

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 Why is the JFET called as a square law device ?
 - b Write a short note on single electron transistors (SET). Include suitable neat sketches wherever necessary.
 - c With neat sketch describe operation of the inductor (L) filter with appropriate waveforms.
 - d Explain the concept of DC load line & Q – Point in bipolar junction transistor (BJT).
 - e Describe combinational clipper circuits with neat diagram & transfer characteristics.
- 2 a Describe the working or operation of a bridge type full wave rectifier with a neat sketch. Draw the output voltage waveforms & mention the expression for DC or average output voltage (V_{dc}) [10]
- b With a neat sketch, explain the Zener diode as a voltage regulator. Describe its operation for both, varying load resistance with a constant DC supply voltage & a varying DC supply voltage with a constant load resistance. [10]
- 3 a Explain how a PN junction is formed with a neat diagram. [10]
- b Explain with the help of neat diagram construction, working & VI characteristics of n channel depletion MOSFET. [10]
- 4 a Draw a circuit diagram of common source (CS) E-MOSFET amplifier, derive equation of voltage gain (A_v), input resistance (R_i) & output resistance (R_o)? [10]
- b For small signal amplifier in common emitter (CE) BJT configuration using voltage divider biasing perform small signal (AC) analysis using the hybrid – π model. [10]

- 5 a With a neat sketch, write a short note on solar cell describing its structure or construction, working & V-I characteristics. Mention few real-life applications of solar cells [10]
- b Draw circuit diagram and explain the operation of different biasing circuits used for D-MOSFET. [10]
- 6 a Explain construction and working principle of Memristor. [10]
- b Draw all the different biasing circuits of BJT. Derive the expression of stability factor (SI) for the voltage divider biasing circuit. [10]
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