22216

Seat No.

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any FIVE of the following:**   **10**

a) Sketch energy band diagram of insulator and semiconductor.

b) State function of 'Gate', 'Source' and 'Drain' terminals of FET.

c) Sketch symbol of NPN and PNP transistor.

d) List out any two applications of FET.

e) Define the term 'Voltage Regulation'

f) Draw the circuit diagram of transistorised series voltage regulator.

g) Define the term 'knee voltage' of P-N junction diode.

Marks

2. **Attempt any <u>THREE</u> of the following:** **12**

   a) Compare P-N junction diode with zener diode on the basis of:

     (i) Symbol

     (ii) Type of reverse break down

     (iii) V. I characteristic

     (iv) Material.

   b) Define following terms related to BJT:

     (i) Current gain in CE configuration (Beta)

     (ii) Quiescent point

     (iii) Stability factor

     (iv) Dynamic input resistance of CE configuration

   c) Sketch and explain zener diode as voltage regulator.

   d) Derive relationship between alpha (α) and beta (β) of BJT.

3. **Attempt any <u>THREE</u> of the following:** **12**

   a) Sketch circuit diagram of bridge rectifier with π filter.

   b) Compare half wave rectifier with full wave (centre tapped) rectifier on the basis of:

     (i) No. of required diodes

     (ii) Rectifier efficiency

     (iii) Ripple factor

     (iv) Transformer utilization factor.

   c) Derive relationship between transconductance (g_m), amplification factor (μ) and drain resistance (γd) of FET.

   d) Sketch transistor shunt voltage regulator and explain how voltage regulation is done.

Marks

4. Attempt any THREE of the following: 12

a) Define the term 'clipper circuit'. State classification of clipper circuit.

b) Sketch the input and output characteristics of CB configuration. Label it.

c) For common base (CB) configuration of BJT if $I_E = 2$ mA and $I_B = 20$ µA. Calculate value of I_C and current gain α (Alpha).

d) Compare BJT with FET on the basis of:

   (i) Symbol

   (ii) Input impedance

   (iii) Thermal stability

   (iv) Charge carrier polarity.

e) Sketch block diagram of D.C regulated power supply and sketch waveform at each stage.

5. Attempt any TWO of the following: 12

a) With neat constructional diagram explain operation of Depletion type N-channel MOSFET.

b) Sketch positive clamper circuit diagram to clamp output at +7V for input sine signal with $V_{pp} = 20$ V. Sketch input and output waveform.

c) Sketch V-I characteristics of P-N junction diode. Calculate static forward resistance if applied forward bias voltage is 0.8 V and corresponding diode current is 150 mA.

Marks

6. **Attempt any <u>TWO</u> of the following:** **12**

a) Suggest proper diode for following applications:

(i) For optical communication as a source

(ii) For rectifier circuit

(iii) For voltage regulation

(iv) For clipper circuit

(v) For light intensity meter

(vi) For meter protection circuit.

b) Explain with circuit diagram voltage divider biasing method for BJT.

c) Draw the circuit diagrams and output waveforms of series inductor filter, LC filter and π filter.

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