

3E1641

Roll No. _____

[Total No. of Pages : 4]

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

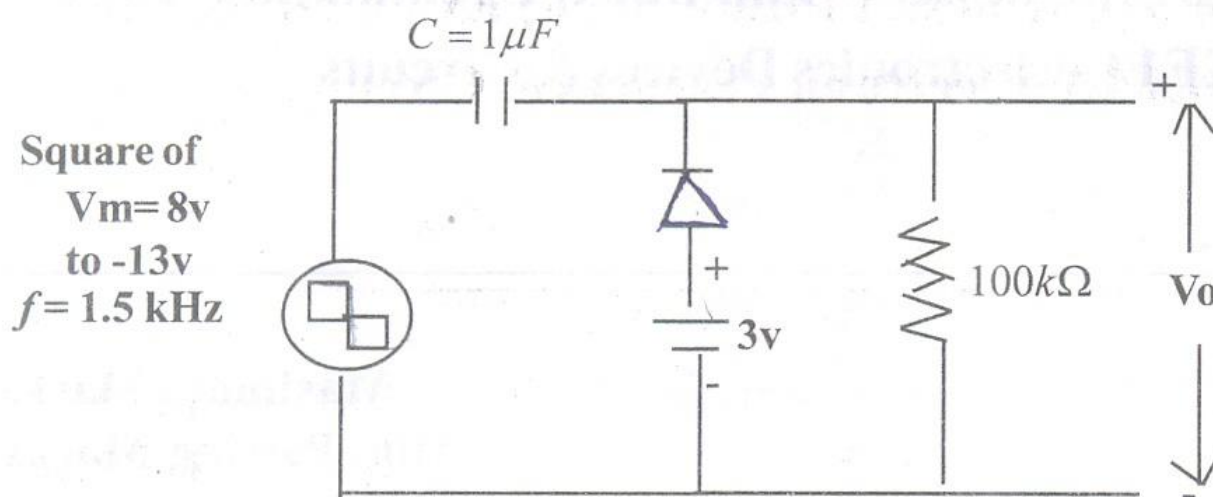
1. a) Explain Energy band theory of crystals. On its basis bring out the difference between Insulator, Semiconductor and metals. (8)
- b) Find the conductivity of Silicon
- i) Under intrinsic condition at 300^ok
- ii) With donor impurity of 1 part in 5×10^7 . Given that, intrinsic concentration (n_i) = $1.5 \times 10^{10}/\text{cm}^3$, mobility of electron (μ_n) = 1300 cm²/v-s, mobility of holes (μ_p) = 500 cm²/v-s, $e = 1.6 \times 10^{-19}\text{C}$ and no. of Si 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)



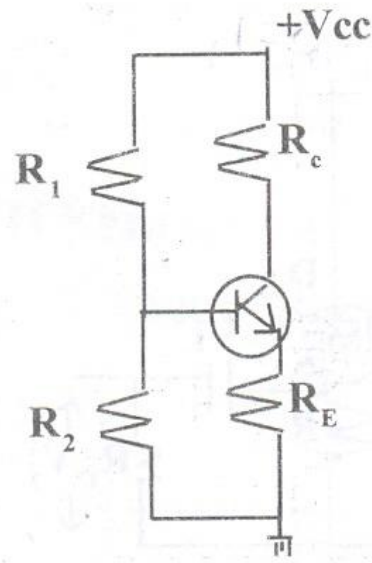
- b) Explain the working principle of UJT. Also explain why UJT has a negative resistance region? (8)

OR

2. a) A full wave rectifier uses diode with forward resistance of $6\ \Omega$. The transformer secondary is centre tap with output 10-0-10 r.m.s and has resistance of $8\ \Omega$ 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 $V_{CC}=24\text{V}$, $R_C=330\ \Omega$, $R_E=130\ \Omega$, $V_{BE}=0.3\ \text{V}$, $I_C=20\text{mA}$, $\alpha=0.99$ and stability factor $S=10$. (8)



