**Enrollment No: _____ Exam Seat No: _____**

# C.U.SHAH UNIVERSITY

## Winter Examination-2019

**Subject Name: Applied Physics**
**Subject Code: 4TE02APH1 Branch: B.Tech (All)**
**Semester: 2 Date : 16/09/2019 Time : 02:30 To 05:30 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.

---

**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)** Which material possess the highest energy band gap?

**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)** Draw the symbol and characteristics of photo diode.

**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 half wave rectifier?

A) 40 % B) 50 % C) 75 % D) 81 %

**8)** Ripple factor of a full 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) BaseB) CollectorC) 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 N- type semiconductors. **07**

**(b)** Draw the V-I characteristics of diode and explain how diode works in forward bias condition. **07**

**Q-3** **Attempt all questions** **(14)**

**(a)** Classify the conductors, insulators and semiconductors with the help of energy band theory. **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 half wave rectifier and explain its operation. **07**

**(b)** Draw the circuit diagram and waveforms of positive clamper circuit and explain its operation. **07**

**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 *8*Ω, 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)** For a semiconductor, explain what is drift current and diffusion current? **07**

**Q-7** **Attempt all questions** **(14)**

**(a)** Draw the construction of N-channel JFET and explain its operation. Draw its V-I characteristics and transfer characteristics. **07**

**(b)** Explain the voltage divider circuits for N channel JFET. **07**

**Q-8** **Attempt all questions** **(14)**

**(a)** Classify the types of LASER and explain any one of them. **07**

**(b)** Explain various types of optical fiber configuration. **07**