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Roll No. 2705161

Total Pages : 2

**8461**

**BT-3/D07**

## SEMICONDUCTOR DEVICES AND CIRCUITS

Paper-ECE-201E

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt any *five* questions.

- (a) Describe the application of  $p-n$  junction as rectifier. Compute the value of dc-voltage and ripple factor for a fullwave rectifier. 12

(b) Explain the photovoltaic effect and describe the volt-amp. characteristics of a  $p-n$  junction diode. 8
- (a) Discuss the importance of voltage regulator in a power supply. How is voltage regulation achieved ? 10

(b) With the help of a circuit diagram, explain the working of an SMPS. 10
- (a) Draw the small signal  $h$ -parameter model of a common collector transistor amplifier and obtain the expressions for current gain and voltage gain in terms of  $h$ -parameters. 10

(b) A transistor is connected as a common emitter amplifier and the  $h$ -parameters are as follows :

$h_{ie} = 1100 \Omega$ ,  $h_{re} = 2.5 \times 10^{-4}$ ,  $h_{fe} = 50$ ,  $h_{oe} = 24 \mu A/V$ .  
Compute the voltage gain, current gain, input and output impedances if the load resistance = 10 K and source resistance  $R_s = 1K$ .
- (a) Draw the circuit of self biasing network and explain its operation. How is thermal stability obtained in this circuit ? 10



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- (b) Derive the expression for the stabilization factor  $S$  of a self-biasing circuit. 10
5. (a) Draw the circuit diagram of an RC-phase shift oscillator and obtain an expression for its frequency of oscillation. 10
- (b) Draw the electrical model of a piezoelectric crystal and give its reactance versus frequency plot. What portion of this curve is useful for a sinusoidal oscillator? 10
6. (a) What are the advantages of using negative feedback in amplifiers? Derive the expression for cut-off frequencies of a feedback amplifier. 12
- (b) An amplifier with open-loop voltage gain  $A_v = 1000 \pm 100$  is available. It is necessary to have an amplifier whose voltage gain varies by no more than 0.1%. Find the reverse transmission factor  $\beta$  of the feedback network used. 8
7. (a) Draw the diagram of a JFET, explain its characteristics and give its small signal low frequency model. 12
- (b) Explain the biasing of depletion mode and enhancement mode MOSFETs. 8
8. Write short notes on the following
- (a) Drain characteristics of  $n$ -channel MOSFET.
- (b) FET amplifier. 10+10

Gt 460 Cms

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Modk

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