



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Fourth Semester – 2019

Paper: Basic Electronics

Course Code: PHY-203 / PHY-22331 Part – I (Compulsory) Time: 15 Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

Signature of Supdt.: .....

**ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.**

**Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

**Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)**

- (i) At room temperature, the current in an intrinsic semiconductor is due to  
(a) holes (b) electrons (c) ions (d) holes and electrons
- (ii) Without a DC source, a clipper circuit resembles to a  
(a) clamper (b) rectifier (c) voltage doubler (d) none as above
- (iii) If both the emitter-base and the collector-base junctions of a bipolar transistor are forward biased, the transistor is in the  
(a) active region (b) saturated region (c) cut-off region (d) inverse mode
- (iv) The biasing technique that produces the most unstable Q-point is  
(a) collector bias (b) emitter bias (c) base bias (d) voltage-divider bias
- (v) In a certain voltage-divider biased *npn* transistor,  $V_B$  is 2.95 V. The dc emitter voltage is approximately  
(a) 2.25 V (b) 2.95 V (c) 3.65 V (d) 0.7 V
- (vi) The disadvantage of base bias is that  
(a) it is very complex (b) it produces low gain  
(c) it is too beta (or  $h_{FE}$ ) dependent (d) it produces high leakage current
- (vii) In a voltage-divider biased *npn* transistor, if the upper voltage-divider resistor (the one connected to  $V_{CC}$ ) opens,  
(a) the transistor goes into cutoff (b) the transistor goes into saturation  
(c) the transistor burns out (d) the supply voltage is too high
- (viii) The input resistance of a common-base (CB) amplifier is  
(a) very high (b) very low  
(c) the same as a CE (d) the same as a CC
- (ix) A small-signal amplifier  
(a) uses only a small portion of its load line (b) always has  $V_{out}$  in the mV range  
(c) goes into saturation once on each input cycle (d) is always a CE amplifier
- (x) The channel of a JFET is between the  
(a) gate and drain (b) drain and source  
(c) gate and source (d) input and output



**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

**Q.2. Write short answers of the following questions: (2×10 = 20)**

- i. What is peak reverse voltage (PRV)?
- ii. Draw the circuit diagram of a voltage doubler circuit.
- iii. Define the terms  $h_{ic}$  and  $h_{fe}$ .
- iv. If  $h_{fe} = 60$  and  $I_C = 15\text{mA}$ , what is the value of  $I_B$  and  $I_E$ ?
- v. What do you mean by the term *transconductance*?
- vi. What is the cause of reverse saturation current?
- vii. Why the common collector circuit called an emitter follower?
- viii. What bias conditions must exist for a transistor to operate as an amplifier?
- ix. Write down the role of input coupling capacitor in a transistor amplifier?
- x. What are two famous modes of operation for a MOSFET?

**Q.3:** (a) Explain what the barrier potential is and how it is created in a *pn* junction?  
(b) Discuss the circuit operation of a positive biased diode clipper and draw its output voltage waveform. (6, 4)

**Q.4:** (a) Draw the circuit for the common-emitter (CE) transistor amplifier, and derive expressions for its *Current Gain*, and the *Voltage Gain*.  
(b) Trace the circuit diagram of a common-emitter (CE) self biased circuit and discuss its circuit operation. (6, 4)

**Q.5:** (a) Explain the construction, symbol, working and characteristics of *p-channel* JFET.  
(b) What is the construction difference between a *JFET* and *MOSFET*? (7, 3)