OR

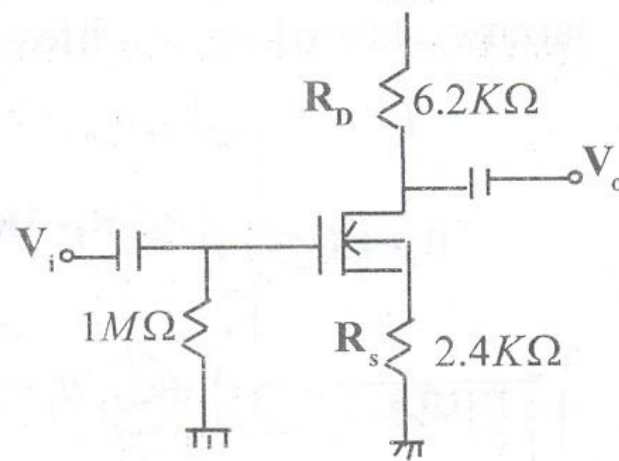
3. a) Deduce expression for A_i, A_v, R_i, R_o and A is in a common collector bJT transistor amplifier in term of h -parameters. (8)
- b) Explain the significance of current gain α and β in a transistor using various current component. (8)

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

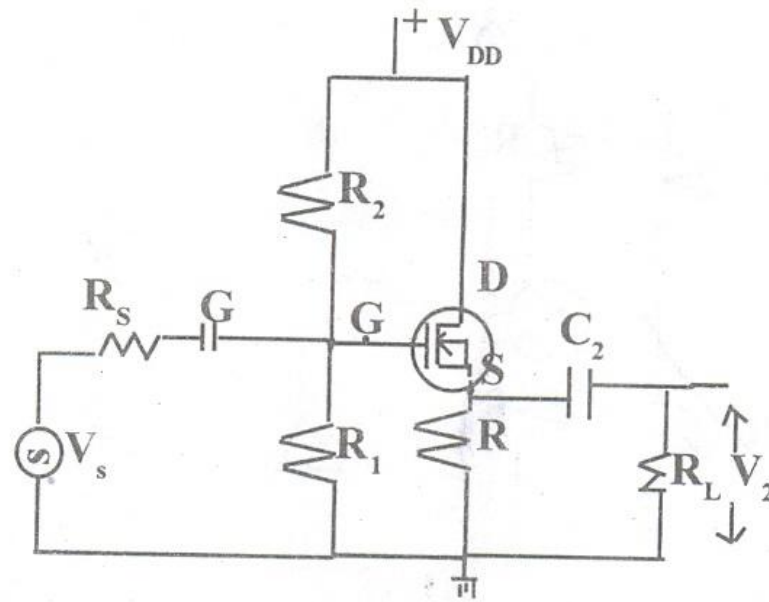
- i) I_{DQ}
 ii) V_{GSQ}
 iii) V_D



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



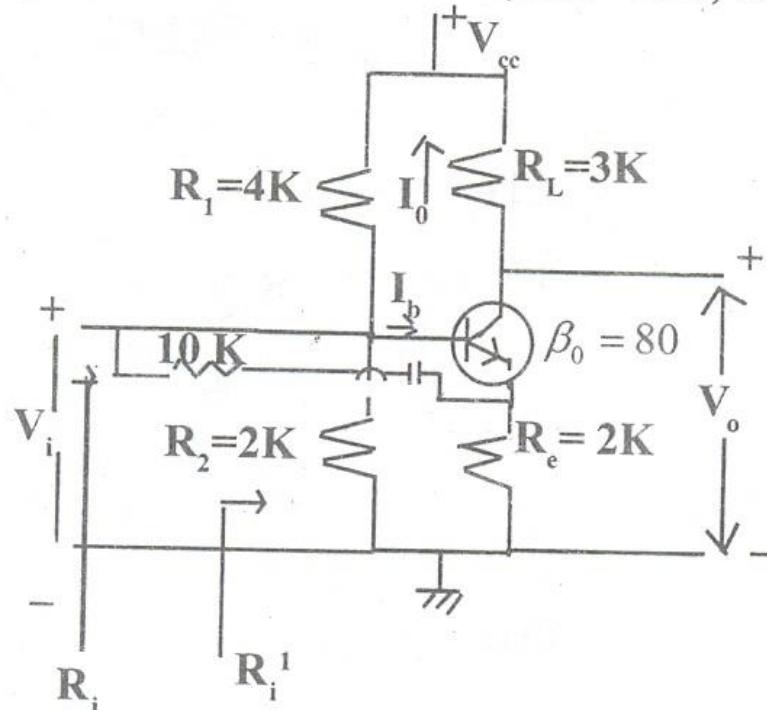
The transfer characteristic is given by $I_D = 12.5 \left(1 + \frac{V_{gs}}{2}\right)^2 \text{ mA}$ (8)

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
- i) Boot strapping
 - ii) Miller's theorem.
- (6)