PG Even Semester Examination, May 2025

PHYSICS

(2nd Semester)

Course No.: PHY-203(C)

(Electronic Devices and Circuits)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

The figures in the right margin indicate full marks for the question.
Answer any five questions selecting one from each unit.

UNIT-I

1. (a) Explain intrinsic and extrinsic semicoductor. 2+2

   (b) Discuss the creation of accepetor level and donor level for extrinsic semiconductor. 5+5

2. (a) What will happen if a a p-type and a n-type matrial is placed in an external field? Also find the expression of electrical conductivity for the same. 4+4+2

   (b) Discuss Hall effect and its significance. 3+1

UNIT-II

3. (a) Draw the characteristic curve of a Zener diode and explain its role as a voltage regulator. 2+5

(b) Discuss the construction & working of photodiode with the help of a neat diagram. 3+4

4. (a) Define α and β of a transistor and obtain relation between them. 2+5

(b) Draw the output characteristics of a transistor in a CE mode. 2

(c) What is a load line and Q-point. 2

(d) With the help of the output characteristic curve and the load line equation explain the working of a transistor as a switch. 3

UNIT-III

5. (a) Discuss the working of a Bridge rectifier circuit. 5

(b) From the output characteristic curve of a transistor in CE mode how it amplify an AC signal having phase opposite to that of input signal. 7

(c) Why CC-mode is known a an emitter follower. 2

6. (a) Discuss how an op-amp can be used as inverting and non-inverting amplifier. 3+3

(b) Discuss the principle and working of a wein Bridge oscillator. 4+4

UNIT-IV

7. (a) Why NOR and NAND gates are called universal gate? Explain. 5+5

(b) Discuss the working of OR and AND gates constructed with the help of diodes. 2+2

8. (a) Prove the following laws of Boolean algebra. 2+2+2

(i) $A+B.C= (A+B)(A+C)$

(ii) $A+(\bar{A}.B) = A+B$

(ii) $\overline{A}+(A.B) = \overline{A}+B$

(b) Convert $(59.4375)_{10}$ in binary. 3

(c) Simplify the following boolean expression. 3+2=5

(i) $(\bar{A}+\bar{B})\bar{C}$ $\overline{AB} = \bar{A}+\bar{B}$

(ii) $(\bar{A}C+B)$ $(\overline{\bar{A}+C})= ABC$

UNIT-V

9. (a) What is amplitude modulation? Obtain the expression of output votage of an amplitude modulated wave. Also discuss the power carried by the side bands and the carrier wave. 2+5+4

(b) Discuss the advantage of frequency modulation over amplitude modulation. 3

10. (a) Discuss sampling theorm? 5

(b) What are the different type of pulse modulation techniques? Explain in details. 9

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