

3 (Sem-1) ELE

2016

ELECTRONICS

(General)

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Fill in the blanks :

1×7=7

- (a) A _____ is a substance which has resistivity in between conductors and insulators.
- (b) Semiconductors have _____ temperature coefficient of resistance.
- (c) When a small amount of _____ impurity is added to a pure semiconductor, it is known as *n*-type semiconductor.
- (d) _____ is the maximum reverse voltage that can be applied to the *p-n* junction without damage to the junction.
- (e) In *n*-type semiconductor, _____ are the minority carriers.

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(Turn Over)

(2)

- (f) The knee voltage for silicon $p-n$ junction is ____.
- (g) In a semiconductor, the energy gap between valence band and conduction band is nearly ____.

2. Answer the following questions : $2 \times 4 = 8$

- (a) What is a rectifier?
- (b) What is the effect of using a filter in a rectifier circuit?
- (c) What is breakdown voltage of a Zener diode?
- (d) What is a clamper?

3. Answer any *three* of the following questions :

$5 \times 3 = 15$

- (a) Mention the different types of transistor configurations. Draw the circuit diagram of each type using $n-p-n$ transistor. $1\frac{1}{2} + 3\frac{1}{2} = 5$
- (b) Deduce an expression for the relation among JFET parameters. 5
- (c) A transistor is capable of providing amplification. Explain the basic transistor amplifier with circuit diagram and relevant waveforms. 5

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(Continued)

(3)

- (d) Deduce an expression for the voltage gain of a feedback amplifier. 5

- (e) Write three applications and two advantages of OP-AMP. $3 + 2 = 5$

4. Answer any *three* questions of the following :

$10 \times 3 = 30$

- (a) Design a Zener-regulated power supply using bridge rectifier and explain its different parts. $5 + 5 = 10$
- (b) Draw the common-emitter output characteristics of BJT showing different regions clearly and describe. $4 + 6 = 10$
- (c) Describe the construction of an SCR with diagram. Also draw the characteristic curve of an SCR and explain. $4 + 2 + 4 = 10$
- (d) Draw a two-stage RC-coupled transistor amplifier and explain its operation. Mention two advantages and two disadvantages of RC-coupled transistor amplifier. $2 + 4 + 2 + 2 = 10$

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(4)

- (e) Explain feedback mechanism with its different types. Mention four advantages of negative feedback. Also mention one disadvantage of negative feedback.

5+4+1=10

- (f) What are the characteristics of an ideal OP-AMP? Draw an inverting amplifier with OP-AMP. Deduce an expression for its output voltage. Define slew rate and virtual ground.

3+2+3+2=10
