

Enrollment No: \_\_\_\_\_ Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

Subject Name: Applied Physics

Subject Code: 4TE02APH1

Branch: B.Tech (All)

Semester: 2

Date: 06/05/2017

Time: 02:00 To 05:00

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1 Attempt the following questions: (14)**

- 1) A pentavalent impurity is added to the silicon atom to form \_\_\_\_\_ type of semiconductor.  
A) Intrinsic semiconductor B) P-type semiconductor  
C) N-type semiconductor D) None of the above
- 2) Holes are the minority charge carriers in which type of material?  
A) N type B) P type C) Intrinsic D) None of the above
- 3) The equation of current density for semiconductor is  $J = \sigma E$ . What does the  $\sigma$  stands for?  
A) Resistivity B) Electric field intensity  
C) Conductivity D) Current Density
- 4) The cut in voltage for a LED is of the order of \_\_\_\_\_.  
A) 1 V B) 1.5 V C) 0.7 V D) 0 V
- 5) The ideal diode acts as a \_\_\_\_\_ switch when forward biased and act as a \_\_\_\_\_ switch when reverse biased.  
A) Open, Open B) Closed, Closed C) Open, Closed D) Closed, Open
- 6) If the diode voltage is 1.2 V and the diode current is 1.75 A, what is the power dissipation?  
A) 2.1 W B) 0.83 W C) 0.68 W D) 1.2 W
- 7) What is the efficiency of a full wave rectifier ?



- A) 40 %      B) 50 %      C) 75 %      D) 81 %
- 8) Ripple factor of a half wave rectifier is \_\_\_\_\_  
 A) 100 %      B) 50 %      C) 121 %      D) 0 %
- 9) In an enhancement type MOSFET, channel permanently exists.  
 A) True      B) False
- 10) In a transistor lightly doped part is \_\_\_\_\_  
 A) Base B) Collector C) Emitter      D) None of the above
- 11) In a P-N-P transistor, base is made of N type material.  
 A) True      B) False
- 12) If the base emitter junction and base collector junction of BJT both are forward biased, BJT operates in \_\_\_\_\_ region.  
 A) Active      B) Cut-off      C) Saturation region      D) None of the above
- 13) List the characteristics of laser.
- 14) Give any two difference between stimulated emission and spontaneous emission.

**Attempt any four questions from Q-2 to Q-8**

- Q-2      Attempt all questions      (14)**
- (a) Explain the formation of P- type semiconductors.      **07**
- (b) Classify the conductors, insulators and semiconductors with the help of energy band theory.      **07**
- Q-3      Attempt all questions      (14)**
- (a) Draw the V-I characteristics of diode and explain how diode works in forward bias condition.      **07**
- (b) Draw the symbol and V-I characteristics of zener diode and discuss various regions of the characteristics.      **07**
- Q-4      Attempt all questions      (14)**
- (a) Draw the circuit diagram and waveforms of full wave bridge rectifier and explain its operation.      **07**
- (b) Draw the circuit diagram, input and output voltage waveforms for below circuits.      **07**



- i) Series Positive Clipper Circuit
- ii) Negative Clamper Circuit

**Q-5**      **Attempt all questions**      **(14)**

- (a) Draw the circuit of common base configuration for BJT. Draw its output characteristics and explain regions of output characteristics.      **07**
- (b) A full wave rectifier circuit is fed from a transformer having a centre-tapped secondary winding. The *rms* voltage from a either end of secondary to centre tap is 30 V. If the diode forward resistance is 20 Ω and that of the half secondary is 8Ω, for a load of 1 k Ω. Calculate,      **07**
  - i) Maximum value of load current
  - ii) Average value of load current
  - iii) RMS value of load current

**Q-6**      **Attempt all questions**      **(14)**

- (a) Explain the transistor action with the help of an NPN transistor and show that  $I_E = I_B + I_C$ . Where  $I_B$  = Base Current,  $I_E$  = Emitter Current,  $I_C$  = Collector Current      **07**
- (b) Determine the following parameters for the below network.      **07**
  - i) Base Current  $I_B$  ii) Collector current  $I_C$  iii) Collector Emitter Voltage  $V_{CE}$



