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( 6th Semester )

PHYSICS

TWELFTH (B) PAPER

( **Advanced Electronics** )

Full Marks : 55

Time : 2½ hours

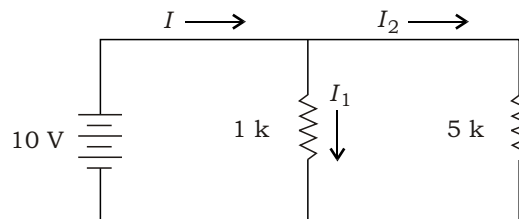
( PART : B—DESCRIPTIVE )

( Marks : 35 )

The figures in the margin indicate full marks for the questions

1. (a) Draw the circuit diagram for Wien's bridge and obtain the two balance conditions. 5

(b) Consider the circuit shown below :



Calculate the currents  $I$ ,  $I_1$  and  $I_2$ . 2

Or

- (a) Draw a typical current vs. voltage characteristic curve for a  $p-n$  junction diode and explain qualitatively its main features. 4

- (b) What are load line and Q-point of a  $p-n$  junction diode? For a basic diode circuit containing one voltage source, series resistance and a diode, draw the characteristic curve showing Q-point. 3

2. With the help of appropriate circuit diagram, explain the working principle of a half-wave rectifier and obtain its efficiency. Also calculate the ripple factor of the half-wave rectifier. 3+2+2=7

Or

What is Zener diode? Describe with diagram the use of Zener diode as voltage regulator for both load and line fluctuations. 1+3+3=7

3. What do you understand by transistor biasing? Describe voltage divider bias method in detail. Explain how stabilization of operating point is achieved by this method. 7

( 3 )

*Or*

With a neat circuit diagram, explain the working of RC coupled amplifier. Draw and explain its frequency response curve. 7

4. What is Barkhausen criterion for oscillation? Draw the circuit diagram of Colpitts' oscillator. Explain how Barkhausen conditions are satisfied. 7

*Or*

Draw a neat circuit diagram of monostable multivibrator and discuss its working. 7

5. What is the difference between a JFET and a bipolar transistor? Explain the construction and working of a JFET. 7

*Or*

A carrier wave is amplitude modulated at audio frequency. Deduce an expression to show that two sidebands are produced. What is the relative power in each sideband carrier when modulation coefficient is 0.5? 7

★★★

Subject Code : PHY/VI/12 (b)

Booklet No. **A**

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Date Stamp .....

**To be filled in by the Candidate**

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(Arts / Science / Commerce /  
..... ) Exam., **2017**  
Subject .....  
Paper .....

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**To be filled in by the Candidate**

DEGREE 6th Semester  
(Arts / Science / Commerce /  
..... ) Exam., **2017**  
Roll No. ....  
Regn. No. ....  
Subject .....  
Paper .....  
Descriptive Type  
Booklet No. B .....

**INSTRUCTIONS TO CANDIDATES**

- 1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
- 2. This paper should be ANSWERED FIRST and submitted within 45 minutes of the commencement of the Examination.
- 3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of  
Scrutiniser(s)

Signature of  
Examiner(s)

Signature of  
Invigilator(s)

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( 6th Semester )

**PHYSICS**

TWELFTH (B) PAPER

**( Advanced Electronics )**

( PART : A—OBJECTIVE )

( Marks : 20 )

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

SECTION—I

( Marks : 5 )

Choose the correct answer by putting a Tick (✓) mark in the brackets provided for it : 1×5=5

1. Conductivity of an intrinsic semiconductor is  
(  $\mu_e$  = mobility of electrons,  $\mu_h$  = mobility of holes,  
 $n$  = electron density,  $p$  = hole density)

(a)  $n \mu_e + p \mu_h$  ( )

(b)  $n \mu_e - p \mu_h$  ( )

(c)  $n \mu_e$  ( )

(d)  $p \mu_h$  ( )

( 2 )

2. Which of the following statements is true?

(a) Emitter in a transistor is always in reverse biased. ( )

(b) Emitter is lightly doped and very thin. ( )

(c) Emitter-base junction is always forward biased. ( )

(d) Collector is the middle section in a transistor. ( )

3. If temperature changes,  $h$  parameters of a transistor

(a) may or may not change ( )

(b) do not change ( )

(c) also change ( )

(d) become infinitely large ( )

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( 3 )

4. An oscillator differs from an amplifier because it

(a) has more gain ( )

(b) requires no input signal ( )

(c) requires no d.c. supply ( )

(d) always has the same input ( )

5. As the modulation level is increased, the carrier power

(a) is increased ( )

(b) remains the same ( )

(c) is decreased ( )

(d) reduces to zero ( )

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( 4 )

SECTION—II

( Marks : 15 )

Give very short answers to the following questions : 3×5=15

1. What do you mean by drift velocity and mobility of an electron?

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( 5 )

2. What are tunnel diode and LED?

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( 6 )

3. What are class A and class B amplifiers? Explain their differences in operation.

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( 7 )

4. What do you understand by gain, stability, distortion and noise?

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( 8 )

5. Write a brief note on demodulation of AM wave using diode detector.

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