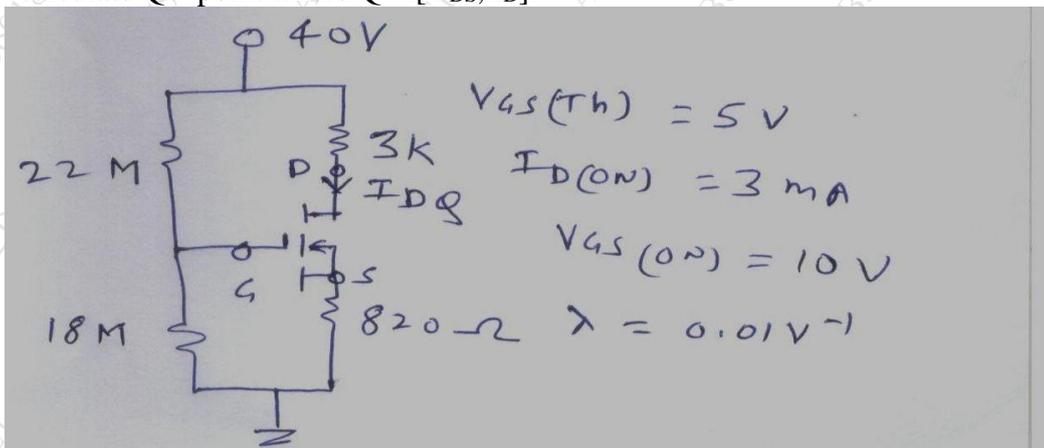


Duration: 3hrs

[Max Marks: 80]

- N.B. : (1) Question No 1 is Compulsory.  
 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.

- 1 Attempt **any FOUR** [20]
  - a Explain the reverse bias mode of operation of the P-N junction diode with neat sketch.
  - b Explain the operation of the photo diode with neat sketch.
  - c Compare or differentiate between clipper & clamper circuits.
  - d Derive an expression for the ripple factor ( $\gamma$ ) of a full wave bridge type rectifier.
  - e Explain the operation of inductor (L) type filter with neat sketch.
- 2 a Describe the working or operation of a center-tapped type full wave rectifier [10]  
 with a neat sketch. Draw the input voltage & output voltage waveforms.  
 b For any full wave rectifier, derive the output voltage expressions for AC output [10]  
 voltage ( $V_{rms}$ ) & DC or average ( $V_{dc}$ ) output voltage.
- 3 a With appropriate mathematical analysis, explain the effect of temperature on the [10]  
 P-N junction diode V-I characteristics.  
 b Explain with the help of neat diagram explain the working of light emitting [10]  
 diode (LED).
- 4 a Compare Zener breakdown & avalanche breakdown. Describe the reverse bias [10]  
 characteristics of Zener diode with neat sketch.  
 b What are memristors ? Explain the operating principle, construction & working [10]  
 of memristors with a neat sketch.
- 5 a Compare different biasing circuits of a bipolar junction transistor (BJT). [10]  
 b Draw circuit diagram and explain the operation of different biasing circuits used [10]  
 for D-MOSFET.
- 6 a For the voltage divider bias circuit shown below using N-channel E-MOSFET [10]  
 calculate Q – point where  $Q = [V_{DS}, I_D]$ .



- b For small signal amplifier in common emitter (CE) BJT configuration using [10]  
 voltage divider biasing perform small signal (AC) analysis using the hybrid –  $\pi$   
 model.

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