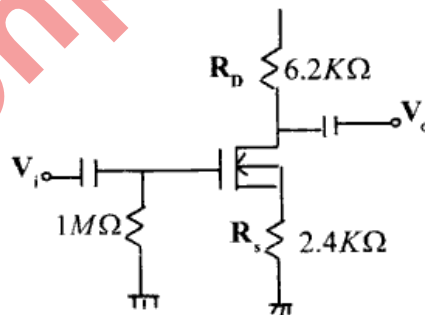
4. a) Describe the carrier transportation in N-channel depletion type MOSFET using suitable diagram and also explain its drain transfer characteristics. (8)
- b) For the given network $I_{DSS} = 8\text{mA}$ and $V_p = -8$ volts. $V_{DD} = +20\text{V}$

Determine the following

i) I_{DQ}

ii) V_{GSQ}

iii) V_D

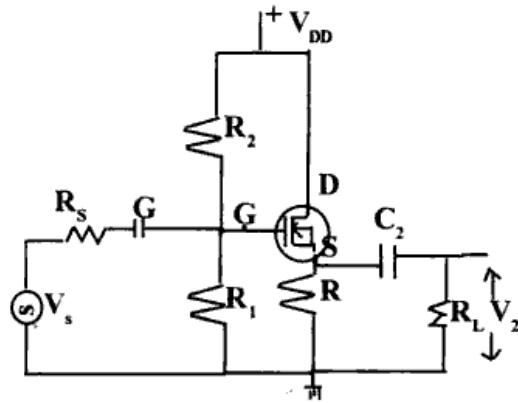


(8)

OR

4. a) Describe briefly the construction of N-channel JFET. Also define pinch off voltage. Draw its characteristics (8)
- b) For the given figure, find out the values of R_i and R_o

Given that $g_{m0} = 12.5\text{m Mho}$, $R_s = 5\text{k}\Omega$, $R_2 = \alpha$, $R_1 = 1\text{m}\Omega$, $R = 50\Omega$, $R_L = 10\text{k}\Omega$ and $V_{DD} = 15\text{V}$



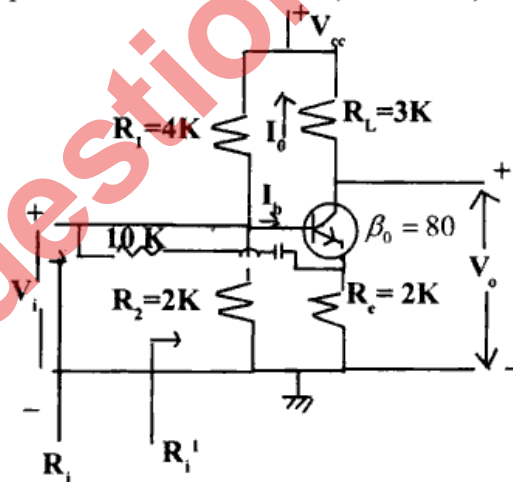
The transfer characteristic is given by $I_D = 12.5 \left(1 + \frac{V_{gs}}{2}\right)^2$ mA (8)

Unit - V

5. a) In 2-stage RC coupled BJT amplifier deduce midband gain, Low frequency gain and high frequency gain in terms of circuit component. (8)
- b) D.c amplifier has a voltage gain of 40dB when ambient temperature increase from 25 to 50°C. The output changes by 0.25 volts. What is the drift of the amplifier referred to input? (8)

OR

5. a) For the bootstrap circuit shown in the fig. Calculate A_i ; R_i and A_v The transistor parameters are $h_{ie} = 2K$, $h_{fe} = 100$, $1/h_{oe} = 40K$, $h_{re} = 2.5 \times 10^{-4}$. (10)



- b) Write short notes on following
- Boot strapping
 - Miller's theorem.

(6)