Total No. of printed pages = 4

ECE 181407

30/6/23

Roll No. of candidate | | | | | | | | | | |

2023

B.Tech. 4th Semester End-Term Examination

APPLIED ELECTRONICS

(New Regulations (w.e.f 2017–18) & New Syllabus

(w.e.f 2018–19)

Full Marks – 70 Time – Three hours

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

Answer Question No. 1 and any *four* from the rest.

1. Answer the multiple choice questions : (10 × 1 = 10)

(a) When pentavalent impurity is added to a pure semiconductor, it becomes _____

(i) an insulator
(ii) an intrinsic semiconductor
(iii) p-type semiconductor
(iv) n-type semiconductor

(b) Zener diode uses _____ characteristics for its working.

(i) reverse (ii) forward
(iii) both reverse and forward (iv) none of above

(c) In npn transistor, minority carriers are _____

(i) free electrons (ii) holes
(iii) donor ions (iv) none of above

(d) For proper amplification by a transistor, the value of V_{BE} for silicon transistor should be

(i) zero (ii) 0.01 V
(iii) not below 0.7 V (iv) between zero and 0.01 V

[Turn over

(e) The binary number 110011 is equal to decimal no

(i) 41 (ii) 51

(iii) 18 (iv) 49

(f) $A + A.B =$ ————————

(i) A (ii) B

(iii) $A + B$ (iv) $A.B$

(g) Bistable mltivibrator is ———————— in any state

(i) stable (ii) unstable

(iii) saturated (iv) independent

(h) The smallest change that a sensor can successfully detect is ————————

(i) accuracy (ii) precision

(iii) resolution (iv) all of the above

(i) The parts and links in a robot are connected by ———————— that allow motion

(i) Joint (ii) Hinge

(iii) None of the mentioned

(j) An non-inverting Opamp has $R_i = 1K\Omega$ and $R_f = 10K\Omega$. The closed looped voltage gain is

(i) 11 (ii) 10

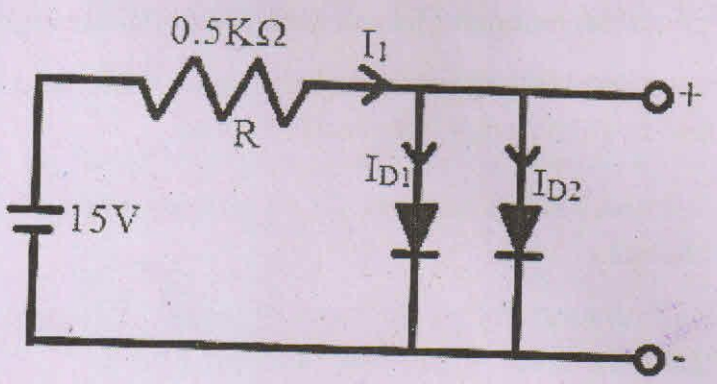
(iii) 100 (iv) 101

2. (a) Give energy band description of semiconductors with neat diagram. Define Fermi level and show it in energy band diagram in case of pure semiconductor. (5+3=8)

(b) Draw and explain the V-I characteristics of a pn junction. What is knee voltage? (4+3=7)

3. (a) What is zener diode? Derive the expression for efficiency of a half wave rectifier. (2+4=6)

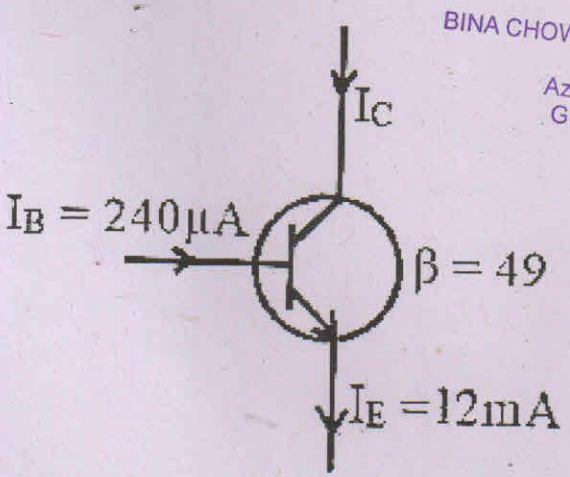
(b) For the circuit shown below, determine the current through each of the diode. The diodes are equivalent and made of Si with barrier potential of 0.7V. (5)



(c) Write the working principle of LED. (4)

4. (a) What is β for a transistor? Draw and explain the input and output characteristics for CE configuration of a transistor. (2+4=6)

(b) Find α of the transistor as shown in the figure below. Determine the value of collector current using α and β of the transistor. (4)



(c) Draw the inverting amplifier using OPamp and find its voltage gain. (5)

5. (a) Convert the followings: (i) $(4057.08)_8$ to decimal equivalent (ii) $(1011011011)_2$ to hexadecimal. (4)

(b) Write down the Truth table for Full adder. Reduce the following expression using K-map and implement them using logic gates

$f = \Sigma m(0, 1, 2, 3, 4, 6, 8, 9, 10, 11)$ (2+4=6)

(c) Write the truth table for JK and T Flipflop. What is register? (2+2+1=5)

6. (a) What are astable, monostable and bistable multivibrator? (6)

(b) Define rise time, fall time and duty cycle with neat diagram. Compare positive and negative edge triggered circuits. (5+4=9)

7. (a) What is a sensor? What are active and passive sensors? Name some sensors used in robotics. (2+3+2=7)

(b) What do you understand by the term robotics? What are the basic aspects of robotics? List the areas where robotics can be used. (2+3+3=8)