



BRAINWARE UNIVERSITY

Course – BSc(HN)

Introduction to Electrical circuits and Basic Electronics I (BHNG101)

(Semester – 1)

Time allotted: 3Hours

Full Marks : 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)

1. Choose the correct alternatives for **any ten** of the following: 1 x10 = 10

- i) A transistor has
 a) one pn junction b) two pn junction c) three pn junction d) four pn junction.
- ii) The base of a transistor isdoped
 a) heavily b) moderately c) lightly d) None of the above
- iii) The value of α of transistor is
 a) More than one b) Less than one c) One d) None of the above
- iv) The common collector mode is seldom used because
 a) Voltage gain is less than unity b) Current gain is less than unity
 c) Power gain gain is less than unity d) None of these
- v) The barrier voltage of a silicon diode is
 a) 0.7 Volt b) 2.5 Volt c) 3 Volt d) 10 Volt
- vi) If the doping level in a crystal diode is increased , the width of depletion layer
 a) remains the same b) is decreased c) is increased d) none of the above
- vii) A Zener diode is used as
 a) an amplifier b) oscillator c) a rectifier d) voltage regulator

viii) The maximum possible efficiency of a half wave rectifier is

- a) 40.6 % b) 81.2 % c) 50 % d) 25 %

ix) A semiconductor is formed by

- a) covalent bonds a) electrovalent bonds c) co-ordinate bonds d) Hydrogen bonds

x) The battery connections required to forward bias a pn junction are

- a) +ve terminal to p and -ve terminal to n type b) -ve terminal to p and +ve terminal to n
c) -ve terminal to p and -ve terminal to n d) None of the above

xi) In an unregulated power supply, if load current increases, the output voltage

- a) remains the same b) decreases c) increases d) None of the above

xii) The maximum power transfer occurs from source to load

- a) when the source resistance is greater than the load resistance
b) when the source resistance is less than the load resistance
c) when there is negligible source resistance
d) when the source resistance is equal to load resistance

xiii) 7000 micro amperes, will be equivalent to

- a) 0.007 amp b) 0.7 amp c) 7 amp d) 700 amp

xiv) The colour code of the resistance 47 ohm

- a) Yellow violet black b) Yellow blue green d) Yellow violet brown d) None of these

Group – B

(Short Answer Type Question)

Answer any *three* of the following. 3 x 5 = 15

2. What is step up and step down transformer. What are the sources of losses in transformer?
3. Show conservation of energy is obeyed in transformer. Write down uses of transformer.
4. Illustrate self and mutual inductance.
5. A p-n junction is a nonlinear unilateral device. Explain this.
6. What is PIV? What is its value for Half wave, Full wave and bridge rectifier?

Group – C

(Long Answer Type Question)

Answer any *three* of the following.

3 x 15 = 45

- 7.a) Explain the terms.(i) Doping (ii) Dopant (iii) Donors (iv) Acceptors 8
 b) Write short note on. (i) Intrinsic semiconductor (ii) Extrinsic semiconductor (iii) n-type semiconductor (iv) p-type semiconductor. 7
- 8.a) Explain with necessary diagram the energy band structure of a metal, semiconductor and an insulator. 5
 b) What is Fermi level. How does it vary with temperature and doping in extrinsic semiconductor ? 2+4
 c) Distinguish between unipolar and bipolar devices with examples 4
- 9.a) What do you mean by transfer of resistor? 3
 b) Draw the circuit diagrams of different configuration of transistor. 6
 c) Define α and β of transistor. Derive a relation between them. 2+4
- 10.a) What do you mean by depletion region in a junction diode ? How is it formed? 2+3
 b) For a transistor, derive the relation $I_C = \beta I_B + (1 + \beta) I_{CO}$, where notations have their usual significance. 4
 c) What is varactor diode? 4
 d)What is reverse saturation current ? 2
- 11.a) Draw the input and output characteristics of an n-p-n transistor in CE mode. In output characteristics , show the saturation, active & cut-off region. 4+3
 c) Write short notes on DIAC and TRIAC. 4+4