3E1401

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3E1401

B. Tech. (Sem. III) (Reback) Examination, February - 2013
Applied Electronics & Inst. Engg.
3AI2 Electronics Devices & Circuits (Common for BM, AE, ME & PI)

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

*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.*

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. Nil 2. Nil

UNIT - I

1 (a) Describe the Hall effect ? What properties of a semiconductor are determined from a Hall effect experiment ?

8

(b) Define and explain the following terms :

(i) Mobility and conductivity

(ii) Fermi-Dirac distribution.

4+4=8

OR

1 (a) Explain Energy Band theory of crystals. On its basis bring out the difference between insulators, semiconductors and metals.

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(b) The resistivity of doped material is 0.039 ohm – cm. Calculate electron density and hole density, if $n_i = 2.5\times10^{13}/cm^3$, $\mu_e = 3600\ cm^2/V-sec$, $\mu_n = 1700\ cm^2/V.sec$. 8

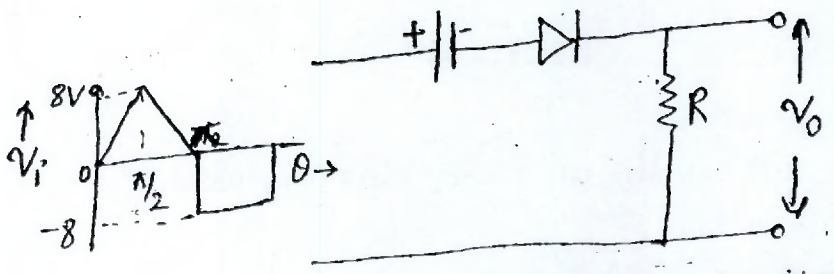
UNIT - II

2 (a) Explain the load line concept as applicable to a diode circuit. How is the operating point shifted if the real is replaced by an ideal diode ? 8

(b) What are voltage multiplier ? What is fundamental limitation of a voltage multiplier circuit compared to step up transformer ? 8

OR

2 (a) Find the output waveform for the circuit shown in Fig. (Assume ideal diode)



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(b) What do you understand by clamping circuit with neat diagram explain the action of :

(i) Positive clamping

(ii) Negative clamping. 8

UNIT - III

3 (a) Explain construction, characteristic and working principles of the following devices :

(i) LED

(ii) Photo diodes

(iii) Thermistors. 4×3=12

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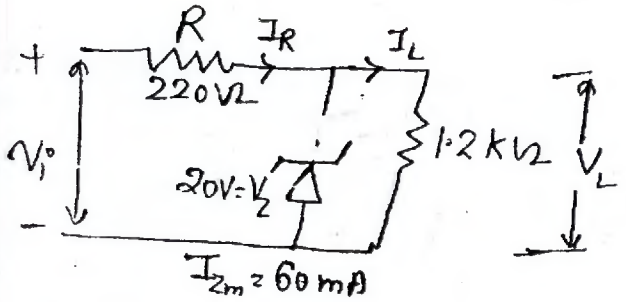
(b) Determine the range of values of V_i that will maintain the zener diode in ON state :



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OR

3 (a) Draw the load line for a solar cell. Find its maximum current and open circuit voltage across it. What is the maximum voltage we can get from a solar cell ?

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(b) Differentiate Zener and Avalanche breakdown. Also explain zener as a voltage regulator.

4

(c) Why do we get negative resistance region in UJT characteristics ?

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UNIT - IV

(a) Draw and explain the biasing circuit in case of :

(i) Fixed bias

(ii) Collector to base bias.

Derive expression for stability factor S in terms of circuit components for the above circuits.

8

(b) Explain the early - effect in BJT. How it affects the output characteristics of a CE amplifier.

4

(c) Explain "Thermal Runaway in BJT" and how it can be avoided.

4

OR

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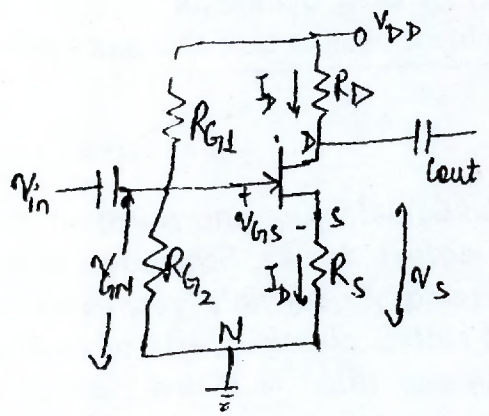
4 (a) In a N-channel JFET determine the value of R_S to give operating point I_D = 4 MA and V_{DS} = 8V. Given that V_{DD} = 25 V, $R_{G1} = 1.2 M\Omega, R_{G2} = 0.6 M\Omega$. JFET parameters are V_P = –4V and I_{DSS} = 12 MA.



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(b) Explain the working of FET as a voltage variable resistor. 4

(c) Draw the circuit of JFET-CS amplifier using fixed bias and describe the working of biasing circuit. 4

UNIT - V

5 (a) Draw the small signal model of FET at low frequencies. In this model which parameters have been taken as independent and why ? 6

(b) State Miller's theorem and its dual with the help of a circuit diagram. 5

(c) Explain the need and working principle of bootstrapping. 5

OR

5 (a) Write short notes on any two of the following :

(i) Cascade amplifier

(ii) Differential amplifier

(iii) Darlington pair. 4+4=8

(b) Draw and explain the working of two stage RC coupled amplifier circuit. 8

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