

# Bihar Engineering University, Patna

## B.Tech 3<sup>rd</sup> Semester Examination, 2023

Course: B.Tech

Code: 100302

Subject: Analog Electronic Circuits

Time: 03 Hours

Full Marks: 70

### Instructions:-

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

### Q.1 Answer the following questions (any seven only):

[2 x 7 = 14]

- (a) Draw the pn junction diode VI characteristics.
- (b) Mention the advantages of Full Wave Rectifier.
- (c) What are the different configurations of BJT?
- (d) What is stability factor?
- (e) What is MOSFET? Classify the types of MOSFET.
- (f) What is meant by pinchoff voltage?
- (g) Define an operational amplifier.
- (h) Define Slew rate.
- (i) Mention some of the non-linear applications of op – amp.
- (j) List the features of instrumentation amplifier.

### Q.2 (a) What is a PN Junction? Explain the formation of depletion layer in a PN junction.

[7]

- (b) Draw the circuit diagram of half wave rectifier and explain its operation with the help of waveforms.

[7]

### Q.3 (a) If the base current in a transistor is $20\mu\text{A}$ when the emitter current is $6.4\text{mA}$ , what are the values of $\alpha$ and $\beta$ ? Also calculate the collector current.

[7]

- (b) Why hybrid model is used for the analysis of BJT amplifier at low frequencies? Draw the hybrid model for CE transistor and derive the parameters.

[7]

### Q.4 (a) Draw and explain the small signal model of FET at low frequency.

[7]

- (b) With the help of neat diagram, explain the operation and characteristics of n-channel enhancement type MOSFET.

[7]

### Q.5 (a) What are the factors that affect the frequency stability of an oscillator? How frequency stability can be improved in oscillators.

[7]

- (b) Compare different configurations of differential amplifier.

[7]

### Q.6 (a) Write the design steps of the first order low pass filter and draw its circuit.

[7]

- (b) With the help of neat and clear sketch, explain the working of a MOS transistor as a switch.

[7]

### Q.7 Explain the basic building block diagram of an op-amp. Write short note on input bias current, output bias current, slew rate and output offset voltage of an op-amp.

[14]

### Q.8 (a) Explain the working of series clipping circuit to clip the input sinusoidal signal above reference level. Draw the waveforms and transfer characteristics.

[7]

- (b) Compare BJT and FET on different parameters.

[7]

### Q.9 (a) Write Short notes on (i) Zero Crossing Detector (ii) Precision Rectifier

[7]

- (b) Explain the function of Square-wave and triangular –wave generators.

[7]